بسم الله الرحمن الرحيم

Ministry of Construction and Infrastructure
Male'
Maldives

# Civil Engineering Academic Standards for Accrediting Undergraduate Level Programmes

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# Contents

# Civil Engineering Academic Standards for Accrediting Undergraduate Level Programmes

## 1) Introduction

a) It is imperative to impart civil engineering students in the Maldives with a world-class education that equips them with both contemporary engineering knowledge and industry-relevant skills. The accreditation of civil engineering programmes plays a crucial role in ensuring that the Maldivian engineering education system delivers these knowledge and essential skills. This accreditation process not only guarantees the development of industry-relevant competencies but also acts as a catalyst for attracting aspiring students to pursue a rewarding career in the civil engineering profession.

b) The accreditation process serves as a powerful tool to showcase the high standards of engineering education in the Maldives, both on a national and international scale. Through such accreditations, institutions manifest their unwavering dedication to excellence in civil engineering education. This acknowledgement instils confidence in students, employers, and the broader community regarding the quality of education imparted by accredited programmes ensuring both its technical and academic relevance.

c) Moreover, accreditation serves as a catalyst for continuous improvement within higher education institutions (HEIs) in the Maldives. It offers a structured framework for HEIs to meticulously review their civil engineering programmes, pinpoint areas of strength and weakness, and cultivate excellence in programme delivery and content. Through the accreditation process, HEIs can refine the relevance and effectiveness of their curricula, ensuring that graduates are well-prepared to confront the challenges of the civil engineering profession in the Maldives.

d) The criteria and processes for accreditation are subject to regular international scrutiny to maintain their efficacy and relevance. It is important to note that while the accreditation process in the Maldives may differ from other countries, it adheres to fundamental principles and standards that are aligned with international best practices. This alignment ensures that the accreditation process in the Maldives meets the rigorous standards set by international engineering standard-setting bodies, reinforcing the value and credibility of the accreditation process.

e) The Ministry of Construction and Infrastructure (Ministry) accredits civil engineering programmes against outcomes-based standards that have been established by the Dublin, Sydney and Washington Accords to define the general academic standards for technical entry-to-practice in the engineering profession. Accreditation to an International Accord standard typically relates to undergraduate engineering programmes - **Diploma in Civil Engineering**, **Advanced Diploma in Civil Engineering** and **Bachelor of Civil Engineering (Honours)** programme. By adhering to international standards and embracing bench-marked accreditations, the Maldivian engineering education system will be able provide students with an education that equips them for successful careers and contributes to the advancement of engineering and development in the Maldives.

## 2) Aims and Objectives

a) In its submission for accreditation of a civil engineering degree programme, a higher education institution (HEI) should be able to express the aims, objectives, and ethos of the programme in relation to the appropriate standards of degree-level education and the requirements of the profession. The HEI should demonstrate how its programmes meet the aims and objectives and how they can respond to future developments.

b) The Ministry acknowledges that civil engineering degree programmes are dynamic entities that must evolve with technology and the ever-changing needs of the profession and society. As such, the Ministry expects HEIs to be able to articulate how the structure and rationale of their programmes can respond to change.

c) In general, all civil engineering undergraduate programmes offered in the Maldives must demonstrate that their graduates possess the following attributes, in accordance with widely accepted engineering standards:

   i) **Proficiency in applying knowledge of mathematics, science, and engineering:** Graduates should be able to apply their knowledge of mathematics, science, and engineering to solve real-world problems.

   ii) **Competence in designing and conducting experiments.** Graduates should be able to design and conduct experiments to test and validate their ideas.

   iii) **Capability to design systems, components, or processes.** Graduates should be able to design systems, components, or processes that meet desired requirements within realistic constraints.

   iv) **Ability to collaborate effectively within multidisciplinary teams.** Graduates should be able to collaborate effectively with people from different disciplines to solve complex problems.

   v) **Skill in identifying, formulating, and solving engineering problems.** Graduates should be able to identify, formulate, and solve engineering problems using appropriate methods and tools.

   vi) **Understanding of professional and ethical responsibilities.** Graduates should understand their professional and ethical responsibilities and be able to act accordingly.

   vii) **Proficiency in effective communication.** Graduates should be able to communicate effectively with a variety of audiences, including technical and non-technical audiences.

   viii) **Awareness of the global and societal impact of engineering solutions.** Graduates should be aware of the global and societal impact of engineering solutions and be able to design solutions that have a positive impact.

   ix) **Capacity to stay informed about contemporary issues in engineering.** Graduates should be able to stay informed about contemporary issues in engineering and be able to apply this knowledge to their work.

x) **Recognition of the importance of lifelong learning and engagement in continuous professional development**. Graduates should recognize the importance of lifelong learning and be committed to continuous professional development.

xi) **Proficiency in utilising techniques, skills, and modern engineering tools.** Graduates should be proficient in utilising techniques, skills, and modern engineering tools that are essential for engineering practice.

xii) **Competence in using computer/IT tools.** Graduates should be competent in utilising computer/IT tools that are relevant to their field of study.

d) The interpretation of these graduate attributes should align with the requirements of the specific Accord, including the level of problem-solving proficiency and the range of engineering activities.

e) For further details, please refer to **Annex I** and **II** for Graduate Attributes and Professional Competencies within this standard.

## 3) Accreditation Criteria

a) Ministry's civil engineering accreditation processes involves reviewing the qualifying requirements and evaluating the programme's adherence to the following nine (9) criteria:

i) **Program Educational Objectives (PEOs)**: These are the goals that the program is designed to achieve. They should be clear, measurable, and relevant to the needs of the profession.

ii) **Student Learning Outcomes (SLOs):** These are the specific knowledge, skills, and abilities that students should acquire by the end of the program. They should be aligned with the PEOs and be measurable.

iii) **Curriculum and Teaching-Learning Process:** The curriculum should be designed to achieve the SLOs and should be delivered in a way that engages students and facilitates learning.

iv) **Students:** The program should attract and retain students who are capable of achieving the SLOs. The program should also provide students with the support they need to succeed.

v) **Faculty and Support Staff:** The faculty and support staff should be qualified and experienced in teaching and supporting students in engineering.

vi) **Facilities and Infrastructure:** The program should have the facilities and infrastructure needed to support student learning.

vii) **Institutional Support and Financial Resources:** The institution should provide the program with the support and resources it needs to succeed.

viii) **Continuous Quality Improvement:** The program should have a process for continuously assessing and improving its quality.

ix) **Industrial and International Linkages:** The program should have linkages with industry and other international engineering programmes.

b) HEIs seeking accreditation for their undergraduate engineering programmes must meet **all** nine criteria as outlined in this document. HEIs are also required to uphold these criteria throughout the validity period of the accreditation. Additionally, HEIs are encouraged to regularly and systematically assess their programmes and strive for continuous improvement.

c) The Ministry utilises these criteria to assess civil engineering undergraduate programmes' suitability for the civil engineering profession. The specific standards for each of these criteria per the programme levels are clearly described in this document. In delineating these criteria, the Ministry acknowledges the importance of promoting an environment that can accommodate innovative educational advancements and facilitates the expression of HEI's distinct strengths, qualities, and ideals. This flexible approach is deemed essential in fulfilling the educational and professional objectives of the HEIs as well as the civil engineering programmes.

# 4) Accreditation Process

## a) Intent to Apply

i) Higher Education Institutions (HEIs) wishing to start a civil engineering programme must submit a written expression of interest to the Ministry of Construction and Infrastructure (Ministry) outlining the level of programme(s) they are seeking for technical accreditation. Upon receiving the expression of interest, the Ministry will provide guidance and support to help the HEI prepare for the accreditation process including all relevant documentations. Using the Ministry's civil engineering accreditation standards set out in this document and the associated guidelines, the HEI will conduct a self-assessment of their civil engineering programme evaluating its compliance with the accreditation requirements.

ii) Ministry's technical accreditation process will be guided by the procedures outlined in '*Academic Regulation on Construction Sector Professional and Technical Programs'* - Regulation no. 2019/R-1016 formulated under The Construction Act (Act no. 4/2017).

iii) Following the technical accreditation from Ministry, HEIs are required to seek further accreditation from the Maldives Qualifications Authority (MQA) before implementing the programme.

## b) Self-Assessment Report

i) The Self-Assessment Report (SAR) demonstrates the level of compliance with specific comments on the current status of accreditation standards and criteria. It will be used as the core document for the purpose of external quality assessment and accreditation. The SAR should be prepared following the guidelines and format provided by Ministry and submitted to Ministry's Assessment Committee.

ii) The Self-Assessment Report (SAR) serves to indicate the level of compliance to accreditation standards and criteria within civil engineering academic programmes. It provides detailed narratives on the present state of compliance to the standards for each of the nine criteria outlined in this document, as relevant to the level of the programme being accredited. The SAR holds significance as the principal document for external quality assessment and accreditation processes. Preparation of the SAR must adhere to the guidelines and format specified by the Ministry of Construction and Infrastructure (Ministry). The information contained within the SAR will be pivotal in evaluating and ensuring the quality and standards of civil engineering academic programmes.

iii) Guidelines for Preparing SAR:

(1) The SAR should contain general information about the HEI and the program under assessment.

(2) The SAR should be written following the SAR format provided with this document.

(3) Contents and arguments in the SAR should be limited to the facts relevant to accreditation standards/criteria.

(4) The SAR should contain clearly written statement and descriptions on the current status of each of the civil engineering accreditation criteria. These descriptions should demonstrate how the standards outlined in each criterion are met in the programme being accredited.

(5) The SAR should provide sufficient information to assess the level of compliance with the civil engineering accreditation criteria's standards and comments on the preparedness in meeting the accreditation requirements.

(6) The SAR should explore the strengths, weaknesses, opportunities and threats to the HEI and program under assessment for accreditation.

(7) The SAR should be supported by documental evidence and survey data as required for specific criterion.

(8) The SAR should be written in clear and concise language and formatted in such a way so that readers can understand and follow the contents with ease.

iv) For further guidance on preparing the SAR, refer to **Annex III** and **Annex IV** of this documents.

## c) Accreditation Decisions

i) The Ministry of Construction and Infrastructure (Ministry)'s Assessment Committee is responsible to evaluate all accreditation applications as stipulated in Regulation 2019/R-1016.

ii) Upon reviewing of the SAR and associated documents, Ministry's Assessment Committee will review all the documents against the standards outlined in the nine criteria set in the document. The committee will then determine the accreditation status of an individual programme based on the levels of compliance (i.e. deficiencies, weaknesses, concerns, and opportunities for improvement) across the nine (9) accreditation criteria. The committee will prepare a decision document of their review and identifying the accreditation status as one of the following:

(1) **Accredited for a temporary duration:** Programmes meeting or exceeding all accreditation criteria, albeit with some areas of concern can be accredited and given a "Temporary Technical Approval".

(2) **Accredited for a full five-year cycle:** Programmes issued a "Temporary Technical Approval", after assessing within 1 year of running and if meeting or exceeding all accreditation criteria, albeit with some areas of concern.

(3) **Accredited for less than five years:** Programmes meeting all accreditation criteria but without any major deficiencies, though they may have some weaknesses or concerns.

(4) **Decline Accreditation:** Programmes not yet ready for accreditation due to significant non-compliance across multiple criteria or serious deficiencies in key attributes. In such a case, a further application is not typically considered within the next **one** year.

iii) Ministry will send this report to the HEI, follow-up where necessary and regularly publish for public viewing the information of all their accredited programmes.

## 5) Accreditation Standards for Diploma in Civil Engineering

### a) Criterion 1: Programme Educational Objectives

i) Programme Educational Objectives (PEOs) encompass comprehensive statements that outline the professional achievements and advancements that the programme aims to equip its graduates with. The assessment of PEOs relies on the qualities and accomplishments demonstrated by alumni, preferably with 3 to 5 years of post-graduation experience. To meet this criterion, every civil engineering programme seeking accreditation or re-accreditation must fulfil the following requirements:

(1) The PEOs must align with the vision and mission of the higher education institution offering the programme. They should reflect the overarching goals and values of the educational institution.

(2) The published PEOs should establish well-defined educational objectives that outline the specific knowledge, skills, and abilities students are expected to acquire by the time of graduation. These objectives must be specific, measurable, achievable, relevant, and time-bound (SMART) to ensure clarity and effectiveness.

(3) The programme's curriculum and teaching-learning processes should effectively support the attainment of the PEOs. Clear justifications must be provided, explaining how these educational components contribute to the accomplishment of the PEOs.

(4) A robust process should be developed to assess the level of attainment for each PEO, enabling the evaluation of the programme's effectiveness. Sufficient evidence and documentation on the assessment of PEO attainment should be provided. The assessment tools used and their application should be clearly indicated and explained.

(5) The assessment of PEOs should lead to periodic reviews of these objectives. Regular evaluation ensures that the PEOs remain relevant and aligned with the evolving needs of the programme's stakeholders.

### b) Criterion 2: Student Learning Outcomes

i) The civil engineering diploma programmes must have well-defined and documented Student Learning Outcomes (SLOs) that align with the programme's educational objectives. These outcomes should demonstrate that graduates possess the necessary knowledge, skills, and attributes by the time of graduation.

ii) The programme may adopt the set of Graduate Attributes (GA) published by the Dublin Accord[1] of the International Engineering Alliance as the basis for its student learning outcomes (See Annex I and II). Alternatively, if the programme chooses to articulate its own learning outcomes, it must establish equivalence to address all the student learning outcomes outlined below.

iii) The GAs describe what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviour that students acquire through the programme. Students of an engineering programme are expected to attain the following GAs:

(1) **DA1 - Engineering Knowledge:** Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices;

(2) **DA2 - Problem Analysis:** Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity. (DK1 to DK4);

(3) **DA3 - Design/Development of Solutions** Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety as well as cultural, societal, and environmental considerations as required (DK5);

(4) **DA4 - Investigation:** Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements (DK8);

(5) **DA5 - Tool Usage:** Apply appropriate techniques, resources, and modern computing, engineering, and IT tools to well-defined engineering problems, with an awareness of the limitations. (DK2 and DK6);

(6) **DA6 - The Engineer and the Society:** When solving well-defined engineering problems, analyse and evaluate sustainable development[2] impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (DK1, DK5, and DK7);

(7) **DA7 - Ethics:** Understand and commit to professional ethics and norms of technician practice including compliance with relevant laws. Demonstrate an understanding of the need for diversity and inclusion (DK9);

(8) **DA8 - Individual and Collaborative Teamwork:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (DK9);

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[1] Graduate Attributes & Professional Competencies. International Engineering Alliance. Retrieved June 17, 2023, from https://www.ieagreements.org, Version: 2021.1, June 2021

[2] UN (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. Resolution Adopted by the General Assembly on 25 September 2015, 42809, 1-13. https://doi.org/10.1007/s13398-014-0173-7.2

(9) **DA9 - Communication:** Communicate effectively and inclusively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions;

(10) **DA10 - Project Management and Finance:** Demonstrate awareness of engineering management principles as a member or leader in a technical team and to manage projects in multidisciplinary environments;

(11) **DA11 - Lifelong Learning:** Recognize the need for, and have the ability for independent updating in the face of specialized technical knowledge (DK8);

iv) In order to meet Criterion 2, the program should demonstrate the following:

(1) Clearly defined and publicly available student learning outcomes.

(2) Alignment of SLOs with the Program Educational Objectives.

(3) Inclusion of all the Graduate Attributes mentioned earlier within the SLOs.

(4) Mapping of SLOs to specific courses within the curriculum.

(5) Utilization of teaching-learning and assessment methods that are suitable and supportive in achieving the SLOs.

(6) Implementation of a quality assessment mechanism to evaluate the level of achievement for each student in relation to all the SLOs.

(7) Establishment of a feedback process where assessment results are used to enhance the assessment mechanism and/or redefine the SLOs, thereby fostering continuous improvement of the program.

## c) Criterion 3: Curriculum and Teaching-Learning Processes

i) Criterion 3 focuses on the curriculum and teaching-learning processes of a civil engineering degree program. It emphasizes the need for a curriculum that enables students to acquire the necessary knowledge, understanding, and skills to practice effectively as graduate engineers. The curriculum should provide breadth and depth appropriate to the discipline, encompassing a range of engineering subjects, mathematics, and complementary support subjects.

(1) **Curriculum Design:** The civil engineering diploma program should demonstrate a well-designed curriculum that is responsive to academic and technological changes, as well as the needs of students, the community, and the profession. The curriculum should be designed to achieve the following objectives:

(a) Produce middle level technical personnel in the field of civil engineering with sound academic knowledge equipped with technical skills that can be applied in real life situation.

(b) Prepare technicians who are capable of undertaking works in civil engineering field as Civil Engineering Technicians;

(c) Produce middle level competent technical workforce/human resources that could provide supervisory works of civil engineering;

(d) Prepare technical workforce who will demonstrate positive attitude and respect for the profession

(e) Help in meeting the demand of required Civil Engineering Technicians for the public and private infrastructure development sector of the Maldives;

(2) The curriculum must include:

(a) Application of:

(i) mathematics through differential equations, probability and statistics, calculus-based physics, chemistry, and either computer science, data science, or an additional area of basic science

(ii) engineering mechanics, materials science, and numerical methods relevant to civil engineering

(iii) principles of sustainability, risk, resilience, diversity, equity, and inclusion to civil engineering problems

(iv) the engineering design process in at least two civil engineering contexts

(v) an engineering code of ethics to ethical dilemmas

(b) Explanation of:

(i) concepts and principles in project management and engineering economics

(ii) professional attitudes and responsibilities of a civil engineer, including licensure and safety.

(3) **Knowledge Profiles:** In modern perspectives of engineering curriculum, especially those emphasizing Outcome-Based Education (OBE), the curriculum serves as a crucial instrument for nurturing the 11 Graduate Attributes (GAs) stated in **Criterion 2**. Consequently, it is considered to consist of multiple Knowledge Profiles (SKs) that foster different dimensions of thinking (mathematical, computational, design, and creative) among students within the Cognitive, Psychomotor, and Affective domains. Specifically, the curriculum should incorporate the following knowledge profiles:

(a) **DK1: Natural and Social Sciences:** A descriptive, formula-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences.

(b) **DK2: Mathematics and Computing:** Procedural mathematics, numerical analysis, data analysis, statistics applicable to the sub-discipline.

(c) **DK3: Engineering Fundamentals:** A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline.

(d) **DK4: Engineering Specialist Knowledge:** Engineering specialist knowledge that provides body of knowledge for an accepted sub-discipline.

(e) **DK5: Engineering Design:** Knowledge that supports engineering design and operations based on the techniques and procedures of a practice area.

(f) **DK6: Engineering Practice:** Codified practical engineering knowledge in recognized practice area.

(g) **DK7: Knowledge of Engineering in Society**: Knowledge of issues and approaches in engineering technician practice, such as public safety and sustainable development.

(h) **DK8: Research Literature:** Engagement with the current technological literature of the practice area.

(i) **DK9: 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.

(4) **Basic Knowledge and Skills:** The curriculum should ensure that undergraduate students acquire the fundamental knowledge, understanding, and skills required for effective and professional practice as graduate engineers. The program must cover essential topics in engineering sciences, engineering design, mathematics, and basic sciences.

(5) **Breadth and Depth:** The course sequences within the curriculum should provide both breadth and depth appropriate to the discipline. Students should have opportunities to explore a range of engineering subjects relevant to their field of study. The program should offer a sufficient number of specialized courses to deepen students' understanding and expertise in their chosen discipline.

(6) **Prerequisites:** The program must ensure that prerequisites are followed, meaning that students have the necessary foundational knowledge and skills before progressing to more advanced topics. Prerequisites serve as building blocks, ensuring a logical progression of learning within the curriculum.

(7) **Complementary Studies:** In addition to engineering subjects, the curriculum should include complementary studies that support the professional nature of the program. These may encompass subjects such as business management, ethics, communication skills, and other interdisciplinary areas that enhance students' ability to navigate the engineering profession effectively.

(8) **Outcome Alignment:** The curriculum must align with the prescribed outcomes and objectives of the engineering degree program. It should be designed in a way that enables students to achieve the desired learning outcomes, fostering their development as competent and professional engineers. Further, to maintain alignment with PEOs and SLOs, the institution should incorporate inputs from all stakeholders, particularly the industry, in developing curriculum content. The program structure should cover fundamental principles initially and progress towards integrated studies in the final year, aligning with various learning domains and levels, as defined, for instance, in Bloom's Taxonomy.

(9) **Teaching-Learning Processes:** The program should employ effective teaching-learning processes that promote active student engagement, critical thinking, problem-solving, and practical application of knowledge. The curriculum should include a variety of instructional methods such as lectures, laboratory work, design projects, case studies, and collaborative learning opportunities to cater to diverse learning styles and enhance student learning outcomes.

(10) **Curriculum Evaluation and Enhancement:** The program should regularly evaluate the curriculum to ensure its relevance, effectiveness, and alignment with the changing needs of the engineering profession. Feedback from students, alumni, employers, and other stakeholders should be considered to identify areas for improvement and make necessary enhancements to the curriculum over time.

ii) This standard does not impose uniformity on HEIs in terms of curricula and syllabuses but expects HEIs to develop courses that respond to academic and societal needs, while also taking into account these general guidelines. Other considerations to consider include:

(1) **Duration:** Civil engineering diploma programmes in HEIs should have a minimum duration of two years, equivalent to full-time study. This means that a student would typically spend 30 weeks per year in class, laboratory, and workshop activities.

(2) **Credits:** Credits serve as an approximate measure of the time it takes for an average student to fulfil the learning outcomes of a course. In the Maldives National Qualifications Framework (MNQF), one credit represents an average of 10 hours of learning time, including both teaching and private study. A standard full-time undergraduate programme in the Maldives generally consists of 120 credits per academic year. For a two-year engineering diploma course, the total number of credits required is typically 240.

(3) **Internship Program:** The engineering programme should include a supervised internship programme of 4 weeks (160 hours) in an engineering practice environment or organization. The internship should be planned and agreed upon by the institution and the host organization, and assessment should be carried out using defined rubrics. Students should critically reflect on and report how this experience has contributed to their development, evaluated against programme-level graduate attributes.

(4) **Lab Work:** Each core engineering subject should be supported by practical work in well-equipped labs, and students should be encouraged to develop practical skills and engage in open-ended labs, problem-based learning, and projects.

(5) **Design Projects:** Design projects should be integral to each core subject, fostering practical skills, creativity, and competition among students. The programme comprises integrative project work where student assessment aligns with a variety of overall programme graduate outcomes. These outcomes must encompass investigation, design, or the development of solutions, either in distinct projects or integrated into a single project of a minimum of 15 credits.

(6) **Evaluation and Feedback:** The effectiveness of teaching-learning processes should be regularly evaluated. The academic calendar, instructional days, contact hours per week, teaching staff quality, syllabi design, student evaluation, and feedback should be reviewed. Internal reviews of quality assurance procedures should be conducted periodically.

(7) **Extra and Co-curricular Activities:** The programme should facilitate extra and co-curricular activities to develop personal skills and promote general wellness among students. These activities can include sports, clubs, and student organizations.

(8) **Library and Educational Technology:** The educational institution should have a comprehensive and up-to-date library, as well as extensive educational technology facilities to support teaching and learning.

iii) Overall, Criterion 3 emphasizes the importance of a well-designed curriculum and effective teaching-learning processes that enable students to acquire the essential knowledge, understanding, and skills required for professional engineering practice. The curriculum should provide both breadth and depth, follow prerequisites, include complementary studies, align with desired outcomes, and undergo continuous evaluation and improvement.

## d) Criterion 4: Students

i) The quality and performance of students are crucial factors in evaluating the effectiveness of an engineering program. Admission and transfer policies should be well-defined and appropriate for selecting students who have the potential to achieve the programme's outcomes. The programme should also provide support mechanisms to guide students academically and professionally.

ii) Key considerations under this criterion include:

(1) **Admission and Transfer Policies:** The institute must establish clear and fair policies for admitting and transferring students into the programme. These policies should aim to select students who have the potential to achieve the programme's desired outcomes.

(2) **Academic Performance Monitoring:** Continuous monitoring of students' academic performance is essential to track their progress in achieving the programme outcomes. Timely and constructive feedback should be provided to students, and appropriate measures should be taken to address any performance gaps.

(3) **Advisory Support:** Each student should be assigned a dedicated advisor who will provide guidance, support, and mentorship on both academic and professional matters. The advisor plays a crucial role in assisting students throughout their educational journey.

(4) **Extra- and Co-curricular Activities:** Students should be provided with ample opportunities to engage in extra- and co-curricular activities. These activities, such as participation in student clubs, competitions, and sports, promote ethical practices, interpersonal skills, and overall character development.

(5) **National and International Competitions:** Students should be encouraged and facilitated to participate in national and international exhibitions and engineering competitions. This allows them to showcase their skills, talents, and innovative ideas on a broader platform.

(6) **Mathematical and Physical Sciences Foundation:** Students interested in pursuing engineering programmes should have a solid foundation in mathematics and physical sciences. However, for those who do not meet the entry qualifications, the institute should offer suitable remedial programmes to help them attain equivalent qualifications.

(7) **Supportive and Engaging Teaching-Learning Environment:** The programme should provide a supportive and engaging teaching-learning environment that nurtures students' enthusiasm and motivation. This includes creating opportunities for interactive and participatory learning experiences.

(8) **Comprehensive Counselling Services:** The institute should offer comprehensive counselling services to students, covering various aspects such as academic, career,

financial, and health matters. These services aim to support students in their personal and academic growth.

(9) **Student Feedback Mechanisms:** The programme should establish effective mechanisms to collect feedback and suggestions from students. This can be achieved through committees, forums, surveys, or other channels that enable students to contribute their ideas for programme improvement.

(10) **Teaching Load Management:** It is important to ensure that students are not overwhelmed with an excessive workload that surpasses their capacity. The programme should carefully manage the teaching load in each semester, ensuring a balance between academic rigor and students' well-being.

(11) **Character Development:** In addition to academic development, the programme should provide opportunities for students to develop their character. Engagement in co-curricular activities, student clubs, competitions, sports, and campus activities contribute to holistic growth and personal development.

iii) Evaluation of students within this criterion emphasizes the importance of student quality, progression, support, and engagement in achieving the desired outcomes of an engineering programme.

## e) Criterion 5: Academic and Support Staff

i) Criterion 5 assesses the adequacy and quality of academic and support staff in the civil engineering degree programme. It focuses on the qualifications, commitment, and number of staff members, as well as the provision of technical and administrative support necessary for effective programme delivery.

(1) **Academic Staff:** The engineering degree programme must have a qualified and committed teaching staff. The staff should have appropriate qualifications and expertise to teach the subject matter by virtue of professional licensure, or by education and design experience. They should be able to engage students in interactive learning experiences, provide timely and constructive feedback, and promote critical thinking, problem-solving, and practical application of knowledge.

(2) **Part-Time Staff:** The institution may engage part-time staff with acceptable professional qualifications in related engineering fields. However, the number of part-time staff should not exceed 40 percent of the total teaching staff.

**(3) Academic Staff-to-Student Ratio**: The program must demonstrate that it is not critically dependent on one individual. The full-time equivalent academic staff to student ratio should ideally be 1:20 or better. This ratio ensures effective teaching, student-staff interaction, student advising and counselling, provision of institutional services, research activities, professional development, and interaction with industries.

(4) **Support Staff:** The programme should also have a sufficient number of technical and workshop staff to facilitate the smooth operation of laboratories, maintenance of equipment, and general support. These staff members should possess the necessary qualifications and experience to effectively manage the practical aspects of the programme, ensuring safety and providing hands-on support to students.

(5) **Administrative and Secretariat Staff:** The programme should also provide a sufficient number of administrative and secretariat staff members to support the academic staff. These staff members play a crucial role in coordinating programme logistics, managing student records, organizing schedules, and providing administrative support to faculty members, ensuring efficient programme administration.

(6) **Resource Allocation and Staff Development:** The programme should allocate appropriate resources for staff development, including funding for professional development opportunities, research activities, and access to relevant educational resources. Adequate provisions should also be made to maintain and upgrade technical facilities, laboratories, and computing resources to support effective teaching and learning.

ii) Overall, Criterion 5 aims to ensure that the engineering degree programme has a qualified and committed teaching staff, supported by technical and administrative personnel, to deliver a high-quality educational experience to its students.

## f) Criterion 6: Facilities and Infrastructure

i) The availability of suitable facilities and infrastructure is crucial for the smooth functioning of civil engineering programmes. Adequate provision of lecture rooms, laboratories, workshops, drawing offices, and private study areas is necessary to support various learning activities, including lectures, tutorials, and practical classes.

(1) **Laboratories:** Laboratories play a vital role in practical education, and it is important that they are well-equipped with modern and relevant equipment. They should provide a safe working environment for students, ensuring their well-being while conducting experiments and hands-on activities.

(2) **Lecture rooms:** Lecture rooms should be large enough to accommodate the number of students enrolled in the programme. They should also be equipped with audio-visual equipment and other resources that are necessary for effective teaching and learning.

(3) **Workshops:** Workshops are important for providing students with hands-on experience in various technical skills. They should be equipped with the necessary tools and equipment for the type of work that will be conducted.

(4) **Drawing offices:** Drawing offices are important for providing students with a space to work on their designs and drawings. They should be equipped with the necessary furniture and equipment, such as drafting tables and computers.

(5) **Private study areas:** Private study areas are important for providing students with a quiet place to study and work independently. They should be well-lit and have comfortable seating.

(6) **Computing and Information Technology Support:** Robust computing and information technology support systems are essential for engineering educational programmes. These systems should cater to the needs of both teaching staff and students, enabling them to access necessary resources, conduct research, and engage in scholarly activities.

## g) Criterion 7: Institutional Support and Financial Resources

i) This criterion assesses the availability and commitment of financial resources to sustain and enhance the engineering programme. Adequate funding is necessary for operational expenses, facility maintenance, staff development, and equipment upgrades. The programme should demonstrate financial sustainability, ongoing commitment, and the ability to meet recurrent and developmental needs. Infrastructure, including well-equipped labs and a stocked library, is crucial, along with a focus on research and development. Institutions must provide relevant financial information and demonstrate sound fiscal management.

## h) Criterion 8: Governance and Continuous Quality Improvement

i) **Governance Structure:** The governance structure of the programme must clearly define authority and responsibility for formulating and implementing policies that align with the programme's mission. The institution should also have a mechanism for ensuring that a Quality Management System (QMS) is effectively implemented and maintained.

ii) **Quality Improvement:** Ensuring the delivery of quality engineering education is a fundamental aspect of higher education institutions (HEIs). A Quality Management System (QMS) should be established to guarantee the achievement of programme objectives and outcomes. This system encompasses planning, implementation, monitoring, and improvement, instilling confidence in stakeholders regarding graduates' demonstrated outcomes. The focus of the QMS revolves around academic programmes, while considering all aspects of campus life. A Quality Enhancement Department (QED) plays a vital role in streamlining and ensuring quality assurance through assessment and improvement mechanisms, leading to continuous quality improvement (CQI) of academic programmes and the attainment of their outcomes.

iii) **Continuous Quality Improvement (CQI) Processes:** CQI is achieved through a closed-loop system involving the QED and engineering departments. The institution should have well-defined processes for quality assessment and improvement, addressing any weaknesses or nonconformities identified in previous accreditation visits. The compliance report should include verifiable remedial measures, verified by the QED.

iv) The program should provide details of its CQI processes, including:

(1) Self-assessment reports

(2) Corrective action reports

(3) Implementation plans based on previous accreditation visit observations.

(4) Evidence of efforts to enhance faculty strength, facilities, and initiatives to support program outcomes.

## q) Criterion 9: Industrial and International Linkages

i) Civil engineering programmes should have strong linkages with national and international industry partners, academic institution and research offices. This can be achieved through a variety of mechanisms, including:

(1) **Establishing linkages with national and international industries, academic institutions, and research organizations:** This can be done through formal agreements, joint research projects, student and staff mobility, and other means.

(2) **Encouraging teaching staff and student exchanges:** This can help to promote the sharing of knowledge and expertise between industry and academia.

(3) **Facilitating joint Research and Development (R&D)projects:** This can help to ensure that the curriculum is aligned with the latest research and development in the field.

(4) **Offering internships and design projects:** This can give students the opportunity to gain real-world experience and learn from practicing engineers.

(5) **Establishing an Industrial Advisory Board:** This can provide a formal mechanism for industry to provide input on the curriculum and program evaluation.

(6) **Establishing a communication channel between industry and academia:** This can help to ensure that there is a continuous flow of information between the two parties.

# 7) Accreditation Standards for Advanced Diploma in Civil Engineering

## a) Criterion 1: Programme Educational Objectives

i) Programme Educational Objectives (PEOs) encompass comprehensive statements that outline the professional achievements and advancements that the programme aims to equip its graduates with. The assessment of PEOs relies on the qualities and accomplishments demonstrated by alumni, preferably with 3 to 5 years of post-graduation experience. To meet this criterion, every civil engineering programme seeking accreditation or re-accreditation must fulfil the following requirements:

ii) The PEOs must align with the vision and mission of the higher education institution offering the programme. They should reflect the overarching goals and values of the educational institution.

iii) The published PEOs should establish well-defined educational objectives that outline the specific knowledge, skills, and abilities students are expected to acquire by the time of graduation. These objectives must be specific, measurable, achievable, relevant, and time-bound (SMART) to ensure clarity and effectiveness.

iv) The programme's curriculum and teaching-learning processes should effectively support the attainment of the PEOs. Clear justifications must be provided, explaining how these educational components contribute to the accomplishment of the PEOs.

v) A robust process should be developed to assess the level of attainment for each PEO, enabling the evaluation of the programme's effectiveness. Sufficient evidence and documentation on the assessment of PEO attainment should be provided. The assessment tools used and their application should be clearly indicated and explained.

vi) The assessment of PEOs should lead to periodic reviews of these objectives. Regular evaluation ensures that the PEOs remain relevant and aligned with the evolving needs of the programme's stakeholders.

## b) Criterion 2: Student Learning Outcomes

i) The civil engineering programmes must have well-defined and documented Student Learning Outcomes (SLOs) that align with the programme's educational objectives. These outcomes should demonstrate that graduates possess the necessary knowledge, skills, and attributes by the time of graduation.

ii) The programme may adopt the set of Graduate Attributes published by the Sydney Accord[3] of the International Engineering Alliance as the basis for its student learning outcomes (See Annex I and II). Alternatively, if the programme chooses to articulate its own learning outcomes, it must establish equivalence to address all the student learning outcomes outlined below.

iii) Graduate Attributes (GA) describe what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviour that students acquire through the programme. Students of an engineering programme are expected to attain the following GAs:

(1) **SA1 - Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals and an engineering specialization as specified in SK1 to SK4 respectively to defined and applied engineering procedures, processes, systems or methodologies;

(2) **SA2 - Problem Analysis:** Identify, formulate, research literature and analyse broadly defined engineering problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialisation (SK1 to SK4);

(3) **SA3 - Design/Development of Solutions:** Design solutions for broadly defined engineering technology problems and contribute to the design of 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 (SK5);

(4) **SA4 - Investigation:** Conduct investigations of broadly defined engineering problems; locate, search and select relevant data from codes, data bases and literature (SK8), design and conduct experiments to provide valid conclusions;

(5) **SA5 - Tool Usage:** Select and apply, and recognise limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems (SK2 and SK6);

(6) **SA6 - The Engineer and the Society:** When solving broadly defined engineering problems, analyse and evaluate sustainable development[4] impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (SK1, SK5, and SK7);

(7) **SA7 - Ethics:** Understand and commit to professional ethics and norms of engineering technology practice including compliance with national and international laws. Demonstrate an understanding of the need for diversity and inclusion (SK9);

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[3] Graduate Attributes & Professional Competencies. International Engineering Alliance. Retrieved June 17, 2023, from https://www.ieagreements.org, Version: 2021.1, June 2021

[4] UN (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. Resolution Adopted by the General Assembly on 25 September 2015, 42809, 1-13. https://doi.org/10.1007/s13398-014-0173-7.2

(8) **SA8 - Individual and Collaborative Teamwork:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (SK9);

(9) **SA9 - Communication:** Communicate effectively and inclusively on broadly-defined 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;

(10) **SA10 -Project Management and Finance:** Apply knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a team and to manage projects in multidisciplinary environments;

(11) **SA11 - Lifelong Learning:** Recognize the need for, and have the ability for i) independent and lifelong learning and ii) critical thinking in the face of new specialist technologies (SK8);

iv) In order to meet Criterion 2, the program should demonstrate the following:

(1) Clearly defined and publicly available student learning outcomes.

(2) Alignment of SLOs with the Program Educational Objectives.

(3) Inclusion of all the Graduate Attributes mentioned earlier within the SLOs.

(4) Mapping of SLOs to specific courses within the curriculum.

(5) Utilization of teaching-learning and assessment methods that are suitable and supportive in achieving the SLOs.

(6) Implementation of a quality assessment mechanism to evaluate the level of achievement for each student in relation to all the SLOs.

(7) Establishment of a feedback process where assessment results are used to enhance the assessment mechanism and/or redefine the SLOs, thereby fostering continuous improvement of the program.

## c) Criterion 3: Curriculum and Teaching-Learning Processes

i) Criterion 3 focuses on the curriculum and teaching-learning processes of a civil engineering degree program. It emphasizes the need for a curriculum that enables students to acquire the necessary knowledge, understanding, and skills to practice effectively as graduate engineers. The curriculum should provide breadth and depth appropriate to civil engineering, encompassing a range of engineering subjects, mathematics, and complementary support subjects.

(1) **Curriculum Design:** The civil engineering advanced diploma program should demonstrate a well-designed curriculum that is responsive to academic and technological changes, as well as the needs of students, the community, and the profession. The curriculum should be designed to optimize resources and align with the programme's objectives. The curriculum must include:

(a) Application of:

(i) mathematics through differential equations, probability and statistics, calculus-based physics, chemistry, and either computer science, data science, or an additional area of basic science

(ii) engineering mechanics, materials science, and numerical methods relevant to civil engineering

(iii) principles of sustainability, risk, resilience, diversity, equity, and inclusion to civil engineering problems

(iv) the engineering design process in at least two civil engineering contexts

(v) an engineering code of ethics to ethical dilemmas

(b) Solution of complex engineering problems in at least four specialty areas appropriate to civil engineering

(c) Conduct of experiments in at least two civil engineering contexts and reporting of results

(d) Explanation of:

(i) concepts and principles in project management and engineering economics

(ii) professional attitudes and responsibilities of a civil engineer, including licensure and safety.

(2) **Knowledge Profiles:** In modern perspectives of engineering curriculum, especially those emphasizing Outcome-Based Education (OBE), the curriculum serves as a crucial instrument for nurturing the 11 Graduate Attributes (GAs) stated in **Criterion 2**. Consequently, it is considered to consist of multiple Knowledge Profiles (SKs) that foster different dimensions of thinking (mathematical, computational, design, and creative) among students within the Cognitive, Psychomotor, and Affective domains. Specifically, the curriculum should incorporate the following knowledge profiles:

(a) **SK1: Natural and Social Sciences:** A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences.

(b) **SK2: Mathematics and Computing:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed consideration and use of models applicable to the sub-discipline.

(c) **SK3: Engineering Fundamentals:** A systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline.

(d) **SK4: Engineering Specialist Knowledge:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline.

(e) **SK5: Engineering Design:** 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 using the technologies of a practice area.

(f) **SK6: Engineering Practice:** Knowledge of engineering technologies applicable in the sub-discipline.

(g) **SK7: Knowledge of Engineering in Society**: Knowledge of the role of technology in society and identified issues in applying engineering technology, such as public safety and sustainable development.

(h) **SK8: Research Literature:** Engagement with the current technological literature of the discipline and awareness of the power of critical thinking.

(i) **SK9: 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.

(3) **Basic Knowledge and Skills:** The curriculum should ensure that undergraduate students acquire the fundamental knowledge, understanding, and skills required for effective and professional practice as graduate engineers. The program must cover essential topics in engineering sciences, engineering design, mathematics, and basic sciences.

(4) **Breadth and Depth:** The course sequences within the curriculum should provide both breadth and depth appropriate to the discipline. Students should have opportunities to explore a range of engineering subjects relevant to their field of study. The program should offer a sufficient number of specialized courses to deepen students' understanding and expertise in their chosen discipline.

(5) **Prerequisites:** The program must ensure that prerequisites are followed, meaning that students have the necessary foundational knowledge and skills before progressing to more advanced topics. Prerequisites serve as building blocks, ensuring a logical progression of learning within the curriculum.

(6) **Complementary Studies:** In addition to engineering subjects, the curriculum should include complementary studies that support the professional nature of the program. These may encompass subjects such as business management, ethics, communication skills, and other interdisciplinary areas that enhance students' ability to navigate the engineering profession effectively.

(7) **Outcome Alignment:** The curriculum must align with the prescribed outcomes and objectives of the engineering degree program. It should be designed in a way that enables students to achieve the desired learning outcomes, fostering their development as competent and professional engineers. Further, to maintain alignment with PEOs and SLOs, the institution should incorporate inputs from all stakeholders, particularly the industry, in developing curriculum content. The program structure should cover fundamental principles initially and progress towards integrated studies in the final year, aligning with various learning domains and levels, as defined, for instance, in Bloom's Taxonomy.

(8) **Teaching-Learning Processes:** The program should employ effective teaching-learning processes that promote active student engagement, critical thinking, problem-solving, and practical application of knowledge. The curriculum should include a variety of instructional methods such as lectures, laboratory work, design projects, case studies, and collaborative learning opportunities to cater to diverse learning styles and enhance student learning outcomes.

(9) **Curriculum Evaluation and Enhancement:** The program should regularly evaluate the curriculum to ensure its relevance, effectiveness, and alignment with the changing needs of the engineering profession. Feedback from students, alumni, employers, and other stakeholders should be considered to identify areas for improvement and make necessary enhancements to the curriculum over time.

ii) This standard does not impose uniformity on HEIs in terms of curricula and syllabuses but expects HEIs to develop courses that respond to academic and societal needs, while also taking into account these general guidelines. Other considerations to consider include:

(1) **Duration:** Civil engineering diploma programmes in HEIs should have a minimum duration of three years, equivalent to full-time study. This means that a student would typically spend 30 weeks per year in class, laboratory, and workshop activities.

(2) **Credits:** Credits serve as an approximate measure of the time it takes for an average student to fulfil the learning outcomes of a course. In the Maldives National Qualifications Framework (MNQF), one credit represents an average of 10 hours of learning time, including both teaching and private study. A standard full-time undergraduate programme in the Maldives generally consists of 120 credits per academic year. For a two-year engineering diploma course, the total number of credits required is typically 360.

(3) **Internship Program:** The engineering programme should include a supervised internship programme of 6 weeks (240 hours) in an engineering practice environment or organization. The internship should be planned and agreed upon by the institution and the host organization, and assessment should be carried out using defined rubrics. Students should critically reflect on and report how this experience has contributed to their development, evaluated against programme-level graduate attributes.

(4) **Lab Work:** Each core engineering subject should be supported by practical work in well-equipped labs, and students should be encouraged to develop practical skills and engage in open-ended labs, problem-based learning, and projects.

(5) **Design Projects:** Design projects should be integral to each core subject, fostering practical skills, creativity, and competition among students. The programme comprises integrative project work where student assessment aligns with a variety of overall programme graduate outcomes. These outcomes must encompass investigation, design, or the development of solutions, either in distinct projects or integrated into a single project of a minimum of 30 credits.

(6) **Evaluation and Feedback:** The effectiveness of teaching-learning processes should be regularly evaluated. The academic calendar, instructional days, contact hours per week, teaching staff quality, syllabi design, student evaluation, and feedback should be reviewed. Internal reviews of quality assurance procedures should be conducted periodically.

(7) **Extra and Co-curricular Activities:** The programme should facilitate extra and co-curricular activities to develop personal skills and promote general wellness among students. These activities can include sports, clubs, and student organizations.

(8) **Library and Educational Technology:** The educational institution should have a comprehensive and up-to-date library, as well as extensive educational technology facilities to support teaching and learning.

iii) Overall, Criterion 3 emphasizes the importance of a well-designed curriculum and effective teaching-learning processes that enable students to acquire the essential knowledge, understanding, and skills required for professional engineering practice. The curriculum should provide both breadth and depth, follow prerequisites, include complementary studies, align with desired outcomes, and undergo continuous evaluation and improvement.

## d) Criterion 4: Students

i) The quality and performance of students are crucial factors in evaluating the effectiveness of an engineering program. Admission and transfer policies should be well-defined and appropriate for selecting students who have the potential to achieve the programme's outcomes. The programme should also provide support mechanisms to guide students academically and professionally.

ii) Key considerations under this criterion include:

(1) **Admission and Transfer Policies:** The institute must establish clear and fair policies for admitting and transferring students into the programme. These policies should aim to select students who have the potential to achieve the programme's desired outcomes.

(2) **Academic Performance Monitoring:** Continuous monitoring of students' academic performance is essential to track their progress in achieving the programme outcomes. Timely and constructive feedback should be provided to students, and appropriate measures should be taken to address any performance gaps.

(3) **Advisory Support:** Each student should be assigned a dedicated advisor who will provide guidance, support, and mentorship on both academic and professional matters. The advisor plays a crucial role in assisting students throughout their educational journey.

(4) **Extra- and Co-curricular Activities:** Students should be provided with ample opportunities to engage in extra- and co-curricular activities. These activities, such as participation in student clubs, competitions, and sports, promote ethical practices, interpersonal skills, and overall character development.

(5) **National and International Competitions:** Students should be encouraged and facilitated to participate in national and international exhibitions and engineering competitions. This allows them to showcase their skills, talents, and innovative ideas on a broader platform.

(6) **Mathematical and Physical Sciences Foundation:** Students interested in pursuing engineering programmes should have a solid foundation in mathematics and physical sciences. However, for those who do not meet the entry qualifications, the institute should offer suitable remedial programmes to help them attain equivalent qualifications.

(7) **Supportive and Engaging Teaching-Learning Environment:** The programme should provide a supportive and engaging teaching-learning environment that nurtures students' enthusiasm and motivation. This includes creating opportunities for interactive and participatory learning experiences.

(8) **Comprehensive Counselling Services:** The institute should offer comprehensive counselling services to students, covering various aspects such as academic, career, financial, and health matters. These services aim to support students in their personal and academic growth.

(9) **Student Feedback Mechanisms:** The programme should establish effective mechanisms to collect feedback and suggestions from students. This can be achieved through committees, forums, surveys, or other channels that enable students to contribute their ideas for programme improvement.

(10) **Teaching Load Management:** It is important to ensure that students are not overwhelmed with an excessive workload that surpasses their capacity. The programme should carefully manage the teaching load in each semester, ensuring a balance between academic rigor and students' well-being.

(11) **Character Development:** In addition to academic development, the programme should provide opportunities for students to develop their character. Engagement in co-curricular activities, student clubs, competitions, sports, and campus activities contribute to holistic growth and personal development.

iii) Evaluation of students within this criterion emphasizes the importance of student quality, progression, support, and engagement in achieving the desired outcomes of an engineering programme.

## e) Criterion 5: Academic and Support Staff

i) Criterion 5 assesses the adequacy and quality of academic and support staff in the civil engineering degree programme. It focuses on the qualifications, commitment, and number of staff members, as well as the provision of technical and administrative support necessary for effective programme delivery.

(1) **Academic Staff:** The engineering degree programme must have a qualified and committed teaching staff. The staff should have appropriate qualifications and expertise to teach the subject matter by virtue of professional licensure, or by education and design experience. They should be able to engage students in interactive learning experiences, provide timely and constructive feedback, and promote critical thinking, problem-solving, and practical application of knowledge.

(2) **Part-Time Staff:** The institution may engage part-time staff with acceptable professional qualifications in related engineering fields. However, the number of part-time staff should not exceed 40 percent of the total teaching staff.

**(3) Academic Staff-to-Student Ratio**: The program must demonstrate that it is not critically dependent on one individual. The full-time equivalent academic staff to student ratio should ideally be 1:20 or better. This ratio ensures effective teaching, student-staff interaction, student advising and counselling, provision of institutional services, research activities, professional development, and interaction with industries.

(4) **Support Staff:** The programme should also have a sufficient number of technical and workshop staff to facilitate the smooth operation of laboratories, maintenance of equipment, and general support. These staff members should possess the necessary qualifications and experience to effectively manage the practical aspects of the programme, ensuring safety and providing hands-on support to students.

(5) **Administrative and Secretariat Staff:** The programme should also provide a sufficient number of administrative and secretariat staff members to support the academic staff. These staff members play a crucial role in coordinating programme logistics, managing student records, organizing schedules, and providing administrative support to faculty members, ensuring efficient programme administration.

(6) **Resource Allocation and Staff Development:** The programme should allocate appropriate resources for staff development, including funding for professional development opportunities, research activities, and access to relevant educational resources. Adequate provisions should also be made to maintain and upgrade technical facilities, laboratories, and computing resources to support effective teaching and learning.

ii) Overall, Criterion 5 aims to ensure that the engineering degree programme has a qualified and committed teaching staff, supported by technical and administrative personnel, to deliver a high-quality educational experience to its students.

## f) Criterion 6: Facilities and Infrastructure

i) The availability of suitable facilities and infrastructure is crucial for the smooth functioning of civil engineering programmes. Adequate provision of lecture rooms, laboratories, workshops, drawing offices, and private study areas is necessary to support various learning activities, including lectures, tutorials, and practical classes.

(1) **Laboratories:** Laboratories play a vital role in practical education, and it is important that they are well-equipped with modern and relevant equipment. They should provide a safe working environment for students, ensuring their well-being while conducting experiments and hands-on activities.

(2) **Lecture rooms:** Lecture rooms should be large enough to accommodate the number of students enrolled in the programme. They should also be equipped with audio-visual equipment and other resources that are necessary for effective teaching and learning.

(3) **Workshops:** Workshops are important for providing students with hands-on experience in various technical skills. They should be equipped with the necessary tools and equipment for the type of work that will be conducted.

(4) **Drawing offices:** Drawing offices are important for providing students with a space to work on their designs and drawings. They should be equipped with the necessary furniture and equipment, such as drafting tables and computers.

(5) **Private study areas:** Private study areas are important for providing students with a quiet place to study and work independently. They should be well-lit and have comfortable seating.

(6) **Computing and Information Technology Support:** Robust computing and information technology support systems are essential for engineering educational programmes. These systems should cater to the needs of both teaching staff and students, enabling them to access necessary resources, conduct research, and engage in scholarly activities.

## g) Criterion 7: Institutional Support and Financial Resources

i) This criterion assesses the availability and commitment of financial resources to sustain and enhance the engineering programme. Adequate funding is necessary for operational expenses, facility maintenance, staff development, and equipment upgrades. The programme should demonstrate financial sustainability, ongoing commitment, and the ability to meet recurrent and developmental needs. Infrastructure, including well-equipped labs and a stocked library, is crucial, along with a focus on research and development. Institutions must provide relevant financial information and demonstrate sound fiscal management.

## h) Criterion 8: Governance and Continuous Quality Improvement

i) **Governance Structure:** The governance structure of the programme must clearly define authority and responsibility for formulating and implementing policies that align with the programme's mission. The institution should also have a mechanism for ensuring that a Quality Management System (QMS) is effectively implemented and maintained.

ii) **Quality Improvement:** Ensuring the delivery of quality engineering education is a fundamental aspect of higher education institutions (HEIs). A Quality Management System (QMS) should be established to guarantee the achievement of programme objectives and outcomes. This system encompasses planning, implementation, monitoring, and improvement, instilling confidence in stakeholders regarding graduates' demonstrated outcomes. The focus of the QMS revolves around academic programmes, while considering all aspects of campus life. A Quality Enhancement Department (QED) plays a vital role in streamlining and ensuring quality assurance through assessment and improvement mechanisms, leading to continuous quality improvement (CQI) of academic programmes and the attainment of their outcomes.

iii) **Continuous Quality Improvement (CQI) Processes:** CQI is achieved through a closed-loop system involving the QED and engineering departments. The institution should have well-defined processes for quality assessment and improvement, addressing any weaknesses or nonconformities identified in previous accreditation visits. The compliance report should include verifiable remedial measures, verified by the QED.

iv) The program should provide details of its CQI processes, including:

(1) Self-assessment reports

(2) Corrective action reports

(3) Implementation plans based on previous accreditation visit observations.

(4) Evidence of efforts to enhance faculty strength, facilities, and initiatives to support program outcomes.

## i) Criterion 9: Industrial and International Linkages

i) Civil engineering programmes should have strong linkages with national and international industry partners, academic institution and research offices. This can be achieved through a variety of mechanisms, including:

(1) **Establishing linkages with national and international industries, academic institutions, and research organizations:** This can be done through formal agreements, joint research projects, student and staff mobility, and other means.

(2) **Encouraging teaching staff and student exchanges:** This can help to promote the sharing of knowledge and expertise between industry and academia.

(3) **Facilitating joint Research and Development (R&D) projects:** This can help to ensure that the curriculum is aligned with the latest research and development in the field.

(4) **Offering internships and design projects:** This can give students the opportunity to gain real-world experience and learn from practicing engineers.

(5) **Establishing an Industrial Advisory Board:** This can provide a formal mechanism for industry to provide input on the curriculum and program evaluation.

(6) **Establishing a communication channel between industry and academia:** This can help to ensure that there is a continuous flow of information between the two parties.

# 8) Accreditation Standards for Bachelor of Civil Engineering (Honours)

## a) Criterion 1: Programme Educational Objectives

i) Programme Educational Objectives (PEOs) encompass comprehensive statements that outline the professional achievements and advancements that the programme aims to equip its graduates with. The assessment of PEOs relies on the qualities and accomplishments demonstrated by alumni, preferably with 3 to 5 years of post-graduation experience. To meet this criterion, every civil engineering programme seeking accreditation or re-accreditation must fulfil the following requirements:

ii) The PEOs must align with the vision and mission of the higher education institution offering the programme. They should reflect the overarching goals and values of the educational institution.

iii) The published PEOs should establish well-defined educational objectives that outline the specific knowledge, skills, and abilities students are expected to acquire by the time of graduation. These objectives must be specific, measurable, achievable, relevant, and time-bound (SMART) to ensure clarity and effectiveness.

iv) The programme's curriculum and teaching-learning processes should effectively support the attainment of the PEOs. Clear justifications must be provided, explaining how these educational components contribute to the accomplishment of the PEOs.

v) A robust process should be developed to assess the level of attainment for each PEO, enabling the evaluation of the programme's effectiveness. Sufficient evidence and documentation on the assessment of PEO attainment should be provided. The assessment tools used and their application should be clearly indicated and explained.

vi) The assessment of PEOs should lead to periodic reviews of these objectives. Regular evaluation ensures that the PEOs remain relevant and aligned with the evolving needs of the programme's stakeholders.

## b) Criterion 2: Student Learning Outcomes

i) The civil engineering programmes must have well-defined and documented Student Learning Outcomes (SLOs) that align with the programme's educational objectives. These outcomes should demonstrate that graduates possess the necessary knowledge, skills, and attributes by the time of graduation.

ii) The programme may adopt the set of Graduate Attributes published by the Washington Accord[5] of the International Engineering Alliance as the basis for its student learning outcomes (See Annex I and II). Alternatively, if the programme chooses to articulate its own learning outcomes, it must establish equivalence to address all the student learning outcomes outlined below.

iii) Graduate Attributes (GA) describe what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviour that students acquire through the programme. Students of an engineering programme are expected to attain the following GAs:

(1) **WA1 - Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in WK1 to WA4 respectively to develop solutions to complex engineering problems;

(2) **WA2 - Problem 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[6] (WK1 to WK4);

(3) **WA3 - Design/Development of Solutions:** 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 (WK5);

(4) **WA4 - Investigation:** 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 (WK8);

(5) **WA5 - Tool Usage:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems (WK2 and WK6);

(6) **WA6 - The Engineer and the World:** When solving complex engineering problems, analyse and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (WK1, WK5, and WK7);

(7) **WA7 - Ethics:** 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 (WK9);

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[5] Graduate Attributes & Professional Competencies. International Engineering Alliance. Retrieved June 17, 2023, from https://www.ieagreements.org, Version: 2021.1, June 2021
[6] Represented by the 17 UN Sustainable Development Goals (UN-SDGs)

(8) **WA8 - Individual and Collaborative Teamwork:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (WK9);

(9) **WA9 - Communication:** 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;

(10) **WA10 - Project Management and Finance:** 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 in multidisciplinary environments;

(11) **WA11- Lifelong Learning:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change (WK8).

iv) In order to meet Criterion 2, the program should demonstrate the following:

(1) Clearly defined and publicly available student learning outcomes.

(2) Alignment of SLOs with the Program Educational Objectives.

(3) Inclusion of all the Graduate Attributes mentioned earlier within the SLOs.

(4) Mapping of SLOs to specific courses within the curriculum.

(5) Utilization of teaching-learning and assessment methods that are suitable and supportive in achieving the SLOs.

(6) Implementation of a quality assessment mechanism to evaluate the level of achievement for each student in relation to all the SLOs.

(7) Establishment of a feedback process where assessment results are used to enhance the assessment mechanism and/or redefine the SLOs, thereby fostering continuous improvement of the program.

## c) Criterion 3: Curriculum and Teaching-Learning Processes

i) Criterion 3 focuses on the curriculum and teaching-learning processes of a civil engineering degree program. It emphasizes the need for a curriculum that enables students to acquire the necessary knowledge, understanding, and skills to practice effectively as graduate engineers. The curriculum should provide breadth and depth appropriate to the discipline, encompassing a range of engineering subjects, mathematics, and complementary support subjects.

(a) **Curriculum Design:** The civil engineering degree program should demonstrate a well-designed curriculum that is responsive to academic and technological changes, as well as the needs of students, the community, and the profession. The curriculum should be designed to optimize resources and align with the program's objectives. The curriculum shall provide students with opportunities to:

(i) Apply mathematics through differential equations, calculus-based physics, chemistry, and either computer science, data science, or an additional area of basic science;

(ii) Integrate principles of probability and statistics to address uncertainty in engineering decision making;

(iii) Master engineering mechanics, materials science, and numerical methods relevant to civil engineering design and analysis;

(iv) Incorporate principles of sustainability, risk, resilience, diversity, equity, and inclusion into civil engineering project planning and execution;

(v) Solution of complex engineering problems in at least four specialised technical areas within civil engineering, such as:

a. Construction engineering

b. Environmental/sanitary engineering

c. Geotechnical engineering

d. Hydraulics/hydrology/water resources engineering

e. Structural engineering

f. Surveying/measurements

g. Transportation engineering

(vi) Conduct of experiments in at least two civil engineering contexts, effectively analysing and interpreting the resulting data;

(vii) Utilise engineering design process in at least two civil engineering contexts;

(viii) Explain fundamental concepts in project management, business, public policy, and leadership.

(ix) Analyse ethical dilemmas using engineering codes of ethics.

(x) Comprehend the significance of professional licensure and uphold ethical standards in practice.

(2) **Knowledge Profiles:** In modern perspectives of engineering curriculum, especially those emphasizing Outcome-Based Education (OBE), the curriculum serves as a crucial instrument for nurturing the 11 Graduate Attributes (GAs) mentioned in **Criterion 2**. Consequently, it is considered to consist of multiple Knowledge Profiles (WKs) that foster different dimensions of thinking (mathematical, computational, design, and creative) among students within the Cognitive, Psychomotor, and Affective domains. Specifically, the curriculum should incorporate the following knowledge profiles:

(a) **WK1: Natural and Social Sciences:** A systematic, theory-based understanding of natural sciences relevant to the discipline and awareness of relevant social sciences.

(b) **WK2: Mathematics and Computing:** 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.

(c) **WK3: Engineering Fundamentals:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

(d) **WK4: Engineering Specialization:** 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.

(e) **WK5: Engineering Design:** 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.

(f) **WK6: Engineering Practice** - Knowledge of engineering practices (technology) in practice areas of the engineering discipline.

(g) **WK7: Knowledge of Engineering in Society**: 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 sustainable development.

(h) **WK8: Research Literature:** 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.

(i) **WK9: Ethics and Behaviour:** 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

(3) **Basic Knowledge and Skills:** The curriculum should ensure that undergraduate students acquire the fundamental knowledge, understanding, and skills required for effective and professional practice as graduate engineers. The program must cover essential topics in engineering sciences, engineering design, mathematics, and basic sciences.

(4) **Breadth and Depth:** The course sequences within the curriculum should provide both breadth and depth appropriate to the discipline. Students should have opportunities to explore a range of engineering subjects relevant to their field of study. The program should offer a sufficient number of specialized courses to deepen students' understanding and expertise in their chosen discipline.

(5) **Prerequisites:** The program must ensure that prerequisites are followed, meaning that students have the necessary foundational knowledge and skills before progressing to more advanced topics. Prerequisites serve as building blocks, ensuring a logical progression of learning within the curriculum.

(6) **Complementary Studies:** In addition to engineering subjects, the curriculum should include complementary studies that support the professional nature of the program. These may encompass subjects such as business management, ethics, communication skills, and other interdisciplinary areas that enhance students' ability to navigate the engineering profession effectively.

(7) **Outcome Alignment:** The curriculum must align with the prescribed outcomes and objectives of the engineering degree program. It should be designed in a way that enables students to achieve the desired learning outcomes, fostering their development as competent and professional engineers. Further, to maintain alignment with PEOs and SLOs, the institution should incorporate inputs from all stakeholders, particularly the industry, in developing curriculum content. The program structure should cover fundamental principles initially and progress towards integrated studies in the final year, aligning with various learning domains and levels, as defined, for instance, in Bloom's Taxonomy.

(8) **Teaching-Learning Processes:** The program should employ effective teaching-learning processes that promote active student engagement, critical thinking, problem-solving, and practical application of knowledge. The curriculum should include a variety of instructional methods such as lectures, laboratory work, design projects, case studies, and collaborative learning opportunities to cater to diverse learning styles and enhance student learning outcomes.

(9) **Curriculum Evaluation and Enhancement:** The program should regularly evaluate the curriculum to ensure its relevance, effectiveness, and alignment with the changing needs of the engineering profession. Feedback from students, alumni, employers, and other stakeholders should be considered to identify areas for improvement and make necessary enhancements to the curriculum over time.

ii) This standard does not impose uniformity on HEIs in terms of curricula and syllabuses but expects HEIs to develop courses that respond to academic and societal needs, while also taking into account these general guidelines. Other considerations to consider include:

(1) **Duration:** Civil engineering degree programmes in HEIs should have a minimum duration of four years, equivalent to full-time study. This means that a student would typically spend 28-30 weeks per year in class, laboratory, and workshop activities. Assessment, fieldwork, and practical training are not included in these 30 weeks.

(2) **Credits:** Credits serve as an approximate measure of the time it takes for an average student to fulfil the learning outcomes of a course. In the Maldives National Qualifications Framework (MNQF), one credit represents an average of 10 hours of learning time, including both teaching and private study. A standard full-time undergraduate programme in the Maldives generally consists of 120 credits per academic year. For a four-year engineering bachelor's degree, the total number of credits required is typically 480.

(3) **Internship Program:** The engineering programme should include a supervised internship programme of two work placements of 10 weeks (400 hours) in an engineering practice environment or organization. The internship should be planned and agreed upon by the institution and the host organization, and assessment should be carried out using defined rubrics.

(4) **Lab Work:** Each core engineering subject should be supported by practical work in well-equipped labs, and students should be encouraged to develop practical skills and engage in open-ended labs, problem-based learning, and projects. Students should critically reflect on and report how this experience has contributed to their development, evaluated against programme-level graduate attributes.

(5) **Design Projects:** Design projects should be integral to each core subject, fostering practical skills, creativity, and competition among students. The programme emphasises integrative project work aligned with a range of graduate outcomes, specifically focusing on designing or developing solutions. Work experiences, ideally linked to professional engineering, can include practical workshops or site-based work. HEIs may recognise up to 400 hours of general work experience, offering flexibility. These experiences, whether full-time or part-time, contribute to a well-rounded skill set, preparing students for diverse engineering career paths. Final Year Design Projects (FYDP) should be undertaken and demonstrate an integration of knowledge and practical skills. The FYDP should span at least two consecutive semesters.

(6) **Research Work:** The programme should include sufficient individual research work to comply with the requirements for the award of an Honours degree.

(7) **Evaluation and Feedback:** The effectiveness of teaching-learning processes should be regularly evaluated. The academic calendar, instructional days, contact hours per week, teaching staff quality, syllabi design, student evaluation, and feedback should be reviewed. Internal reviews of quality assurance procedures should be conducted periodically.

(8) **Extra and Co-curricular Activities:** The programme should facilitate extra and co-curricular activities to develop personal skills and promote general wellness among students. These activities can include sports, clubs, and student organizations.

(9) **Library and Educational Technology:** The educational institution should have a comprehensive and up-to-date library, as well as extensive educational technology facilities to support teaching and learning.

iii) Overall, Criterion 3 emphasizes the importance of a well-designed curriculum and effective teaching-learning processes that enable students to acquire the essential knowledge, understanding, and skills required for professional engineering practice. The curriculum should provide both breadth and depth, follow prerequisites, include complementary studies, align with desired outcomes, and undergo continuous evaluation and improvement.

## d) Criterion 4: Students

e) The quality and performance of students are crucial factors in evaluating the effectiveness of an engineering program. Admission and transfer policies should be well-defined and appropriate for selecting students who have the potential to achieve the programme's outcomes. The programme should also provide support mechanisms to guide students academically and professionally.

f) Key considerations under this criterion include:

i) **Admission and Transfer Policies:** The institute must establish clear and fair policies for admitting and transferring students into the programme. These policies should aim to select students who have the potential to achieve the programme's desired outcomes.

ii) **Academic Performance Monitoring:** Continuous monitoring of students' academic performance is essential to track their progress in achieving the programme outcomes. Timely and constructive feedback should be provided to students, and appropriate measures should be taken to address any performance gaps.

iii) **Advisory Support:** Each student should be assigned a dedicated advisor who will provide guidance, support, and mentorship on both academic and professional matters. The advisor plays a crucial role in assisting students throughout their educational journey.

iv) **Extra- and Co-curricular Activities:** Students should be provided with ample opportunities to engage in extra- and co-curricular activities. These activities, such as participation in student clubs, competitions, and sports, promote ethical practices, interpersonal skills, and overall character development.

v) **National and International Competitions:** Students should be encouraged and facilitated to participate in national and international exhibitions and engineering competitions. This allows them to showcase their skills, talents, and innovative ideas on a broader platform.

vi) **Mathematical and Physical Sciences Foundation:** Students interested in pursuing engineering programmes should have a solid foundation in mathematics and physical sciences. However, for those who do not meet the entry qualifications, the institute should offer suitable remedial programmes to help them attain equivalent qualifications.

vii) **Supportive and Engaging Teaching-Learning Environment:** The programme should provide a supportive and engaging teaching-learning environment that nurtures students' enthusiasm and motivation. This includes creating opportunities for interactive and participatory learning experiences.

viii) **Comprehensive Counselling Services:** The institute should offer comprehensive counselling services to students, covering various aspects such as academic, career, financial, and health matters. These services aim to support students in their personal and academic growth.

ix) **Student Feedback Mechanisms:** The programme should establish effective mechanisms to collect feedback and suggestions from students. This can be achieved through committees, forums, surveys, or other channels that enable students to contribute their ideas for programme improvement.

x) **Teaching Load Management:** It is important to ensure that students are not overwhelmed with an excessive workload that surpasses their capacity. The programme should carefully manage the teaching load in each semester, ensuring a balance between academic rigor and students' well-being.

xi) **Character Development:** In addition to academic development, the programme should provide opportunities for students to develop their character. Engagement in co-curricular activities, student clubs, competitions, sports, and campus activities contribute to holistic growth and personal development.

g) Evaluation of students within this criterion emphasizes the importance of student quality, progression, support, and engagement in achieving the desired outcomes of an engineering programme.

### h) Criterion 5: Academic and Support Staff

i) Criterion 5 assesses the adequacy and quality of academic and support staff in the civil engineering degree programme. It focuses on the qualifications, commitment, and number of staff members, as well as the provision of technical and administrative support necessary for effective programme delivery.

(1) **Academic Staff:** The civil engineering degree programme must have a qualified and committed teaching staff. They should be able to engage students in interactive learning experiences, provide timely and constructive feedback, and promote critical thinking, problem-solving, and practical application of knowledge. Those academic staff members teaching courses on design should possess either certification of professional engineer or qualification through experience in engineering design and practices. To ensure proper programme guidance and development of effective evaluation, assessment, and improvement processes, the academic members must have appropriate qualifications and demonstrably sufficient authority. Their overall competence will be assessed based on factors such as education, engineering experience, teaching effectiveness and experience, communication skills, enthusiasm for programme improvement, scholarship level, participation in professional societies, and, where applicable, professional engineering licensure.

(2) **Part-Time Staff:** The institution may engage part-time staff with acceptable professional qualifications in related engineering fields. However, the number of part-time staff should not exceed 40 percent of the total teaching staff.

**(3) Academic Staff-to-Student Ratio**: The program must demonstrate that it is not critically dependent on one individual. The full-time equivalent academic staff to student ratio should ideally be 1:20 or better. This ratio ensures effective teaching, student-staff interaction, student advising and counselling, provision of institutional services, research activities, professional development, and interaction with industries.

(4) **Support Staff:** The programme should also have a sufficient number of technical and workshop staff to facilitate the smooth operation of laboratories, maintenance of equipment, and general support. These staff members should possess the necessary qualifications and experience to effectively manage the practical aspects of the programme, ensuring safety and providing hands-on support to students.

(5) **Administrative and Secretariat Staff:** The programme should also provide a sufficient number of administrative and secretariat staff members to support the academic staff. These staff members play a crucial role in coordinating programme logistics, managing student records, organizing schedules, and providing administrative support to faculty members, ensuring efficient programme administration.

(6) **Resource Allocation and Staff Development:** The programme should allocate appropriate resources for staff development, including funding for professional development opportunities, research activities, and access to relevant educational resources. Adequate provisions should also be made to maintain and upgrade technical facilities, laboratories, and computing resources to support effective teaching and learning.

ii) Overall, Criterion 5 aims to ensure that the engineering degree programme has a qualified and committed teaching staff, supported by technical and administrative personnel, to deliver a high-quality educational experience to its students.

## i) Criterion 6: Facilities and Infrastructure

i) The availability of suitable facilities and infrastructure is crucial for the smooth functioning of civil engineering programmes. Adequate provision of lecture rooms, laboratories, workshops, drawing offices, and private study areas is necessary to support various learning activities, including lectures, tutorials, and practical classes.

(1) **Laboratories:** Laboratories play a vital role in practical education, and it is important that they are well-equipped with modern and relevant equipment. They should provide a safe working environment for students, ensuring their well-being while conducting experiments and hands-on activities.

(2) **Lecture rooms:** Lecture rooms should be large enough to accommodate the number of students enrolled in the programme. They should also be equipped with audio-visual equipment and other resources that are necessary for effective teaching and learning.

(3) **Workshops:** Workshops are important for providing students with hands-on experience in various technical skills. They should be equipped with the necessary tools and equipment for the type of work that will be conducted.

(4) **Drawing offices:** Drawing offices are important for providing students with a space to work on their designs and drawings. They should be equipped with the necessary furniture and equipment, such as drafting tables and computers.

(5) **Private study areas:** Private study areas are important for providing students with a quiet place to study and work independently. They should be well-lit and have comfortable seating.

(6) **Computing and Information Technology Support:** Robust computing and information technology support systems are essential for engineering educational programmes. These systems should cater to the needs of both teaching staff and students, enabling them to access necessary resources, conduct research, and engage in scholarly activities.

## a) Criterion 7: Institutional Support and Financial Resources

i) This criterion assesses the availability and commitment of financial resources to sustain and enhance the engineering programme. Adequate funding is necessary for operational expenses, facility maintenance, staff development, and equipment upgrades. The programme should demonstrate financial sustainability, ongoing commitment, and the ability to meet recurrent and developmental needs. Infrastructure, including well-equipped labs and a stocked library, is crucial, along with a focus on research and development. Institutions must provide relevant financial information and demonstrate sound fiscal management.

## b) Criterion 8: Governance and Continuous Quality Improvement

i) **Governance Structure:** The governance structure of the programme must clearly define authority and responsibility for formulating and implementing policies that align with the programme's mission. The institution should also have a mechanism for ensuring that a Quality Management System (QMS) is effectively implemented and maintained.

ii) **Quality Improvement:** Ensuring the delivery of quality engineering education is a fundamental aspect of higher education institutions (HEIs). A Quality Management System (QMS) should be established to guarantee the achievement of programme objectives and outcomes. This system encompasses planning, implementation, monitoring, and improvement, instilling confidence in stakeholders regarding graduates' demonstrated outcomes. The focus of the QMS revolves around academic programmes, while considering all aspects of campus life. A Quality Enhancement Department (QED) plays a vital role in streamlining and ensuring quality assurance through assessment and improvement mechanisms, leading to continuous quality improvement (CQI) of academic programmes and the attainment of their outcomes.

iii) **Continuous Quality Improvement (CQI) Processes:** CQI is achieved through a closed-loop system involving the QED and engineering departments. The institution should have well-defined processes for quality assessment and improvement, addressing any weaknesses or nonconformities identified in previous accreditation visits. The compliance report should include verifiable remedial measures, verified by the QED.

iv) The program should provide details of its CQI processes, including:

(1) Self-assessment reports

(2) Corrective action reports

(3) Implementation plans based on previous accreditation visit observations.

(4) Evidence of efforts to enhance faculty strength, facilities, and initiatives to support program outcomes.

### c) Criterion 9: Industrial and International Linkages

i) Civil engineering programmes should have strong linkages with national and international industry partners, academic institution and research offices. This can be achieved through a variety of mechanisms, including:

(1) **Establishing linkages with national and international industries, academic institutions, and research organizations:** This can be done through formal agreements, joint research projects, student and staff mobility, and other means.

(2) **Encouraging teaching staff and student exchanges:** This can help to promote the sharing of knowledge and expertise between industry and academia.

(3) **Facilitating joint Research and Development (R&D) projects:** This can help to ensure that the curriculum is aligned with the latest research and development in the field.

(4) **Offering internships and design projects:** This can give students the opportunity to gain real-world experience and learn from practicing engineers.

(5) **Establishing an Industrial Advisory Board:** This can provide a formal mechanism for industry to provide input on the curriculum and program evaluation.

(6) **Establishing a communication channel between industry and academia:** This can help to ensure that there is a continuous flow of information between the two parties.

# Annex I - International Engineering Alliance Knowledge Profiles

| A Washington Accord program provides: | A Sydney Accord program provides: | A Dublin Accord program provides: |
|---|---|---|
| **WK1:** A systematic, theory-based understanding of the **natural sciences** applicable to the discipline and awareness of relevant **social sciences** | **SK1:** A systematic, theory-based understanding of the **natural sciences** applicable to the sub-discipline and awareness of relevant **social sciences** | **DK1:** A descriptive, formula-based understanding of the **natural sciences** applicable in a sub-discipline and awareness of directly relevant **social sciences** |
| **WK2:** 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 | **SK2:** Conceptually-based **mathematics**, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed consideration and use of models applicable to the sub-discipline | **DK2:** Procedural **mathematics**, numerical analysis, statistics applicable in a subdiscipline |
| **WK3:** A systematic, theory-based formulation of **engineering fundamentals** required in the engineering discipline | **SK3:** A systematic, theory-based formulation of **engineering fundamentals** required in an accepted sub-discipline | **DK3:** A coherent procedural formulation of **engineering fundamentals** required in an accepted sub-discipline |
| **WK4:** 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. | **SK4:** Engineering **specialist knowledge** that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline | **DK4:** Engineering **specialist knowledge** that provides the body of knowledge for an accepted sub-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 | **SK5:** 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** using the technologies of a practice area | **DK5:** Knowledge that supports **engineering design and operations** based on the techniques and procedures of a practice area |
| **WK6:** Knowledge of **engineering practice** (technology) in the practice areas in the engineering discipline | **SK6:** Knowledge of **engineering technologies** applicable in the sub-discipline | **DK6:** Codified **practical engineering knowledge** in recognized practice area. |

| A Washington Accord program provides: | A Sydney Accord program provides: | A Dublin Accord program provides: |
|---|---|---|
| **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 sustainable development. | **SK7: Knowledge** of the role of technology in society and identified issues in applying engineering technology, such as public safety and sustainable development. | **DK7: Knowledge** of issues and approaches in engineering technician practice, such as public safety and sustainable development. |
| **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 | **SK8:** Engagement with the current **technological literature** of the discipline and awareness of the power of critical thinking | **DK8:** Engagement with the current **technological literature** of the practice area |
| **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 | **SK9: 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 | **DK9: 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 |

# Annex II - International Engineering Alliance Graduate Attribute Profiles

| Differentiating Characteristic | Engineer Graduate | Engineering Technologist Graduate | Engineering Technician Graduate |
|---|---|---|---|
| **Engineering Knowledge:** Breadth, depth and type of knowledge, both theoretical and practical | **WA1:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization as specified in WK1 to WK4 respectively to develop solutions to complex engineering problems | **SA1:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals and an engineering specialization as specified in SK1 to SK4 respectively to defined and applied engineering procedures, processes, systems or methodologies. | **DA1:** Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices. |
| **Problem Analysis** Complexity of analysis | **WA2:** 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 (WK1 to WK4) | **SA2:** Identify, formulate, research literature and analyse *broadly-defined* engineering problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialisation. (SK1 to SK4) | **DA2:** Identify and analyse *well-defined* engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity. (DK1 to DK4) |
| **Design/development of solutions:** Breadth and uniqueness of engineering problems i.e., the extent to which problems are original and to which solutions have not previously been identified or codified. | **WA3:** 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 (WK5) | **SA3:** Design solutions for *broadly- defined* engineering technology problems and *contribute to* the design of 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 (SK5) | **DA3:** Design solutions for *well-defined* technical problems and *assist with* the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety as well as cultural, societal, and environmental considerations as required (DK5) |

| Differentiating Characteristic | Engineer Graduate | Engineering Technologist Graduate | Engineering Technician Graduate |
|---|---|---|---|
| **Investigation:** Breadth and depth of investigation and experimentation | **WA4:** 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 (WK8) | **SA4:** Conduct investigations of *broadly defined* engineering problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions (SK8) | **DA4:** Conduct investigations of *well-defined* problems; locate and search relevant codes and catalogues, conduct standard tests and measurements (DK8) |
| **Tool Usage:** Level of understanding of the appropriateness of technologies and tools | **WA5:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to *complex* engineering problems (WK2 and WK6) | **SA5:** Select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to *broadly-defined* engineering problems (SK2 and SK6) | **DA5:** Apply appropriate techniques, resources, and modern computing, engineering, and IT tools to *well-defined* engineering problems, with an awareness of the limitations. (DK2 and DK6) |
| **The Engineer and the World:** Level of knowledge and responsibility for sustainable development | **WA6:** When solving complex engineering problems, analyse and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (WK1, WK5, and WK7) | **SA6:** When solving broadly-defined engineering problems, analyse and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (SK1, SK5, and SK7) | **DA6:** When solving well-defined engineering problems, evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (DK1, DK5, and DK7) |
| **Ethics:** Understanding and level of practice | **WA7:** 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 (WK9) | **SA7:** Understand and commit to professional ethics and norms of engineering technology practice including compliance with national and international laws. Demonstrate an understanding of the need for diversity and inclusion (SK9) | **DA7:** Understand and commit to professional ethics and norms of technician practice including compliance with relevant laws. Demonstrate an understanding of the need for diversity and inclusion (DK9) |

| Differentiating Characteristic | Engineer Graduate | Engineering Technologist Graduate | Engineering Technician Graduate |
|---|---|---|---|
| **Individual and Collaborative Team work:** Role in and diversity of team | **WA8:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (WK9) | **SA8:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (SK9) | **DA8:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (DK9) |
| **Investigation:** Breadth and depth of investigation and experimentation | **WA4:** 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 (WK8) | **SA4:** Conduct investigations of *broadly defined* engineering problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions (SK8) | **DA4:** Conduct investigations of *well-defined* problems; locate and search relevant codes and catalogues, conduct standard tests and measurements (DK8) |
| **Tool Usage:** Level of understanding of the appropriateness of technologies and tools | **WA5:** Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to *complex* engineering problems (WK2 and WK6) | **SA5:** Select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to *broadly-defined* engineering problems (SK2 and SK6) | **DA5:** Apply appropriate techniques, resources, and modern computing, engineering, and IT tools to *welldefined* engineering problems, with an awareness of the limitations. (DK2 and DK6) |
| **The Engineer and the World:** Level of knowledge and responsibility for sustainable development | **WA6:** When solving complex engineering problems, analyse and evaluate sustainable development impacts* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (WK1, WK5, and WK7) | **SA6:** When solving broadly-defined engineering problems, analyse and evaluate sustainable development impacts* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (SK1, SK5, and SK7) | **DA6:** When solving well-defined engineering problems, evaluate sustainable development impacts* to: society, the economy, sustainability, health and safety, legal frameworks, and the environment (DK1, DK5, and DK7) |
| **Ethics:** Understanding and level of practice | **WA7:** 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 (WK9) | **SA7:** Understand and commit to professional ethics and norms of engineering technology practice including compliance with national and international laws. Demonstrate an understanding of the need for diversity and inclusion (SK9) | **DA7:** Understand and commit to professional ethics and norms of technician practice including compliance with relevant laws. Demonstrate an understanding of the need for diversity and inclusion (DK9) |

| Differentiating Characteristic | Engineer Graduate | Engineering Technologist Graduate | Engineering Technician Graduate |
| --- | --- | --- | --- |
| **Individual and Collaborative Team work:** Role in and diversity of team | **WA8:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (WK9) | **SA8:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (SK9) | **DA8:** Function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings (DK9) |
| **Communication:** Level of communication according to type of activities performed | **WA9:** 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. | **SA9:** Communicate effectively and inclusively on *broadly-defined* 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. | **DA9:** Communicate effectively and inclusively on *well-defined* engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions |
| **Project Management and Finance:** Level of management required for differing types of activity | **WA10:** 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 in multidisciplinary environments. | **SA10:** Apply knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a team and to manage projects in multidisciplinary environments. | **DA10:** Demonstrate awareness of engineering management principles as a member or leader in a technical team and to manage projects in multidisciplinary environments |
| **Lifelong learning:** Duration and manner | **WA11:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK8) | **SA11:** Recognize the need for, and have the ability for i) independent and lifelong learning and ii) critical thinking in the face of new specialist technologies (SK8) | **DA11:** Recognize the need for, and have the ability for independent updating in the face of specialized technical knowledge (DK8) |

# Annex III - Format for Programme Self-Assessment Report (SAR)

The SAR should have the following statement in its coversheet.

*Self-Assessment Report for Accreditation of ………. offered by the (Department of _ /HEI with Address) Month, Year*

*Name of the Head of HEI:*

*Signature:*

*Date:*

The SAR should contain the following chapters. Annex III describes the expected content in Chapter 2.

Chapter 1: Introduction

1.1 Overview of the higher education institution (HEI)
1.2 Mission and objectives of the HEI
1.3 Overview of the programme offering department
1.4 Assessment process
1.5 Graduate Attributes
1.6 Brief Description of the program under assessment including the development process and internal approval milestones.

Chapter 2: Level of Compliance with Ministry's Accreditation Criteria and Standards

2.1 Program Educational Objectives (PEOs)
2.2 Student Learning Outcomes (SLOs)
2.3 Curriculum and Teaching-Learning Process
2.4 Students
2.5 Faculty and Support Staff
2.6 Facilities and Infrastructure
2.7 Institutional Support and Financial Resources
2.8 Continuous Quality Improvement
2.9 Industrial and International Linkages

Chapter 3: SWOT Analysis of the Programme

Chapter 4: Conclusion

4.1 Strategic plan for further improvement
4.2 Conclusion

Annex all curriculum documents such as course specifications and subject/unit outlines, including relevant policies, rules, regulations, procedures etc. as references/exhibits.

# Annex IV – Guidelines to complete Chapter 2 of the SAR

The HEI applying for accreditation are encouraged to provide accurate and comprehensive details as outlined in the Civil Engineering Academic Standards. By following the guidelines below, the institution ensures the accuracy and completeness of the information presented. This not only demonstrates the institution's commitment to transparency and accountability but also enhances the credibility of the accreditation process.

I. Programme Educational Objectives

a) State the institution/faculty's vision and mission.
b) Describe the PEOs and state where they are the published.
c) Describe how the PEOs are aligned with the institution/faculty's vision, mission, and stakeholders' requirements.
d) Outline the processes for evaluating PEO achievement.
e) Explain how evaluation results enhance programme effectiveness.

II. Student Learning Outcomes (SLOs)

a) List and specify the publication source of SLOs.
b) Relate SLOs to PEOs.
c) Ensure alignment of SLOs with the requirements outlined in this standard.
d) Detail the processes for establishing and reviewing SLOs, highlighting stakeholder involvement.
e) Map courses with SLOs.
f) Summarize data and assessment results for SLOs.
g) Apply assessment outcomes to enhance programme development.
h) Describe materials, including student work and evidence, demonstrating SLO achievement.
i) Provide evidence of exposure to complex engineering problems through examples from both general and specialized courses. Highlight the specific domains and levels of cognitive skills involved, showcasing the alignment with mapped SLOs.

III. Curriculum and Teaching-Learning Processes

a) Discuss the program structure and course contents to show how they are appropriate to, consistent with, and support the development of the range of intellectual and practical skills and attainment or achievement of the SLOs.
a) Describe the curriculum and teaching-learning processes of the civil engineering programme and how they enable students to acquire the necessary knowledge, understanding, and skills to practice effectively as graduates.
b) Explain how the curriculum provides breadth and depth appropriate to civil engineering, encompassing a range of engineering subjects, mathematics, and complementary support subjects.
c) Describe the curriculum design and how it is responsive to academic and technological changes, as well as the needs of students, the community, and the profession.
d) Explain how the curriculum is designed to optimize resources and align with the programme's objectives.

e) Describe the knowledge profiles of the programme and how they reflect modern perspectives of engineering curriculum. Explain how the knowledge profiles are defined, measured, and evaluated.

f) Include relevant information of the following:
   (i) How the curriculum applies: Mathematics through differential equations, probability and statistics, calculus-based physics, chemistry, and either computer science, data science, or an additional area of basic science.
   (ii) Matrix linking courses to PLOs.
   (iii) Distribution of engineering courses by program-specific areas.
   (iv) Distribution of non-engineering (general education) courses.
   (v) Semester-wise distribution of courses.
   (vi) Details of laboratory equipment/workstations and conducted experiments.

## IV. Students

a) Outline student admission requirements, procedures, and annual intake.

b) The programme may adopt the minimum entry requirements set out below, or if the programme chooses to articulate its own entry requirements, it must establish equivalence to the requirements given below. Where the minimum entry requirements stated below and "Entry Criteria for MNQF Qualifications" differ, the higher entry requirements would be required to be adopted.

| Level | Qualification(s) | Minimum Entry Criteria | |
|---|---|---|---|
| | | **General Entry** | **Alternative Entry** |
| Level 5 | Diploma | • Successful completion of Higher Secondary Education, or<br>• Attainment of a Level 4 qualification in a related field, or<br>• Attainment of a Level 4 Foundation Study Program approved by MQA for the specific Diploma program. | • Completion of a Level 4 qualification in a (unrelated field), and successful completion of an MQA approved University Preparation Program, or<br>• 20 years old, completion of secondary school, 2 years of relevant work experience, and successful completion of an MQA approved University Program |
| Level 6 | Advanced Diploma / Associate Degree | • Successful completion of Higher Secondary Education, or<br>• Attainment of a Level 4 or Level 5 qualification in a related field, or<br>• Attainment of a Level 4 Foundation Study Program approved by MQA for the specific Diploma program. | • Completion of a Level 4 qualification in a (unrelated field), and successful completion of an MQA approved University Preparation Program, or<br>• 20 years old, completion of secondary school, 2 years of relevant work experience, and successful completion of an MQA approved University Program |
| Level 7 | Bachelor's Honors Degree | • Successful Completion of Higher Secondary Education, or<br>• Attainment of a Level 5 or Level 6 qualification in a | • Completion of a Level 4 qualification in a (unrelated field), and successful completion of an MQA approved University Preparation Program, or |

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|---|---|---|---|
| | | related field, or<br>• Attainment of a Level 4 Foundation Study Program approved by MQA for the specific Diploma program. | • 20 years old, completion of secondary school, 2 years of relevant work experience, and successful completion of an MQA approved University Program |

Explanation of terms:

1. "Successful Completion of Higher Secondary Education" means:
   Term as defined in "Entry Criteria for MNQF Qualifications" and should have minimum "passing grades" in mathematics as one of the 2 subjects, in a nationally recognized Higher Secondary School Examinations.

2. "Level 4 Foundation Study Program" means:
   Term as defined in "Entry Criteria for MNQF Qualifications" and should have minimum "passing grades" in mathematics.

3. "University Preparation Program" means:
   Term as defined in "Entry Criteria for MNQF Qualifications" and should have minimum "passing grades" in mathematics.

4. "Experience in the relevant field" means:
   Term as defined in "Entry Criteria for MNQF Qualifications"

c) What are the procedures and procedures for credit transfer/exemption?
d) Explain strategies for providing academic, career, and well-being guidance to students.
e) What is student workload, class sizes, laboratory sessions, and course completion?
f) Describe students' involvement in organizations, emphasizing their experiences in management, governance, representation, and social activities.
g) Discuss KPIs that demonstrate students' performance relative to SLOs.

## V. Academic and Support Staff

a) Teaching Staff and Coordinators must meet the criteria set out under Section 20 of MQA's regulation for Programme Accreditation (Regulation No: R-77/2022)
b) Examine the academic staff's strength and competencies across all programme areas, emphasizing the implementation of outcome-based education.
c) Evaluate the overall staff workload, ensuring effective teaching, student-teacher ratio, student-staff interaction, advising, counselling, institutional service, research activities, professional development, and industry involvement.
d) Discuss the process for staff development, training, and retention.
e) Assess the capacity and competence of technical and administrative staff to provide adequate support to the educational programme.

## VI. Facilities and Infrastructure

a) Evaluate the quality and suitability of teaching and learning facilities, including classrooms, learning-support facilities, study areas, the library, computing and information-technology systems, laboratories, workshops, and related equipment to support various delivery modes.

(i) Provide a list of lecture facilities (specify number, capacity, and audio-visual facilities available).
(ii) Provide a list of laboratories allocated for the programme.
(iii) Provide a list of the workshops (specify the equipment/machinery available in each workshop)
(iv) Provide a list of computer laboratories (specify the hardware and software available).

b) Evaluate the adequacy of support facilities, such as hostels, sport and recreational centres, health centres, student centres, and transport, in enhancing student life on campus and facilitating character development. Provide examples and maps where necessary.
c) Brief overview of recent and expected improvements in these facilities.

VII. Institutional Support and Financial Resources

a) Provide evidence of the availability and commitment of financial resources to sustain and enhance the civil engineering programme.
b) Explain how the funding is allocated for operational expenses, facility maintenance, staff development, and equipment upgrades.
c) Show how the programme demonstrates financial sustainability, ongoing commitment, and the ability to meet recurrent and developmental needs.
d) Explain how the institution will fund infrastructure upkeep, including well-equipped labs and a stocked library.
e) Highlight the research and development activities and how they are funded and managed.
f) Present relevant financial information and demonstrate sound fiscal management.

VIII. Governance and Continuous Quality Improvement

a) Describe the programme's governance structure and how it aligns policies with the programme's mission. Explain how the QMS is implemented and maintained.
b) Explain how the programme delivers quality engineering education and establishes a QMS to achieve programme objectives and outcomes.
c) Describe how the QMS plans, implements, monitors, and improves the programme and instils confidence in stakeholders.
d) Explain how the QMS considers all aspects of campus life.
e) Describe the QED's role and functions in ensuring quality assurance and CQI.
f) Describe how the QED and engineering departments achieve CQI through a closed-loop system.
g) Explain how the institution assesses and improves quality and addresses previous accreditation issues.
h) Provide the compliance report and verifiable remedial measures, verified by the QED.
i) Provide details of the CQI processes, including:
   (i) Self-assessment reports
   (ii) Corrective action reports
   (iii) Implementation plans based on previous accreditation observations.
   (iv) Evidence of efforts to enhance faculty, facilities, and initiatives.

IX. Industrial and International Linkages

a) Explain how the programme achieved linkages with national and international industry partners, academic institutions and research offices.

b) Provide a list of formal agreements, joint research projects, student and staff mobility, and other means with industries, academic institutions, and research organisations.
c) Describe the existence of active industry advisory board/committee and formal involvement of industry in development and review of the programme.
d) Discuss opportunities for collaborative design projects and supervised placement for students.
e) Discuss different HEI policies to encourage staff and students to engage with the industry to have industry-sponsored projects.