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CRITERIA FOR
ACCREDITATION OF ENGINEERING DEGREE PROGRAMMES MEETING STAGE-1 OF CRPE REGISTRATION REQUIREMENTS

Document Reference: EAB-A03-P
Short Title: Accreditation Criteria for BEng (Hons)/BSc (Eng)(Hons) type Programmes

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Purpose of this Document

This document spells out the accreditation criteria for programmes in the three stages of their lifecycle: at planning stage, at halfway point, and at the end of the programme.

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1.   Purpose of the Document

1.1   This document defines the criteria for accreditation of BEng(Hons) / BSc(Eng.)(Hons) engineering degree programmes meeting the education standard requirements for Stage-1 (Eligibility: *Approval of Qualifications*) of the registration process with the Council of Registered Professional Engineers (CRPE), i.e. for issue of a Certificate of Eligibility to engage in the practice of engineering with the aim of acquiring the Training/Experience prescribed for Stage-2 (*Registration as a Registered Professional Engineer*) in Mauritius.

The accreditation criteria are the generic set of requirements that, when fully met by a programme, indicate that the programme is of adequate quality, including the curriculum, learning outcomes achieved (i.e., meeting the Graduate Attributes), educational process, resourcing and sustainability for the intended purpose.

EAB, through these criteria, seeks to conform with the International Engineering Alliance (IEA) standards in terms of accreditation processes and assessment of the Washington Accord Graduate Attributes. The evaluation process is based on the criteria for accreditation, including the Graduate Attributes (reproduced in document **EAB-A02-P: *Qualification Standard for Bachelor of Engineering (Hons)/ Bachelor of Science (Hons) in Engineering Programmes***) adopted by the Washington Accord signatories. Accreditation criteria are defined for three stages in the lifecycle of a programme: planning (Initial Evaluation), students at halfway point (Desktop Evaluation), and producing graduates (Accreditation).

- Section 3 defines the criteria that must be satisfied by an existing programme that has produced a cohort of graduates; these comprise:
  - Sub-section 3.1 **CRITERION-1**: Programme Educational Objectives and Programme Structure
  - Sub-section 3.2 **CRITERION-2**: Assessment of Graduate Attributes and Assessment System
  - Sub-section 3.3 **CRITERION-3**: Teaching and Learning and Quality Assurance Processes
  - Sub-section 3.4 **CRITERION-4**: Resourcing and Sustainability
- Section 4 concerns **CRITERION- 5**: the response to previously identified Deficiencies and Concerns, and the Capacity for Improvement and Programme Review
- Section 5 defines criteria for Provisional Accreditation of developing programmes that have not yet produced a Cohort of Graduates, but which have achieved at least one-half of the academic credit units or more for the programme.

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- Section 6 defines the manner in which the criteria are applied to a proposed new programme submitted for Initial Evaluation. Proposed and developing programmes must be planned to meet the accreditation criteria.
- Section 7 defines criteria for Programmes Submitted for Desktop Evaluation.

1.2   Chart EAB-A03-P

The following Chart (EAB-A03-P) illustrates the documents that define the EAB Engineering Programme Accreditation System and the linkage between them.
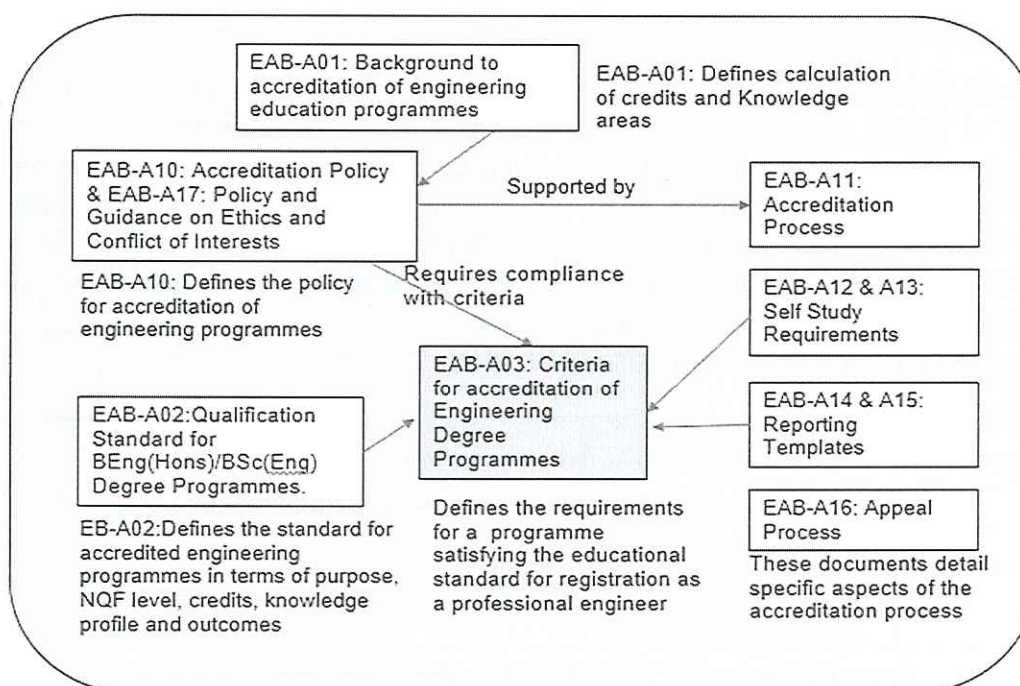
Chart EAB-A03

2.   The International Engineering Alliance (IEA) Criteria for accredited programmes

2.1   The following extracts from Schedule B1 (Section 2) of the Rules and Procedures of the IEA are reproduced hereunder to give programme providers (the HEIs) a quick insight into the criteria that EAB has adopted and defined herein for accrediting engineering degree programme meeting the Qualification Standard defined in document **EAB-02-P**:

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"The accreditation agency's criteria for accreditation include requirements for:

    a) Programme outcomes that are consistent with the purpose of the programme
    b) A curriculum providing a broad basis for engineering practice;
    c) A suitable environment to deliver the programme;
    d) Adequate leadership for the programme;
    e) Suitably qualified engineering practitioners teaching in the programme;
    f) Appropriate entry and progression standards; and
    g) Adequate human, physical and financial resources for the programme."

2.2 Definitions of Terms

Definitions of terms used in this document are given in document **EAB-A01-P:** *Background to Accreditation of Engineering Degree Programmes*.

3. Accreditation Criteria

EAB recognises that HEIs may be under obligations to implement the policies of the State, their owners or shareholders, as may be the case, and thus may have socio-economic or business objectives to achieve. It is expected that the respective mission statements of the HEIs will highlight their institutional purposes which will include delivery of a quality assured engineering education. The criteria defined herein address the latter objectives.

EAB will consider any request from an HEI for evaluation of a programme against criteria defined herein subject to the following:

(a) For an HEI established in Mauritius, the Institution offering the degree programme has received authorisation from the Education Authorities to establish itself and offer programmes which include engineering; for overseas HEIs requesting accreditation HEIs should refer to the document **EAB-A10-P:** *Accreditation Policy on Engineering Degree Programmes.*

(b) The request should concern only programmes of studies and not the establishment.

(c) The HEI should have delivered at least one cohort of graduates who have completed the programme proposed for accreditation.

(d) For programmes not satisfying the requirement (c), EAB will consider provisional accreditation in accordance with the criteria set out in Section 5 of this document.

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The Accreditation Criteria against which EAB will accredit engineering degree programmes satisfying the requirements at Section 2.1, are defined herein under four CRITERIA as follows:

CRITERION-1: Programme Educational Objectives and Programme Structure.

CRITERION-2: Assessment of Graduate Attributes and Assessment System.

CRITERION-3: Teaching and Learning and Quality Assurance Processes.

CRITERION-4: Resourcing and Sustainability.

It is the responsibility of the institution seeking accreditation of an engineering programme to demonstrate clearly that the programme meets all the criteria prescribed in Sections 3.1 to 3.4. The Institution is also responsible for documenting that the programme satisfies each CRITERION. It should periodically:

(1) review the strengths and weaknesses of the programme and

(2) seek to continually improve the standards and quality and

(3) to address any shortcoming identified with respect to the standards, i.e., any aspect falling short of the standards set by the accreditation criteria. Sections 4 to 7 contain provisions that apply to programmes in different stages of their cycle.

3.1 CRITERION-1: Programme Educational Objectives and Programme Structure

3.1A Programme Educational Objectives (PEOs).

(a) (i) For each programme seeking accreditation, there must have been published on the HEI's website PEOs that are consistent with

- o the mission of the institution,
- o the needs of the programme's various constituencies, and
- o the Programme Outcomes;

(ii) The programme must state the primary purpose of meeting the educational requirements for its identified engineering role;

(iii) There should also be in place a system to continuously re-evaluate these objectives.

(iv) The information must be readily and easily accessible and frequently updated, based on the needs of the programme's internal and external constituencies.

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(v) The programme must demonstrate industry participation in the development of the curriculum to ensure it is relevant, regularly updated, and meets the needs of the industry, particularly in areas experiencing rapid changes. An engineering programme should have an Industry Advisory Committee which meets at least once yearly with the department to provide feedback.

(b) The EAB expects some degree of commonality between the Programme's Educational Objectives and the purpose of the qualifications as described in Section 9 of Document **EAB-A02-P**.

3.1B.   Credits, Knowledge Profile, and Coherent Design

The programme should conform to the specific requisites of the BEng standard set down in document **EAB-A02-P**, particularly with regards to:

3.1B1. Total (minimum) Accreditation Credits specified.

The credit computation includes both contact and non-contact time, i.e., classroom and out-of-class learning time:

560 Accreditation Credit Units (ACU) over four (4) academic years or eight (8) academic semesters.

See document **EAB-A01-P.**

3.1B2. The Knowledge Areas

An accredited engineering degree will conform to the minimum credit quanta prescribed in document **EAB-A02-P**, (reproduced hereunder) in respect of the Mathematical Sciences, the Natural sciences, Engineering Sciences, Design & Synthesis, and the Complementary Studies, in addition to satisfying Section 3.1B1.

Mathematical Sciences	**56**
Natural Sciences	**56**
Engineering Sciences	**180**
Design and Synthesis	**72**
Complementary Studies	**56**

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3.1B3. Complementary Studies

In addition to the foregoing requirements (in sections 3.1B1 & 2), the programme design must ensure learning opportunities for students in the other areas specified in Section 10.3 of document **EAB-A02-P**, which are relevant to the practice of engineering. These include, inter-alia, the following key areas:

- engineering economics,
- management,
- the impact of technology on society,
- effective communication (oral and written), as well as
- the humanities and social sciences.

[see Appendix A.2 of document **EAB-A01-P** for *definition/description* of the Knowledge Areas.]

3.1B4. A coherent core appropriate to the purpose of the programme defined in that standard.

The programme must have a coherent core of mathematics, natural sciences and engineering fundamentals that prepares students for a career as well as provide a viable platform for further studies and lifelong learning. No specific courses are prescribed, but a key requirement will be a programme design and structure that ensures that each of the Graduate Attributes or learning outcomes can be attained.

3.1B5. The Specialist study component.

The coherent core must enable development in a traditional discipline or in an emerging field. This requirement may be satisfied through either compulsory or elective credits.

3.1B6. A minimum period of Industrial Training/Work Based Learning

(a) Industrial training may be related to attainment of a Graduate Attribute. A continuous period of Industrial Training (work-based learning) of a minimum of 8 weeks must be included in the curriculum and completed before the final semester.

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(b) However, as provided for in Section 10.4.3 of document **EAB-A02-P**, the quantum of credits may only be assigned if the training is quality assured by the HEI to ensure achievement of stipulated objectives, and the following applies:

(i) The learning objectives and outcomes to be achieved are defined and accepted by the workplace provider.

Note: The Graduate Attributes defined for the qualification include those of Work-Based Learning, where applicable.

(ii) Effective placement of students in the workplace and ongoing communication take place.

(iii) Suitably qualified mentors who are technically competent in the discipline and the art of mentoring are available in the workplace.

(iv) Students are mentored in the workplace, and their performance is monitored and recorded in relation to objectives.

(v) The student's performance and competence are assessed through a rigorous process against defined Graduate Attributes; this assessment is the responsibility of the academic provider.

(vi) The process is documented and presented in the accreditation process, which should also document the system in place to monitor and assess the industrial training.

3.1B7. Laboratory Experience

(i) This is an essential component of the curriculum aimed at integrating theory with practice through exposure to laboratory work and professional engineering practice. Laboratory work should be designed to complement learning through theory and should be supervised by academic staff members who are registered professional engineers.

(ii) Application of computers and appropriate laboratory experience must be an integral component of the engineering curriculum.

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(iii) Instruction in safety procedures must be included in preparation of student's laboratory and field experience.

(iv) Assignments must include a statement as to the outcomes to be attained through the laboratory work, assigned to a group of students; the assessment reports must show that the required outcomes have been achieved by each of the students within the group.

3.1B8. An Integrated Design (Capstone) Project.

(i) The Integrated Design Project should conform to the specifications defined in Section 10.4.5.1 of document **EAB-A02-P.**

(ii) As specified therein, the Project may be assigned on its own, distinct from a purely Research Oriented Project, or shall be designed as a multifaceted assignment intended to deliver a culminating "capstone" academic and intellectual experience to permit attainment of several Graduate Attributes.

3.1B9. A Research (Research-Oriented) Project

As stated in Section 10.4.5.2 of document **EAB-A02-P**, the HEI may, if it considers appropriate to assess the research component in a separate Research Project, include such a requirement (for a maximum of 48 Accreditation Credit Units).

3.1B10. The Programme Designation

A designation and qualifier consistent with the programme's purpose and engineering sciences content as stated in Section 6 of document **EAB-A02-P**. For example, for this purpose, System Engineering or Computer Engineering are acceptable qualifiers.

3.1B11. Explicit rules of combination and progression.

The requirements for and process of admission of students to the programme must be explicit and published. Likewise, the policies and processes for credit transfer and exemption in relation to the programme or to any of its modules.

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Where the policies result in a requirement for extra support to be provided to the students to enhance and ensure their potential for attainment of some specific or all the Graduate Attributes, the learning necessitated shall not be computed into the minimum credits included under sections 3.1B1 and 3.1B2.

3.1B12. Explicit horizontal and vertical articulation options

Applicable policies and rules for moving at the same levels or to another between programmes must be explained and justified stated. The students concerned by these rules must still satisfy the provisions under sections 3.1B1 and 3.1B2.

3.2 CRITERION-2: Assessment of Graduate Attributes and Assessment System

3.2.1 Programme Outcomes and Graduate Attributes

EAB has adopted the set of Graduates Attributes (GAs) published by the International Engineering Alliance approved and adopted by the Washington Accord signatories as the basis of Learning Outcomes. These are reproduced under Sections 13.5.1 to 13.5.11 of document **EAB-A02-P.**

The programme must demonstrate that, by the time of graduation, the students have attained each and every one of the set of Graduate Attributes published by the EAB.

Where the HEI has published its own set of Programme Outcomes, the HEI must:

(i)   show how these Programme Outcomes relate to the Programme Educational Objectives described in Section 3.1 (CRITERION-1), and

(ii) demonstrate by mapping the Programme Outcomes against the EAB Graduate Attributes that the Programme Outcomes fully encompass every one of the Graduate Attributes and are consistent with them.

3.2.2 Every Graduate Attribute to be assessed.

(a) The assessment process within the programme must:

1. Ensure that all graduates satisfy every Graduate Attribute defined in the standard (Section 13 of document **EAB-A02-P**).

2. Use a documented set of assessment criteria, including indicators, and processes that, taken together, demonstrate that the attributes are satisfied at the level indicated by the range statement, applicable to that Graduate Attribute.

3. Establish and document the process of measuring, assessing, and evaluating the degree of achievement of Programme Outcomes by the students. The results of this assessment

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process shall be applied for continuous improvement of the programme required in Section 3.2.3, and

(b) HEI must map the Programme Outcomes of each course/module in the academic curriculum against the Graduate Attributes, indicating the specific module and the academic cycle (or semester) in which each attribute is developed and explicitly addressed, and the means of assessment and the criteria for satisfaction of each outcome or attribute and the required level at assessment.

(c) HEI must ensure that the curriculum contains comprehensive information on all the modules in the degree programme, including the syllabus, the module Graduate Attribute(s), the methodology of teaching and learning, credit allocation, the method of module assessment, and any pre-requisite or co-requisite modules or other programme requirements.

3.2.3 Continuous Improvement

(i) There must be a long-term commitment on the part of the HEI to quality improvement of the engineering education it delivers.

(ii) The HEI must have in place appropriate quality assurance mechanisms for,
- assuring quality and improving the same,
- putting in place a process to ensure continuous improvement, and
- thirdly, putting in place adequate arrangements for planning, development, delivery and review of engineering programmes together.

(iii) The system must oversee and monitor the overall achievement of both the Programme Educational Objectives as well as the Graduate Attributes.

(iv) Academic staff development programme must also include among its objectives the achievement of the sustainability and quality improvement of the programme.

(v) The Faculty must have recourse to an Industry Advisory Committee comprising stakeholders from the industry as well as academics to conduct review of the curriculum towards ensuring it remains relevant and meets the needs of the industry, while meeting the objectives at item (iii) above and equipping the graduates for facing the challenges represented by the UN Sustainable Development Goals (UNSDGs).

(vi) The programme must demonstrate how feedback from industry and students is used to improve the curriculum and its delivery.

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(vii) The Faculty should collect data on status of graduates periodically (at least once every year) to ascertain students' progress post-graduation.

3.3 CRITERION-3: Teaching and Learning and Quality Assurance Processes

The programme must provide an effective teaching and learning process towards the achievement of the outcomes that is evidenced by the following:

3.3.1 Documentation

The content, learning objectives, expected outcomes and method of assessment for each module of the programme are defined and documented, and are available to staff and students.

3.3.2 Course Modules, Assessment Method, and Level of Achievement.

(i) For each Graduate Attribute, the information provided in Section 3.3.1 clarifies the modules in which each Graduate Attribute assessment takes place, the method of assessing each Graduate Attribute, the level of achievement required of the students and the consequence for the student of not achieving the graduate attribute.

(ii) The relevant information must also clarify if the achievement of any one or more outcomes will be demonstrated through a solution of complex problems, which may require individual research work, incorporated in the Integrated Design (capstone) design project: Section 3.1B8 or in the Research-Oriented Project: Section 3.1B9.

3.3.3 Teaching and Learning Strategy, Methodology for Students meeting Admission Criteria.

(i) The teaching and learning strategy and methodology are designed to achieve the outcomes of the programme *with students who meet the stated admission criteria*, viz, demonstrating their capacity to acquire the knowledge, understanding, skills and abilities specified in the graduate attributes.

(ii) The modes of teaching used, such as lecture, tutorial, seminar, project, teacher-student interaction outside class, peer-group discussion, or a combination of two or more of these, must be designed and implemented so as to facilitate and encourage learning.

3.3.4 Learning Opportunities to facilitate acquisition of Knowledge and Skills.

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Suitable Learning opportunities are provided to facilitate the acquisition of knowledge and skills specified in the programme outcomes, including:

- extra- and co-curricular activities be facilitated in order to hone personal skills and general wellness of the students.
- competitions, sports and campus activities towards character building.
- industrial experience via internships or design projects conducted by professional engineers and faculty members with industrial experience.

The purpose of the industrial attachment, section 3.1B6, should be clearly articulated and the learning outcomes to be achieved along with their method of assessment must be spelt out. The organisation of the same should be entrusted to a departmental unit to facilitate this aspect of the programme and monitor students' progress, towards taking corrective actions where needed.

3.3.5 Coordination of Programme.

The programme is effectively coordinated by full-time academic staff.

3.3.6 Development of Independent Learning Aptitudes

The learning process encourages independent learning attitudes and abilities, and an appropriate mix and balance between different teaching and learning methods is maintained to encourage active participation of students in the teaching and learning process.

3.3.7 Monitoring of Learning Progress

The learning progress of students is appropriately monitored and where necessary, academic development support is provided to students through structured and monitored interventions.

3.3.8 Feedback to Students

(i) Assessment practices and procedures provide feedback to students at regular intervals.

(ii) Students should have an opportunity to redeem work that is assessed as being below standard, provided this can be done without compromising output standards.

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3.3.9 Internal Moderation Process

An internal process including moderation ensures that all forms of summative assessment of student performance within programme are effective, fair, rigorous and address the stated learning objectives and outcomes.

3.3.10 External Moderation and Assessment of Graduate Attributes

Graduate Attributes assessment is subject to external moderation.

3.3.11 Monitoring of Teaching and Learning Process

(i)   The teaching and learning process is monitored and evaluated by an effective quality assurance process that supports continuous improvement. (See Section 3.2.3).

(ii) The monitoring and evaluation must include the academic calendar, the number of instructional days and contact hours per week, are maximally conducive to teaching and learning.

3.3.12 Monitoring of Student Progress

(i)   Student retention and throughput rates are monitored, and measures are taken to identify and address the factors, including students' workload, that adversely affects overall throughput and throughput of distinct groups.

(ii) The educational institution must provide student support services including counselling. In addition to the course-specific guidance, designated student counsellors should advise and counsel students on academic and career matters.

3.4 CRITERION-4: Resourcing and Sustainability

The programme must be adequately planned, resourced, led and executed to ensure that it is sustainable over the period of accreditation. This is evidenced by the following:

3.4.1 Students (as Resources)

(i)   The level of selection of students is commensurate with the programme's academic requirements and defined by the HEI consistent with the demands of the curriculum, the preparedness of students at intake and expected progression.

(ii) The policies and procedures for student admission and transfer to allow alternative educational pathways, including the grant of exemptions from requirements on grounds of credits earned elsewhere, should be clearly spelt out and transparent.

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(iii)   The number of students admitted takes into account the capacity of the programme to offer good quality education and to meet professional requirements.

(iv)   The selection and admission of students are linked to the Institution's equity and diversity plans.

3.4.2 Academic Staff (as resources)

3.4.2(1).   Professional and Technical Competence - planning and management of assessment

(i)   The staff members responsible for leadership, planning and management of assessment of the Graduate Attributes are professionally and technically competent in the respective disciplines. Registration with CRPE as Professional Engineers is the approved norm for professional standing. Opportunities must be available to staff to achieve professional registration.

(ii)   The authority and responsibility to steer and run the programme must lie with members of the Faculty. This includes the authority over evaluation, assessment processes and decisions on programme involvement.

3.4.2(2). Qualification, assessment competence, knowledge and teaching experience

(i)   The academic staff responsible for the programmes are suitably qualified, have assessment competence and possess sufficient and relevant knowledge and teaching experience to implement the outcome-based approach to education.

(ii)   The academic staff have the range of expertise and abilities to teach at specialist and fundamental level that is required by the programme and are expected to hold a post-graduate degree at least for teaching the core and specialist modules.

(iii)   Staff have research profiles relevant to the programme.

(iv)   Staff teaching modules that are primarily design in content are qualified to teach the subject matter by virtue of education and experience or professional registration.

(v)   Staff, whether on full time or part time basis, supervising the Integrated Design (Capstone) project should have relevant educational qualifications, and preferably, a professional registration.

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(vi) New staff without sufficient teaching experience receive training on teaching methodology.

(vii) All staff receive training on outcomes assessment to enable them to set appropriate course outcomes and can apply a combination of direct and indirect assessment tools to determine the level of outcomes achievement.

3.4.2(3) The number of academic and support staff ~~is sufficient for the programme~~

(i)   The number of academic and support staff is sufficient for the programme.

(ii)   The academic staff should include at least one (1) full-time member holding professional engineering registration with CRPE or a Washington Accord signatory. Staff teaching engineering design or supervising Integrated Design projects have industry experience or are engaged in engineering consultancy if not holding a professional registration.

(iii) The academic strength should be adequate to permit members to engage in activities other than teaching, e.g., on research and for the purposes of professional development and interaction with industrial and professional practitioners.

(iv)   The full-time equivalent academic staff-to-student ratio shall ideally be 1:20 or better to enable an effective delivery of teaching and learning while at the same time enabling faculty-student interaction.

(v)   HEIs may engage part-time staff with acceptable professional qualifications in the related engineering fields.

3.4.2(4) Faculty Strategy for Staff Recruitment, Development and Retention

(i)   Faculty has an academic staff recruitment, development and retention plan in place and that plan is aligned with the diversity plan of the HEI.

(ii)   Staff are involved in relevant professional societies.

(iii) HEIs provide opportunities to academic staff to acquire the industry experience prescribed for professional registration.

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(iv) Opportunities for the development of support staff should also be provided; this can be achieved through further education as well as exposure to the industry.

3.4.3.Research Opportunities and Students' Facilities

3.4.3(1). Research Opportunities

(i) The faculty must support, encourage and maintain Research and Development activities by their academic staff and publish their work as motivation for their students to take up research and as well as attracting research projects from the industry and obtaining research grants from funding agencies.

(ii) Appropriate research development opportunities and programmes for staff members are consistent with the requirements of Higher Educational Authorities, if applicable and aligned with the Institution's mission.

(iii) Appropriate research development opportunities and programmes for staff members are in place.

(iv) Staff must have research profiles relevant to the programme.

3.4.3(2). Laboratory and Library Facilities

(i) Office, teaching and laboratory accommodation and equipment are adequate to provide a learning environment conducive to the fulfilment of programme objectives.

(ii) Computing and information technology support systems and library services are in place to support the scholarly activities of both faculty and students, including books, journals, and other resources.

(iii) There must be adequate facilities to allow students to participate in extra-curricular activities, to meet students' social and cultural needs, to foster faculty-student interaction, and to create a climate that encourages professional development and professional activities.

(iv) Safety measures are in place in the teaching environment and in student laboratories.

3.4.4. Institutional support and Financial Resources

(a) The HEI should have a commitment to continuous and long-term quality engineering education.

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(b) There is a designated staff or office for handling requests and issues related to Institutional Support and funding, including mechanisms in place for reviewing and prioritising expenditure, to ensure removal of obstacles to achievement of Graduate Attributes.

(c) The Faculty has sufficient autonomy to ensure timely procurement of financial support and facilities and logistics to meet contingencies and requirements for achieving all Graduates Attributes.

(d) Institutional support and financial resources are sufficient to ensure programme quality and continuity and sustainability, including with support from external bodies, if available, for:

(i) Allocation of funds and necessary resources to the school or department where the programme is located and the appropriate utilisation of these resources by the school or department form part of the institutional planning and quality assurance processes

(ii) Budgetary allocations for the programme are adequate and are effectively utilised to meet the following:
- o Staffing budgets and resulting packages to fulfill its mission, including for attracting and retaining a well-qualified staff, and to provide them with opportunities for continued development and career growth,
- o Laboratory equipment requirements,
- o Computing and networking,
- o Operating expenses, including provision for the acquisition, repair, maintenance and replacement of physical facilities and equipment,
- o Library facilities, and
- o Work based learning as applicable

(e) There are arrangements in place within the Faculty for reviewing infrastructure needs to cater for increased students' intake, new courses, additional programmes, or new laboratories, libraries, IT and digital facilities, or extra-curricular facilities.

3.4.5. Academic Development of Students

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3.4.5(1) Academic development programmes may be present in various forms: foundational, that is, before entry into the main programme, or extended, that is, integrated with the main programme.

Where academic development programmes for students are either offered or are associated with the programme:

o the programmes are designed to match the students' state of preparation and progression towards the main programme;

o staff responsible for the academic development programmes are adequately qualified, experienced and skilled;

o funding for the programmes is adequate;

o realistic criteria are applied for acceptance of students into the academic development programmes; and

o the academic development programmes are quality assured.

3.4.5(2) Where academic support is provided for students not meeting the prescribed entry requirements to the programme, such learning by the students shall not be comprised within the minimum Accreditation Credits for the knowledge areas covered under such academic support.

3.4.6. Governance and Impact

(i) Studies on the effectiveness of the programme in meeting its objectives are undertaken at regular intervals. The results are used to improve programme design, delivery and resourcing and for staff development and student support where necessary.

(ii) The governance structure of the programme must clearly assign authority and responsibility for the formulation and implementation of policies that enable the programme to fulfill its mission.

(iii) The organization of the HEI and all decision-making processes of the senior management, the faculty, the department and, if any, other sub-units, within themselves and with each other, must be organized in a way so as to support the achievement of programme educational objectives and programme outcomes.

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3.4.7 Continuous Improvement

The HEI must ensure that resources are made available for the operation and implementation of mechanisms for assuring and improving its quality to demonstrate the continual improvement process as required in Section 3.2.3.

4.   CRITERION- 5. Response to Previously Identified Deficiencies and Concerns, Capacity for Improvement and Programme Review

4.1.   Follow-up on previous visit

In the case of deficiencies and concerns identified at the previous visit, such identified deficiencies and concerns must be adequately addressed.

Depending on the decision of the previous visit, HEI to provide statements in regard to the following:

(a) In the case of an Interim Report, Interim Visit or Final Visit:
- o   A statement indicating how the deficiencies identified at the previous visit have been remedied;
- o   A statement of major changes to the programme, which are unrelated to the additional deficiencies that must be remedied

(b) If concerns were expressed in the decision letter of the previous visit:
- o   the provider's response to these concerns must be detailed.

5.   Criteria for Provisional Accreditation of Developing Programmes that Have Not Yet Produced a Cohort of Graduates

5.1   This applies to programmes that have achieved *at least one-half of the academic credit units or more* for the programme and *have not yet delivered a cohort of graduates.*

5.2.   To be granted provisional accreditation, the programme must:
- 1:   Satisfy CRITERION -1 as demonstrated by the implemented part of the programme and as documented by the part of the programme not yet implemented;

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2:    Present a detailed assessment plan that demonstrates how the programme intends satisfying CRITERION-2;

3:    Present evidence of teaching and learning effectiveness against the sub-criteria of CRITERION-3:

    (a) drawn from the part of the programme already implemented and

    (b) in the form of a plan for achieving effective teaching and learning for the remainder of the programme;

4:    Present evidence of adequate resourcing and sustainability of the programme against the sub-criteria of CRITERION-4. In particular, resources (once-off and ongoing) already available, committed and requested for the programme against the sub-criteria of CRITERION-4 must be adequate.

5:    Demonstrate the effectiveness of measures taken to address concerns raised during the Initial Evaluation as in Item 6 below.

6.   Criteria for New Programmes submitted for Initial Evaluation

6.1. Initial Evaluation:

An Initial Evaluation is defined in Section 5.1 of **document EAB-A10-P** as *"A paper-based evaluation of a proposed programme based on comprehensive planning information. This mechanism is available to HEIs that do not have programmes accredited by EAB for a least one cycle."*

An Initial Evaluation on a new programme considers the extent to which the programme:

1:    Satisfies CRITERION-1, as judged from a fully detailed proposed programme;

2:    Presents a detailed assessment plan that demonstrates how the programme intends satisfying CRITERION-2;

3:    Presents a detailed plan for achieving teaching and learning effectiveness against the sub- criteria of CRITERION-3;

4:    Presents evidence of planning and institutional commitment to the programme and providing resources for both start-up of the programme and on an ongoing basis against CRITERION-4.

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6.2   Simplified Initial Evaluation:

The document **EAB-A10-P** defines "Simplified Initial Evaluation" as *"A simplified paper-based evaluation of a proposed programme based on selected planning information. Available to HEIs that have programmes accredited by EAB for a least one cycle."*

Where a programme qualifies for Simplified Initial Evaluation only CRITERION-1 is considered.

7.   Criteria for Programmes Submitted for Desktop Evaluation

A Desktop Evaluation is defined in Section 5.1 of document **EAB-A10-P** as: *"A comprehensive paper-based evaluation of an existing unaccredited programme that produces graduates. May be required as a precondition to an accreditation visit in the case of providers that do not have programmes accredited by EAB but have completed one accreditation cycle".*

A programme submitted for Desktop Evaluation is judged against Criteria 1 to 4, and 5 if a resubmission is under consideration.

8.   Document Review History

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APPENDIX: The Graduate Attributes

[Note: The Sections Numbering in this Appendix correspond to those of EAB Document EAB-A02]

THE GRADUATE ATTRIBUTES

The text in this document is taken from Section 13 of EAB Document EAB-A02: Qualification Standard for Bachelor of Engineering (Hons) / Bachelor of Science (Hons) in Engineering Degree Programmes.

13.5   The Graduate Attributes

An accredited engineering degree programme must be capable of demonstrating that every one of the students successfully completing the programme of studies is capable, on graduation, of achieving each one of the eleven (11) Graduate Attributes listed hereinafter and identified as

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Graduate Attributes GA1 to GA11, respectively, and will have attained the Knowledge and Attitude Profiles defined in Section 13.6.

13.5.1 Graduate Attribute GA1: Engineering Knowledge: *Breadth, depth and type of knowledge, both theoretical and practical*

Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialisation as specified in Section 13.6 (Knowledge and Attitude Profiles **WK1 to WK4** respectively to develop solutions to complex engineering problems.

13.5.2 Graduate Attribute GA2: Problem Analysis: *Complexity of analysis*

Identify, formulate, research literature and, analyse complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. with holistic considerations for sustainable development*. **Knowledge and Attitude Profile for delivery of GA2**: As for GA1, e.g., WK1 to WK4.

13.5.3 Graduate Attribute GA3: Design and Development of solutions: *Breadth and Uniqueness of Engineering problems, that is, extent to which problems are original and to which solutions have not previously been identified or codified*

Design creative solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate consideration for public health, and safety, whole-life cost, net zero carbon as well as resource, cultural, societal and environmental considerations as required. **Knowledge and Attitude Profile** for delivery of GA3: WK5:

13.5.4 Graduate Attribute GA4: Investigations: *Breadth and Depth of investigations and experimentation*

Conduct investigations of complex engineering problems using research methods including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions; **Knowledge and Attitude Profile** for delivery of GA4: WK8

13.5.5 Graduate Attribute GA5: Tool Usage: *Level of understanding of the appropriateness of technologies and tools.*

Create, select, and apply, and recognise limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems. **Knowledge and Attitude Profile** for delivery of GA5: WK2 and WK6

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13.5.6 Graduate Attribute GA6: The Engineer and the World: *Level of knowledge and responsibility for sustainable development.*

When solving complex engineering problems, analyze and evaluate sustainable development impacts* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment [*Represented by the 17 UN Sustainable Development Goals (UN-SDG)] : **Knowledge and Attitude Profile** for delivery of GA6: WK1, WK5, and WK7

13.5.7   Graduate Attribute GA7: Ethics: *Understanding and level of practice*

Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion. **Knowledge and Attitude Profile** for delivery of GA8: WK9

13.5.~~9~~8   Graduate Attribute GA~~9~~8: Individual and Collaborative Teamwork: *Role in and Diversity of Team*

Function effectively as an individual, and as a member or leader in diverse teams and multi-disciplinary, face-to-face, remote and distributed settings.   Knowledge   and   Attitude Profile for delivery of GA8: WK9

13.5.9 Graduate Attribute GA9:   Communication: *Level of communication according to type of activities performed*

Communicate effectively and inclusively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account cultural, language, and learning differences.

13.5.10   Graduate Attribute GA10: Project Management and Finance: *Level of Management and Finance required for differing types of activity*

Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and multidisciplinary environments.

13.5.11   Graduate Attribute GA11: Lifelong learning: Duration and manner

Recognise the need for, and have the preparation and ability for
(i)   independent and life-long learning ,
(ii)   adaptability to new and emerging technologies and

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(iii)   critical thinking in the broadest context of technological change.

Knowledge and Attitude Profile for delivery of GA11: WK8.

13.6   Knowledge and Attitude Profiles for delivery of respective Graduate Attributes

A *Knowledge and Attitude Profile* (WK) is an indicated volume of learning and the attributes against which graduates must be able to perform.

- **WK1: Natural Sciences:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
- **WK2: Mathematics:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
- **WK3: Engineering Sciences:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
- **WK4: Specialist Knowledge:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
- **WK5:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
- **WK6:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
- **WK7:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline such as the professional responsibility of an engineer to public safety and sustainble development*. (*Represented by the 17 UN Sustainable Development Goals (UN-SDG))
- **WK8:** Engagement with selected knowledge in the current research literature of the discipline., awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
- **WK9: Ethics, inclusive behaviour and conduct:** Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

* Represented by the 17 UN Sustainable Development Goals (UN-SDG)

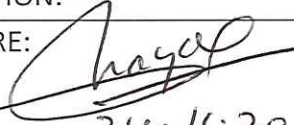| Doc no. EAB-A03-P	Revision no. 0	Effective Date: 2022-11-18	
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Note: *A programme that builds this type of knowledge and attitude and develops the base attributes listed below described under GA1 to 12 is typically achieved in 4 to 5 years of study, depending on the level of students at entry, in contrast with a period of 3 to 4 years for the Engineering Technologist and 2 to 3 years for Engineering Technician.*

13.3 Range of Problem Identification and Solving:

Complex Engineering problems have the characteristics of WP1 and some or all of WP2 to WP7:

(i) **WP1: Depth of knowledge required**: Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WP7 (see Section 13.6) which allows a fundamentals-based, first principles analytical approach.

(ii) **WP2: Range of conflicting requirements**: Involve wide-ranging and/or conflicting technical, non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements.

(iii) **WP3: Depth of analysis required**: Have no obvious solution and require abstract thinking, creativity and originality in analysis to formulate suitable models.

(iv) **WP4: Familiarity of issues**: Involve infrequently encountered issues or novel problems.

(v) **WP5: Extent of applicable codes**: Address problems not encompassed by standards and codes of practice for professional engineering.

(vi) **WP6: Extent of stakeholder involvement and conflicting requirements**: Involve collaboration across engineering disciplines, other fields, and/or diverse groups of stakeholders with widely varying needs.

(vii) **WP7: Interdependence**: Address high-level problems with many component or sub-problems that may require a systems approach.

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