This document is optional to be used by higher education institutions for programmes seeking accreditation between September 2026 and August 2028 and mandated to be used from September 2028 onwards

THE HONG KONG INSTITUTION OF ENGINEERS

SUBMISSION FOR ACCREDITATION OR REACCREDITATION OF AN ENGINEERING DEGREE PROGRAMME TO MEET THE HKIE'S ACADEMIC REQUIREMENTS FOR CORPORATE MEMBERSHIP AT THE WASHINGTON ACCORD LEVEL

Submitted by

_____

Name of University/Institution

Faculty:

Department(s):

Programmes(s):

Date of Visit:

Signed By:

_____ Date _____
Dean/Head of Department

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GUIDANCE NOTES

FOR

COMPLETION OF THE ACCREDITATION SUBMISSION

This accreditation submission format is designed to assist academic departments in the preparation of their submission for a professional accreditation exercise and the visiting teams in the assimilation of the information required. The information requested is as set out below and references the HKIE's Professional Accreditation Handbook - Engineering Degrees. It is strongly recommended that this handbook be studied carefully before preparing the accreditation submission.

Content

The accreditation submission is set out as follows:

Part 1: General information of the Higher Education Institution (HEI)
Part 2: General information of the engineering department *(One submission for each department)*
Part 3: Information of the engineering programme – general information and other criteria *(One submission for each programme)*
Part 4: Information of the engineering programme – programme assessment *(One submission for each programme)*

Completion

Please provide the information under each clause and complete the tables as required. Please do **not** change the wording, sequence or format of the sections, clauses, headings or tables.

Soft copies of the submission, with all attachments, should be uploaded to the HKIE Accreditation Online Platform at least six weeks before the visit. Hard copies of the submission may be required if request from the Visiting Team is received. One set of the accreditation submission in electronic version will be kept seven years by the HKIE after the completion of the accreditation exercise and will be destroyed afterwards.

CONTENTS

PART 1

GENERAL INFORMATION OF THE HIGHER EDUCATION INSTITUTION (HEI)

1.1 VICE CHANCELLOR, PRESIDENT OR DIRECTOR

Title:

Name:

1.2 DEAN

Name:

Date of appointment:

1.3 STRUCTURE OF THE HEI

Provide details of the organisational structure of the HEI including its major academic and administrative components. An organisational chart may be attached if appropriate.

1.4 FUNDING

Please present the funding arrangements for the HEI. Information required include but not limited to the following:

- Distribution of the source of funding.
- The audited financial statement for the past two years.
- Any anticipated changes in the funding model and/or financial situation in the next five years.

1.5 STUDENT NUMBERS OF THE FACULTY/COLLEGE/SCHOOL

Please provide the total number of undergraduate students of the Faculty/College/School in which the programme is seeking accreditation, for the last five academic years in the table below:

20XX/20XX	20XX/20XX	20XX/20XX	20XX/20XX	20XX/20XX

PART 2

GENERAL INFORMATION OF THE ENGINEERING DEPARTMENT

Note: One submission of Part 2 is required for each department, irrespective of the number of programme(s) to be accredited under this department.

2.1 LIST OF PROGRAMME(S) TO BE ACCREDITED UNDER THIS DEPARTMENT

Provide the list of programme(s) to be accredited under the Department in this accreditation exercise.

2.2 STRUCTURE OF THE DEPARTMENT

Provide the organisation chart outlining the organisational structure of the Department including its major academic administrative units, the units responsible for the programme development and administration as well as the quality assurance of the programmes to be accredited. Please also provide a brief description of the composition and the list of responsibilities for these major academic and administrative units.

2.3 ADMINISTRATIVE RESPONSIBILITIES

Describe the authority of the Dean, Head of Department and others within the Department under which the programme(s) to be accredited is/are offered. Please also provide their respective list of responsibilities together with their names and titles.

2.4 OTHER DEPARTMENT(S)

Provide details and describe the relationship with other Departments that provide courses that are included in the curriculum of the programme(s) to be accredited. Information required include but not limited to the list of courses and the description of the operation arrangement agreed with the Department(s).

PART 3

INFORMATION OF THE ENGINEERING PROGRAMME – GENERAL INFORMATION AND OTHER CRITERIA

Note: One submission of Part 3 is required for each programme to be accredited.

3.1 TITLE OF THE PROGRAMME

Provide the full official name of the programme.

3.2 AWARD OF DEGREE

Provide the name of the degree to be awarded after completion of the programmes. Same programme with different mode of study (full-time, part-time, sandwich…etc) should be listed under separate entry.

3.3 MONTH/YEAR OF FIRST INTAKE OF STUDENTS

Month/Year of first intake of students:

(Different mode of study (full-time, part-time, sandwich…etc) should be listed under separate entry.)

3.4 PROGRAMME GOVERNANCE

Identify the programme director/leader and describe in detail his/her responsibilities.

3.5 PREVIOUS HKIE ACCREDITATION RECORD (IF APPLICABLE)

Date on which last professional accreditation exercise took place:

Outcome of the exercise:

Please attach a copy of the visit report and decision letter of the last accreditation exercise.

3.6 AMENDMENTS TO THE PROGRAMME

Please provide details of any changes made to the programme since the last professional accreditation exercise and indicate whether such changes were reported to the HKIE.

3.7 DURATION

Please provide information on programme duration in the following table and use separate table for each mode of study:

Programme duration	
	Full-time/Part-time Programme
Minimum years of study	
Maximum years of study	
Number of weeks per academic year *(excluding assessment and/or practical training)*	

3.8 ENTRY LEVELS

3.8.1 Admission Requirements and Selection Procedures

Provide the admission requirements of the programme for the last five years. Explain the basis for setting these standards and the selection procedures.

Please specify the different admission criteria and selection procedures for applicants of different academic background, if any.

3.8.2 Academic Background of Students upon Admission

If provision exists for entry into the programme other than by the qualification of Hong Kong Diploma of Secondary Education, please list out the academic background of students upon admission in the last five academic years by completing the following table. One table to be completed for each academic year.

Year 1/2/3 entry

Academic Year: 20XX/20XX		
Qualification upon admission	**Graduated from:**	**Number of students admitted**
…		
…		

Example:

Year 3 entry

Academic Year: 2019/2020		
Qualification upon admission	**Graduated from:**	**Number of students admitted**
Higher Diploma in Civil Engineering	XYZ College	5
…		

3.9 STUDENT NUMBERS

Please provide the total number of students for the last five academic years (for existing programmes) or the years since the programme commenced (for new programmes) in the table below and use separate table for each mode of study:

	Year 1	Year 2	Year 3	Year 4	Total
20XX/20XX					

3.10 GRADUATION STATISTICS

Please indicate the graduation statistics for the past five years in the below table and use separate table for each mode of study.

		Year of Graduation				
The total number of students admitted to the programme in **corresponding first year**						
The total number of students admitted to the programme in **corresponding second and subsequent years**						
The number of these students graduating with honours degrees	1st					
	2/1					
	2/2					
	3rd					
The number of these students graduating with pass degrees						
The number of these students leaving the programme						
The number of these students who are still studying in the programme						

3.11 STAFFING

3.11.1 Academic Staff

(a) Academic Staff Number and Age Demographic Distribution

Please provide information on the number of academic staff within the Department for the recent three years.

Academic Staff	**Academic Year**		
Total academic staff establishment			
Number of full-time academic staff employed			
Number of part-time academic staff employed			
TOTAL			
Number of staff on sabbatical leave			
Number of academic staff vacancies			

Please provide the distribution of age demographics of all full-time academic staff in the below table:

Age	Position			
	Chair Professor	Professor	Associate Professor	Others (please specify)
below 30				
31-40				
41-50				
51-60				
above 60				

(b) HKIE Membership and Other Professional Qualifications

Please provide information on the number of academic staff within the Department for the recent three years.

Please provide the number and percentage of academic staff who are Corporate Members (FHKIE and MHKIE) of the HKIE:

_____ number of staff equivalent to _____% of total academic staff establishment.

Please provide the number and the percentage of academic staff who are members of relevant professional bodies:

_____ number of staff equivalent to _____% of total academic staff establishment.

(c) Academic Staff Experience and Workload

Describe the composition, size, credentials, experience, and workload of the academic staff that supports this programme.

Please provide information of the full list of academic staff (full-time and part-time) who teach this programme:

Name of Academic Staff	**Course(s) Taught**	**No. of hours/week devoted to this programme** *(including time for teaching and students' supervision)*
Describe the competencies of the academic staff and how they are adequate to cover all of the curricular areas of the programme		

(d) Academic Staff Curriculum Vitae

For each member of academic staff in the Department and other servicing Departments who are supporting the programme, please provide the information as listed below **in a separate document**. A Curriculum Vitae containing the same information can also be used.

- *Name:*
- *Present Position:*
  Date: a) joining University/Institution: b) present appointment
- *Academic Qualifications:*
- *Member of the HKIE: Y/N*
- *Other Professional Qualifications*
- *Sabbatical Leave/Other Activities Supporting Professional Development:*
  a) Year b) Organisation c) Location
- *Courses taught in the past three years:*
  a) Undergraduate b) Postgraduate
- *Courses/modules/subjects currently teaching and student contact hours per course/module/subject per year*
- *Number of student theses supervised*
  Undergraduate Masters PhD
- *Publications*
  a) Refereed Journals b) Refereed Conference c) Other
- *Consultancy for last five years*
- *Professional/Scholarly Activity*
- *Industrial and related experience*

(e) Academic Staff Policies

Provide information related to the policy for academic staff in relation to the following:

- Induction for New Academic Staff
- Continue Research and Professional Development
- Sabbatical Leave
- Research and Development
- Consultancy

(f) Part-time Academic Staff Supervision and Support

Provide information on the way the part-time academic staff are supervised, supported and evaluated in relation to: presentation of the required course content, competence in teaching and availability to students.

3.11.2 Support Staff

Please provide the number of support staff for the recent three years in the following table:

Staff	Academic Year		
Number of full-time office/administration staff			
Number of part-time office/administration staff			
Number of full-time technical staff			
Number of part-time technical staff			
Number of teaching assistant			
Other support staff			
Total			

Please provide a list of all technical, laboratory and other support staff giving their position, qualifications and brief details of their experience as table below **in a separate document**. Differentiate between permanent (P), part-time (PT) and short term research staff (R).

Name	Qualifications	Experience

3.12 RESOURCES

3.12.1 Accommodation and Equipment

Provide information on the accommodation and equipment available for the programme including the following:

- Lecture halls/classrooms
- Laboratories and equipment (stating the courses/modules/subjects that are taught in each laboratory and the equipment being used)
- Offices
- Student work areas

3.12.2 Computer Facilities and Information Services

Provide details of the computer facilities available for the programme and the availability of software for students' access to facilitate their study of the programme.

3.12.3 Library Facilities

Please provide the services and resources that the library provided to the students. Provide also details of the library facilities available that are relevant to the programme.

3.12.4 Finance

Detail the process used to establish the programme budget. Provide evidence of the continuity of support for the programme. Include both institutional and other funding sources.

(a) Committed to teaching and teaching support

Year / **Category**				
Operating: Teaching Office supplies Other Maintenance				
Equipment (Specify) Maintenance				
Capital (Specify)				
Others / Acquisitions				
Total HK$				

(b) Committed to research support

Years / Funding Source				
UGC				
Other research bodies				
Industry				
Other (Specify)				
Total HK$				

3.13 DEVELOPMENT

Describe how the programme incorporates the requirements of society and the profession.

Describe how the programme responds to local and international requirements.

Please provide details of the future plan like proposed development, change in staff, new equipment, new facilities, etc, within the programme. Please also include the budget associated with these new plans as appropriate.

3.14 OTHER INFORMATION

Please provide other information which is not covered but is considered relevant to the accreditation exercise.

PART 4

INFORMATION OF THE ENGINEERING PROGRAMME – PROGRAMME ASSESSMENT

Note: A copy of this section should be completed and submitted for each programme for accreditation.

4.1 AIMS AND OBJECTIVES

Provide details of the programme educational objectives and their relationship to the HEI, college and department mission statements. Provide details of the following and complete the mapping table below:

(a) The institutional, college, and departmental missions

(b) The list of Programme Objectives

4.1.1 Mapping of Programme Objectives to Institutional Mission

	HEI MISSION ELEMENTS						
PROGRAMME OBJECTIVES	**1**	**2**	**3**	**4**	**5**	**...**	**...**
1							
2							
3							
4							
5							
6							

* *Please mark "X" to the appropriate boxes in the above matrix to indicate the mapping.*

4.2 PROGRAMME OUTCOMES AND HKIE GRADUATE ATTRIBUTES

Provide details of the programme outcomes and their relationship to the programme objectives. Provide details of the following and complete the mapping tables below:

(a) The list of Programme Outcomes

(b) Provide information explaining the way the Programme Outcomes lead to the achievement of the Programme Objectives

4.2.1 Mapping of Programme Outcomes to Programme Objectives

	PROGRAMME OBJECTIVES						
PROGRAMME OUTCOMES	**1**	**2**	**3**	**4**	**5**		
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

* *Please mark "X" to the appropriate boxes in the above matrix to indicate the mapping, and*
please explain the way the Programme Outcomes lead to the achievement of the Programme Objectives.

4.2.2 Mapping of Programme Outcomes to HKIE Graduate Attributes

In order for an engineering degree programme to be accredited, it must demonstrate that all the HKIE Graduate Attributes are being met.

The programme outcomes are to describe what students are expected to know and to do by the time of graduation. If the programme under consideration has a set of programme outcomes different from the HKIE Graduate Attributes, please present the mapping of the programme outcomes to the HKIE Graduate Attributes in the following table.

	PROGRAMME OUTCOMES						
HKIE GRADUATE ATTRIBUTES	**1**	**2**	**3**	**4**	**5**	**…**	
GA(a)							
GA(b)							
GA(c)							
GA(d)							
GA(e)							
GA(f)							
GA(g)							
GA(h)							
GA(i)							
GA(j)							
GA(k)							

* *Please mark "X" to the appropriate boxes in the above matrix to indicate the mapping*

The following is the list of HKIE Graduate Attributes for Engineering Degree programmes for easy reference:

(a) Apply knowledge of mathematics, natural science, computer science and engineering appropriate to the degree discipline to develop solutions to complex engineering problems

(b) 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*

(c) Design creative and sustainable solutions for complex engineering problems and design systems, components or processes to meet identified needs with appropriate economic, environmental, social, political, ethical, cultural, health and safety, whole-life cost, net zero carbon, manufacturability considerations as required

(d) 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

(e) Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to support detailed analysis of complex engineering problems, and recognise limitations of such techniques, resources and tools

(f) Analyse and evaluate the impact of engineering solutions in a global, economic, environmental and societal context, especially the importance of health, safety, legal, and sustainable development* considerations to both workers and the general public when solving complex engineering problems

(g) Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws with the understanding of the need for diversity and inclusion

(h) Function effectively as an individual, and in different roles of diverse and inclusive teams and in various settings as needed

(i) 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

(j) Apply knowledge of engineering management principles and economic decision-making to one's own work, and to manage projects and in multidisciplinary environments

(k) Stay abreast of contemporary issues and recognise the need for, and have the preparation and ability for i) independent and life-long learning, ii) adaptability to new and emerging technologies, and iii) critical thinking in the context of technological change

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

Note: The above graduate attributes are reproduced from the HKIE accreditation criteria for engineering degrees. The interpretation of these graduate attributes should be consistent with the requirements of the Washington Accord and a copy of the Washington Accord Graduate Attributes and Professional Competencies is enclosed at the end of this submission format.

4.2.3 Measurement Dimension of Programme Outcomes

Present the measurement dimension of each programme outcome in the following table. Use one table for each programme outcome:

Programme Outcome:	
List of measurement dimensions:	
1.	
2.	
3.	

Example:

Programme Outcome (f): Ability to communicate effectively with a range of audiences	
List of measurement dimensions:	
1.	An ability to comprehend and write effective reports on complex engineering activities.
2.	An ability to comprehend and write clear design documentation on complex engineering activities.
3.	An ability to make effective presentations on complex engineering activities to the engineering community and the society at large.
4.	An ability to give and receive clear instructions on complex engineering activities.

4.3 SYLLABUS AND CURRICULUM

4.3.1 Programme structure

Provide a block diagram for the programme structure clearly showing core and optional course codes and titles, and all possible routes for the completion of the programme.

4.3.2 Curriculum

(a) For each course/module/subject within the programme, please provide the following:

name of course/module/subject leader
syllabus (with the date of last major and minor revision)
statement of objectives/outcomes
list of essential and reference textbooks
relationship of course to Programme Outcomes
assessment details

(b) Describe the provisions for any co-teaching with other departments that is used to satisfy curricular requirements.

(c) Provide a matrix showing the contribution of courses/modules/subjects to programme outcomes. Elaborate how each programme outcome is met through teaching, practice and measurement.

HKIE GRADUATE ATTRIBUTES		a	b	c	d	e	f	…	...
PROGRAMME OUTCOMES		1	5, 6	3	2	…			
	Core								
	Year 1								
Course/ Module/ Subject Codes and Titles	ABCXXX Physics I			T					
	ENGXXX Fluid Mechanics				T, P				
	ENGXXX	T							
	HUMXXX			P	T				
	MATHXXX		T,P	P					
	ENGRXXX				P				
	Year X								
	ENGRXXX				T,P,M				
	ENGRXXX	P		P,M					
	ENGRXXX		M						
	Electives								
	ENGRXXX				T				
	ENGRXXX	T,P		T,M					

Please use the following indication to mark on the above matrix.

T – TEACH
P – PRACTISE
M – MEASURE

4.3.3 Embedded Assessment Components Table

Please complete the following embedded assessment component table to indicate the way each programme outcome is achieved through the selected course modules. Use one table for each programme outcome.

Programme Outcome:					
Course/ Module	**Description**	**Metric**	**Rubric**	**Standard**	**Benchmark**

Example:

Programme Outcome (i): An ability to understand professional and ethical responsibility					
Course/ Module	**Description**	**Metric**	**Rubric**	**Standard**	**Benchmark**
CON4433 Sustainability and Engineering Profession	Students are required to submit assignments in relation to engineers in society, ethics and professionalism and sustainability.	The measurement of proficiency is the student's score on an assignment. Each assignment addresses part of the outcome to be measured.	Assignment(s) is/are evaluated on a 10 points scale. 7 points or above indicates competence achieved. Below 7 points indicates not achieving the required level of competence	A score of 7 points is an acceptable level of competence.	75% of students achieved the standard

4.3.4a Curriculum Details

Provide curriculum details using the format below for each year of the programme.

Year_____

Course/Module/Subject (Indicate core or optional subject)	Timetabled work in hours per week			No of teaching weeks	Total hours	Total credits	Assessment Components and their weightings (e.g. assignment/quiz/ project/ examination, etc)	Faculty member responsible for the course/module/subject
	Lect	Tut	Pract					
TOTAL:								

Lect = Lecture; Tut = Tutorial; Pract = Practice

4.3.4b Curriculum Details

Course/Module/Subject	Term	Hours			Indicate the number of credits in the programmes contributed to the following curriculum contents		
		Lect	Lab/tut	Other	Mathematics and Basic Sciences	Engineering Subjects	Complementary Studies
TOTAL :							

4.3.4c Design Elements

Please provide details of the courses/modules/subjects which exhibit elements of engineering design.

Course/Module/ Subject Title	Design content in course work	Design Project(s)	Design content in Laboratories

Please use a "X" to indicate the presence of the specific elements in the course/module/subject.

4.3.4d Projects

Please provide details of the use of project work within the programme, explaining the way it demonstrates the achievement of the programme outcome(s) if any.

Outline the arrangements for project allocation in final year.

Please make available for the Visiting Team to review examples of projects representing the range of topics covered and the marking, including details showing how the final project mark was achieved.

Please use the table below to provide a list of the project titles and marks (or grades), together with mean and standard deviation **for the most recent year available.**

Title	**Supervisor**	**Student**	**Mark/Grade**

4.3.4e Practical Training

Please describe the form of provision made for the practical training of students, whether they are offered in the form of workshop training, internship or industrial attachment.

For the last three years, please indicate the proportion of graduates who have:

	Year of graduation		
Received practical training			
Did not receive practical training			

Provide details of the nature of the practical training received.

4.4 QUALITY ASSURANCE SYSTEM / ASSESSMENT

Provide details of process used to assure an effective quality assurance system, including but not limited to the following:

(a) The list of Programme Constituencies.

(b) The process used for establishing and revising Programme Outcomes.

(c) The processes that document periodically the degree to which the intended programme outcomes are attained. Describe the level of achievement of intended programme outcomes relative to the desired levels of those outcomes. Present evidence on measurement of programme outcomes through courses/modules/subjects assessment or other activities.

(d) The information and processes commonly used in making decisions regarding programme improvements.

(e) Describe actions taken to improve the programme since the last general review. Indicate why, i.e., the basis for taking action, and when each action was implemented and the results of the implementation.

(f) Membership list, Terms of Reference and minutes of any advisory committees. Indicate the roles of the committees relative to setting and/or evaluating desired programme objectives and outcomes.

(g) If an external examiner is engaged as part of the assessment process, please attach copies of the external examiner's reports for the past three years and provide the following details:

- ***frequency of visit to the department for programme review***
- ***the coverage of the review***

- ***whether the achievement of programme/module outcomes is included in the review processes, if yes, please provide the related documents***

(h) Please provide the list of indirect measurements, such as graduate surveys and focus group meetings to demonstrate the achievement of programme outcomes, with the description of process and attachment of measurement of results.

* *For the above (c), (f), (g) and (h), the assessment results and evaluation for specific programme outcome measurement and the copies of the meeting minutes/records of the relevant Committees/Boards in the past three years concerning the quality assurance procedures of the programme should be provided to the Visiting Team for review. Such information with assessment details will be made available online for the Visiting Team to access at a link provided by the HEI from two weeks before the on-site visit until the end of the visit.*

INTERNATIONAL ENGINEERING ALLIANCE

GRADUATE ATTRIBUTES & PROFESSIONAL COMPETENCIES

PROUDLY SUPPORTED BY:

World Federation of Engineering Organizations
Fédération Mondiale des Organisations d'Ingénieurs

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PREAMBLE

The International Engineering Alliance is pleased to announce that all Accords and Agreements have approved revisions to its Graduate Attributes and Professional Competencies (GAPC) international benchmark. The review, supported by UNESCO, was undertaken by a joint IEA-WFEO Working Group who engaged extensively with IEA signatories, WFEO members and WFEO partners representing academics, industry and women globally. They reflect requirements for new technologies and engineering disciplines, new pedagogies and values such as sustainable development, diversity and inclusion and ethics. They are well positioned to support the engineering role in building a more sustainable and equitable world.

Our thanks to UNESCO and WFEO for their constant support and endorsement and to the GAPC Working Group members, who commenced this work three years ago and who have worked tirelessly to bring this to fruition.

VERSION: 2021.1

The documents presented in this compendium are current as of 21 June 2021.

IEA Constituent Agreements

Washington Accord	International Professional Engineers Agreement
Sydney Accord	International Engineering Technologists Agreement
Dublin Accord	APEC Engineer Agreement
	Agreement for International Engineering Technicians

Graduate Attributes and Professional Competences

Approved Version 4: 21 June 2021

This document is available through the IEA website: http://www.ieagreements.org

Executive Summary

Many accrediting bodies for engineering qualifications have developed outcomes-based criteria for evaluating programs. Similarly, many engineering regulatory bodies have developed or are in the process of developing competence-based standards for registration. Educational and professional accords for mutual recognition of qualifications and registration have developed statements of graduate attributes and professional competence profiles. This document, which is a revised version that takes into account the present-day state of engineering activities, presents the background to these developments, their purpose, and the methodology and limitations of the statements. After defining general range statements that allow the competences of the different categories to be distinguished, the paper presents the graduate attributes and professional competence profiles for three professional tracks: engineer, engineering technologist, and engineering technician.

1 Introduction

Engineering is an activity that is essential to meeting the needs of people, economic development and the provision of services to society. Engineering involves the purposeful application of mathematical and natural sciences and a body of engineering knowledge, technology and techniques. Engineering seeks to produce solutions of which the effects are predicted to the greatest degree possible, in often uncertain contexts. While bringing benefits, engineering activity has potential adverse consequences. Engineering therefore must be carried out responsibly and ethically, use available resources efficiently, be economic, safeguard health and safety, be environmentally sound and sustainable and generally manage risks throughout the entire lifecycle of a system. The United Nations Sustainable Development Goals present targets for 2030. Engineers are vital contributors for making progress towards these goals.

Typical engineering activity requires several roles including those of the engineer, engineering technologist and engineering technician, recognized as professional registration categories in many jurisdictions[1]. These roles are defined by their distinctive competences

[1] The terminology used in this document uses the term *engineering* as an activity in a broad sense and *engineer* as shorthand for the various types of professional and chartered engineer. It is recognized that *engineers*,

and their level of responsibility to the public. There is a degree of overlap between roles. The distinctive competences, together with their educational underpinnings, are defined in sections 4 to 6 of this document.

The development of an engineering professional in any of the categories is an ongoing process with important identified stages. The first stage is the attainment of an *accredited educational qualification*, the graduate stage. The fundamental purpose of *engineering education* is to build a knowledge base and attributes to enable the graduate to continue learning and to proceed to formative development that will develop the competences required for independent practice. The second stage, following a period of formative development, is *professional registration*. The fundamental purpose of formative development is to build on the educational base to develop the competences required for independent practice in which the graduate works with engineering practitioners and progresses from an assisting role to taking more individual and team responsibility until competence can be demonstrated at the level required for registration. Once registered, the practitioner must maintain and expand competence.

For engineers, engineering technologists, and engineering technicians, a third milestone is to qualify for the *international register* held by the various jurisdictions. In addition, engineers, technologists and technicians are expected to maintain and enhance competence throughout their working lives.

Several international accords provide for recognition of graduates of accredited programs of each signatory by the remaining signatories. The Washington Accord (WA) provides for mutual recognition of programs accredited for the engineer track. The Sydney Accord (SA) establishes mutual recognition of accredited qualifications for engineering technologist. The Dublin Accord (DA) provides for mutual recognition of accredited qualifications for engineering technicians. These accords are based on the principle of substantial equivalence rather than exact correspondence of content and outcomes. This document records the signatories' consensus on the attributes of graduates for each accord.

Similarly, the International Professional Engineers Agreement[2] (IPEA), the International Engineering Technologists Agreement[3] (IETA), and the Agreement for International Engineering Technicians (AIET) provide mechanisms to support the recognition of a professional registered in one signatory jurisdiction obtaining recognition in another. The signatories have formulated consensus competence profiles for the registration and these are recorded in this document.

Section 2 gives the background to the graduate attributes presented in section 5. Section 3 provides background to the professional competence profiles presented in section 6. General range statements are presented in section 4. The graduate attributes are presented in section 5 while the professional competence profiles are defined in section 6. Appendix A defines terms used in this document. Appendix B sketches the origin and development history of the graduate attributes and professional competence profiles.

2 Graduate Attributes

This section gives background to the graduate attributes presented in section 5.

Purpose of Graduate Attributes

Graduate attributes form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practise at the appropriate

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engineering technologists, and *engineering technicians* may have specific titles or designations and differing legal empowerment or restrictions within individual jurisdictions.

level. The graduate attributes are exemplars of the attributes expected of graduate from an accredited program. Graduate attributes are clear, succinct statements of the expected capability, qualified if necessary, by a range indication appropriate to the type of program.

The graduate attributes are intended to assist Signatories and Provisional Members to develop or review their outcomes-based accreditation criteria for use by their respective jurisdictions. Graduate attributes also guide bodies in developing or revising their accreditation systems with a view to seeking signatory status.

Graduate attributes are defined for educational qualifications in the engineer, engineering technologist and engineering technician tracks. The graduate attributes serve to identify the distinctive characteristics as well as areas of commonality between the expected outcomes of different types of programs.

Limitation of Graduate Attributes

Each signatory defines the standards for the relevant track (engineer, engineering technologist or engineering technician) against which engineering educational programs are accredited. Each educational level accord is based on the principle of *substantial equivalence*; that is, programs are not expected to have identical outcomes and content but rather produce graduates who could enter employment and be fit to undertake a program of training and experiential learning leading to professional competence and registration. The Graduate Attributes provide a point of reference for bodies to describe the outcomes of substantially equivalent qualification. The Graduate Attributes do not, in themselves, constitute an "international standard" for accredited qualifications but provide a widely accepted common reference or benchmark for bodies to describe the outcomes of substantially equivalent qualifications.

Graduate Attributes may be accepted for use within a jurisdiction or adapted to accommodate the context and any specific requirements of the jurisdiction. Where a signatory has adapted or developed their own graduate attributes, it is expected that there is alignment to these Graduate Attributes.

The term graduate does not imply a particular type of qualification but rather the exit level of the qualification, be it a degree or diploma.

Graduate Attributes and the Quality of Programs

The Washington, Sydney and Dublin Accords "recognize the substantial equivalence of … programs satisfying the academic requirements for practice …" for engineers, engineering technologists and engineering technicians respectively. The Graduate Attributes are assessable outcomes, supported by level statements, developed by the signatories that give confidence that the educational objectives of programs are being achieved. The quality of a program depends not only on the stated objectives and attributes to be assessed but also on the program design, resources committed to the program, the teaching and learning process and assessment of students, including confirmation that the graduate attributes are satisfied. The Accords therefore base the judgement of the substantial equivalence of programs accredited by signatories on both the Graduate Attributes and the best practice indicators for evaluating program quality listed in the Accords' Rules and Procedures[2].

[2] Accord Rules and Procedures. June 2018, section C.4.5. Available at www.ieagreements.org.

Scope and Organization of Graduate Attributes

The graduate attributes are organized using eleven headings shown in section 5.2. Each heading identifies the differentiating characteristic that allows the distinctive roles of engineers, technologists and technicians to be distinguished by range information.

For each attribute, statements are formulated for engineer, engineering technologist and engineering technician using a common stem, with ranging information appropriate to each educational track defined in sections 4.1 and 5.1. For example, for the **Engineering Knowledge** attribute:

> **Common Stem:** Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialization …
>
> **Engineer Range:** … as specified in the engineer knowledge profile to develop solutions to complex engineering problems.
>
> **Engineering Technologist Range:** … as specified in the engineering technologist knowledge profile to defined and applied engineering procedures, processes, systems or methodologies.
>
> **Engineering Technician Range:** … as specified in the engineering technician knowledge profile to wide practical procedures and practices.

The resulting statements are shown below for this example:

Engineer Graduate	Engineering Technologist Graduate	Engineering Technician Graduate
Apply knowledge of mathematics, science, computing and engineering fundamentals and an engineering specialization as specified in WK1-WK4 respectively to develop solutions to complex engineering problems.	Apply knowledge of mathematics, science, computing and engineering fundamentals and an engineering specialization as specified in SK1-SK4 respectively to defined and applied engineering procedures, processes, systems or methodologies.	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization as specified in DK1-DK4 respectively to wide practical procedures and practices.

The range qualifier in several attribute statements uses the notions of *complex engineering problems*, *broadly-defined engineering problems* and *well-defined engineering problems*. These shorthand level descriptors are defined in section 4.1.

The attributes are chosen to be universally applicable and reflect acceptable minimum standards and be capable of objective measurement. While all attributes are important, individual attributes are not necessarily of equal weight. Attributes are selected that are expected to be valid for extended periods and changed infrequently only after considerable debate. Attributes may depend on information external to this document, for example generally accepted principles of ethical conduct.

The full set of graduate attribute definitions is given in section 5.

Contextual Interpretation

The graduate attributes are stated generically and are applicable to all engineering disciplines. In interpreting the statements within a disciplinary context, individual statements

may be amplified and given particular emphasis but they must not be altered in substance or individual elements ignored.

Best Practice in Application of Graduate Attributes

The attributes of Accord programs are defined as a *knowledge profile*, which is an indicated volume of learning and the attributes against which graduates must be able to perform. The requirements are stated without reference to the design of programs that would achieve the requirements. Providers therefore are free to design programs with different detailed structures, learning pathways and modes of delivery. Evaluation of individual programs is the concern of national accreditation systems.

3 Professional Competence Profiles

Purpose of Professional Competence Profiles

A professionally or occupationally *competent person* has the attributes necessary to perform the activities within the profession or occupation to the standards expected in independent employment or practice. The *professional competence profiles* for each professional category record the elements of competence necessary for performance that the professional is expected to be able to demonstrate in a holistic way at the stage of attaining registration.

Professional competence can be described using a set of attributes corresponding largely to the graduate attributes, but with different emphases. For example, at the professional level, the ability to take responsibility in a real-life situation is essential. Unlike the graduate attributes, professional competence is more than a set of attributes that can be demonstrated individually. Rather, competence must be assessed holistically.

Scope and Organization of Professional Competence Profiles

The professional competence profiles are written for each of the three categories: engineer, engineering technologist and engineering technician at the point of registration[3]. Each profile consists of thirteen elements. Individual elements are formulated around a differentiating characteristic using a stem and modifier, similar to the method used for the graduate attributes described in section 2.3.

The stems are common to all three categories and the range modifiers allow distinctions and commonalities between categories to be identified. Like their counterparts in the graduate attributes, the range statements use the notions of complex engineering problems, broadly-defined engineering problems and well-defined engineering problems defined in section 4.1. At the professional level, a classification of engineering activities is used to define ranges and to distinguish between categories. Engineering activities are classified as *complex*, *broadly-defined* or *well-defined*. These shorthand level descriptors are defined in section 4.2.

Limitations of Professional Competence Profile

As in the case of the graduate attributes, the professional competence profiles are not prescriptive in detail but rather reflect the essential elements that would be present in competence standards.

The professional competence profiles do not specify performance indicators or how the above items should be interpreted in assessing evidence of competence from different areas of practice or for different types of work. Section 3.4 examines contextual interpretation.

[3] Requirements for the IEPA, IETA, and AIET International Registers call for enhanced competence and responsibility.

Each jurisdiction may define *performance indicators*; that is, actions on the part of the candidate that demonstrate competence. For example, a design competence may be evidenced by the following performances:

1: Identify and analyse a design/planning requirement and draw up a detailed requirements specification
2: Synthesise a range of potential solutions to problem or approaches to project execution
3: Evaluate potential approaches to meet requirements and their possible impacts
4: Fully develop design of selected option
5: Produce design documentation for implementation

Contextual Interpretation

Although competence can be demonstrated in different areas of practice and types of work, competence statements are independent of, and separate to, any specific discipline. Thus the competence statements accommodate different types of work (for example, design, research and development and engineering management) by using the broad phases in the cycle of engineering activity (problem analysis, synthesis, implementation, operation and evaluation) together with the management attributes needed. The competence statements also include the personal attributes needed for competent performance irrespective of specific local requirements: communication, ethical practice, judgement, taking responsibility and the protection of society.

The professional competence profiles are stated generically and are applicable to all engineering disciplines. The application of a competence profile may require amplification in different regulatory, disciplinary, occupational or environmental contexts. In interpreting the statements within a particular context, individual statements may be amplified and given particular emphasis but must not be altered in substance or ignored.

Mobility between Professional Categories

The Graduate Attributes and Professional Competence for each of the three categories of engineering practitioner (engineer, engineering technologist and engineering technician) define the benchmark route or vertical progression in each category. This document does not address the movement of individuals between categories, a process that usually requires additional education, training and experience. The Graduate Attributes and Professional Competences, through their definitions of level of demand, knowledge profile and outcomes to be achieved, allow a person planning such an attainment to judge the further learning and experience that will be required. The education and registration requirements of the jurisdiction should be examined for specific requirements.

4 Common Range and Contextual Definitions

Range of Problem Identification and Solving

References included are to the Knowledge and Attitude Profile in 5.1

In the context of both Graduate Attributes and Professional Competences:			
Attribute	***Complex Engineering Problems*** have characteristic WP1 and some or all of WP2 to WP7*:*	***Broadly-defined Engineering Problems* have characteristic SP1 and some or all of SP2 to SP7*:***	***Well-defined Engineering Problems*** have characteristic DP1 and some or all of DP2 to DP7*:*
Depth of Knowledge Required	**WP1:** Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamentals-based, first principles analytical approach	**SP1:** Cannot be resolved without engineering knowledge at the level of one or more of SK 4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed technology	**DP1:** Cannot be resolved without extensive practical engineering knowledge as reflected in DK5 and DK6 supported by theoretical knowledge defined in DK3 and DK4
Range of conflicting requirements	**WP2:** Involve wide-ranging and/or conflicting technical, non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements	**SP2:** Involve a variety of conflicting technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements	**DP2:** Involve several technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements
Depth of analysis required	**WP3:** Have no obvious solution and require abstract thinking, creativity and originality in analysis to formulate suitable models	**SP3:** Can be solved by application of well-proven analysis techniques and models	**DP3:** Can be solved in standardized ways
Familiarity of issues	**WP4:** Involve infrequently encountered issues or novel problems	**SP4:** Belong to families of familiar problems which are solved in well-accepted ways	**DP4:** Are frequently encountered and thus familiar to most practitioners in the practice area
Extent of applicable codes	**WP5:** Address problems not encompassed by standards and codes of practice for professional engineering	**SP5:** Address problems that may be partially outside those encompassed by standards or codes of practice	**DP5:** Addresses problems that are encompassed by standards and/or documented codes of practice
Extent of stakeholder involvement and conflicting requirements	**WP6:** Involve collaboration across engineering disciplines, other fields, and/or diverse groups of stakeholders with widely varying needs	**SP6:** Involve different engineering disciplines and other fields with several groups of stakeholders with differing and occasionally conflicting needs	**DP6:** Involve a limited range of stakeholders with differing needs
Interdependence	**WP 7:** Address high level problems with many components or sub-problems that	**SP7:** Address components of systems within complex engineering problems	**DP7:** Address discrete components of engineering systems

	may require a systems approach		

Range of Engineering Activities

Attribute	Complex Activities	Broadly-defined Activities	Well-defined Activities
Preamble	**Complex activities** means (*engineering)* activities or projects that have some or all of the following characteristics:	**Broadly defined activities** means (*engineering)* activities or projects that have some or all of the following characteristics:	**Well-defined activities** means *(engineering)* activities or projects that have some or all of the following characteristics:
Range of resources	**EA1:** Involve the use of diverse resources including people, data and information, natural, financial and physical resources and appropriate technologies including analytical and/or design software	**TA1:** Involve a variety of resources including people, data and information, natural, financial and physical resources and appropriate technologies including analytical and/or design software	**NA1:** Involve a limited range of resources for example people, data and information, natural, financial and physical resources and/or appropriate technologies
Level of interactions	**EA2:** Require optimal resolution of interactions between wide-ranging and/or conflicting technical, non-technical, and engineering issues	**TA2:** Require the best possible resolution of occasional interactions between technical, non-technical, and engineering issues, of which few are conflicting	**NA2:** Require the best possible resolution of interactions between limited technical, non-technical, and engineering issues
Innovation	**EA3:** Involve creative use of engineering principles, innovative solutions for a conscious purpose, and research-based knowledge	**TA3:** Involve the use of new materials, techniques or processes in non-standard ways	**NA3:** Involve the use of existing materials techniques, or processes in modified or new ways
Consequences to society and the environment	**EA4:** Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation	**TA4:** Have reasonably predictable consequences that are most important locally, but may extend more widely	**NA4:** Have predictable consequences with relatively limited and localized impact.
Familiarity	**EA5:** Can extend beyond previous experiences by applying principles-based approaches	**TA5:** Require a knowledge of normal operating procedures and processes	**NA5:** Require a knowledge of practical procedures and practices for widely-applied operations and processes

5 Accord program profiles

The following tables provide profiles of graduates of three types of tertiary education engineering programs. See section 4 for definitions of complex engineering problems, broadly-defined engineering problems, and well-defined engineering problems.

Knowledge and Attitude Profile

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 sub-discipline
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.

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 behavior 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 behavior 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 behavior and conduct.** Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes
*Represented by the 17 UN Sustainable Development Goals (UN-SDG)		
A program that builds this type of knowledge and attitude and develops the base attributes listed below is typically achieved in 4 to 5 years of study, depending on the level of students at entry.	A program that builds this type of knowledge and attitude and develops the base attributes listed below is typically achieved in 3 to 4 years of study, depending on the level of students at entry.	A program that builds this type of knowledge and attitude and develops the base attributes listed below is typically achieved in 2 to 3 years of study, depending on the level of students at entry.

Graduate Attribute Profiles

References included are to the Knowledge and Attitude Profile in 5.1.

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 analyze *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 analyze *broadly-defined* engineering problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialisation. (SK1 to SK4)	**DA2:** Identify and analyze *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, analyze 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, analyze 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)
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)

Differentiating Characteristic	Engineer Graduate	Engineering Technologist Graduate	Engineering Technician Graduate
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 life-long 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)
*Represented by the 17 UN Sustainable Development Goals (UN-SDG)			

6 Professional Competence Profiles

To meet the minimum standard of competence a person must demonstrate that they are able to practice competently, within a practice area, to the standard expected of a reasonable Professional Engineer/Engineering Technologist/Engineering Technician.

The extent to which the person is able to perform each of the following elements in practice area must be taken into account in assessing whether or not the individual meets the overall standard.

Differentiating Characteristic	Professional Engineer	Engineering Technologist	Engineering Technician
Comprehend and apply universal knowledge: Breadth and depth of education and type of knowledge	**EC1:** Comprehend and apply advanced knowledge of the widely-applied principles underpinning good practice	**TC1:** Comprehend and apply the knowledge embodied in widely accepted and applied procedures, processes, systems or methodologies	**NC1:** Comprehend and apply knowledge embodied in standardized practices
Comprehend and apply local knowledge: Type of local knowledge	**EC2:** Comprehend and apply advanced knowledge of the widely-applied principles underpinning good practice specific to the jurisdiction of practice	**TC2:** Comprehend and apply the knowledge embodied procedures, processes, systems or methodologies that is specific to the jurisdiction of practice	**NC2:** Comprehend and apply knowledge embodied in standardized practices specific to the jurisdiction of practice.
Problem analysis: Complexity of analysis	**EC3:** Define, investigate and analyze complex problems using data and information technologies where applicable	**TC3:** Identify, clarify, and analyze broadly-defined problems using the support of computing and information technologies where applicable	**NC3:** Identify, state and analyze well-defined problems using the support of computing and information technologies where applicable
Design and development of solutions: Nature of the problem and uniqueness of the solution	**EC4:** Design or develop solutions to complex problems considering a variety of perspectives and taking account of stakeholder views	**TC4:** Design or develop solutions to broadly-defined problems considering a variety of perspectives.	**NC4:** Design or develop solutions to well-defined problems
Evaluation: Type of activity	**EC5:** Evaluate the outcomes and impacts of complex activities	**TC4:** Evaluate the outcomes and impacts of broadly defined activities	**NC5:** Evaluate the outcomes and impacts of well-defined activities

Differentiating Characteristic	Professional Engineer	Engineering Technologist	Engineering Technician
Protection of society: Types of activity and responsibility to consider sustainable outcomes	**EC6:** Recognize the foreseeable economic, social, and environmental effects of complex activities and seek to achieve sustainable outcomes*	**TC6:** Recognize the foreseeable economic, social, and environmental effects of broadly-defined activities and seek to achieve sustainable outcomes*	**NC6:** Recognize the foreseeable economic, social, and environmental effects of well-defined activities and seek to achieve sustainable outcomes*
Legal, regulatory, and cultural: No differentiation in this characteristic	**EC7:** Meet all legal, regulatory, and cultural requirements and protect public health and safety in the course of all activities	**TC7:** Meet all legal, regulatory, and cultural requirements and protect public health and safety in the course of all activities	**NC7:** Meet all legal, regulatory, and cultural requirements and protect public health and safety in the course of all activities
Ethics: No differentiation in this characteristic	**EC8:** Conduct activities ethically	**TC8:** Conduct activities ethically	**NC8:** Conduct activities ethically
Manage engineering activities: Types of activity	**EC9:** Manage part or all of one or more complex activities	**TC9:** Manage part or all of one or more broadly-defined activities	**NC9:** Manage part or all of one or more well-defined activities
Communication and Collaboration: Requirement for inclusive communications. No differentiation in this characteristic	**EC10:** Communicate and collaborate using multiple media clearly and inclusively with a broad range of stakeholders in the course of all activities.	**TC10:** Communicate and collaborate using multiple media clearly and inclusively with a broad range of stakeholders in the course of all activities.	**NC10:** Communicate and collaborate using multiple media clearly and inclusively with a broad range of stakeholders in the course of all activities.
Continuing Professional Development (CPD) and Lifelong learning: Preparation for and depth of continuing learning. No differentiation in this characteristic	**EC11:** Undertake CPD activities to maintain and extend competences and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	**TC11:** Undertake CPD activities to maintain and extend competences and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	**NC11:** Undertake CPD activities to maintain and extend competences and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.
Judgement: Level of	**EC12:** Recognize complexity and	**TC12:** Choose appropriate	**NC12:** Choose and apply appropriate

Differentiating Characteristic	Professional Engineer	Engineering Technologist	Engineering Technician
developed knowledge, and ability and judgement in relation to type of activity	assess alternatives in light of competing requirements and incomplete knowledge. Exercise sound judgement in the course of all complex activities	technologies to deal with broadly defined problems. Exercise sound judgement in the course of all broadly-defined activities	technical expertise. Exercise sound judgement in the course of all well-defined activities
Responsibility for decisions: Type of activity for which responsibility is taken	**EC13:** Be responsible for making decisions on part or all of complex activities	**TC13:** Be responsible for making decisions on part or all of one or more broadly defined activities	**NC13:** Be responsible for making decisions on part or all of all of one or more well-defined activities
*Represented by the 17 UN Sustainable Development Goals (UN-SDG)			

Appendix A: Definitions of terms

Note: These definitions apply to terms used in this document.

Awareness: Recognizing the context and implications while using or applying what has been learned. The demonstration of awareness can be more varied than a demonstration of knowledge. Asking the right questions, including among the assumptions made, complying with or respecting when faced with a situation may be acceptable demonstrations.

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

Broadly-defined engineering problems: a class of problem with characteristics defined in section 4.1.

Broadly-defined engineering activities: a class of activities with characteristics defined in section 4.2.

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

Complex engineering problems: a class of problem with characteristics defined in section 4.1.

Complex engineering activities: a class of activities with characteristics defined in section 4.2.

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

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

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

Engineering discipline: synonymous with *branch of engineering.*

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

Engineering management: the generic management functions of planning, organising, leading and controlling, applied together with engineering knowledge in contexts including the management of projects, construction, operations, maintenance, quality, risk, change and business.

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

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

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

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

Forefront of the professional discipline/branch[4]: defined by advanced practice in the specialisations within the discipline.

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

Knowledge: Recognizing and comprehending terminology, facts, methods, trends, classifications, structures, or theories. It involves learning as well as demonstrating what has been learned. The demonstration of a specific knowledge is invariably by means of work done based on that knowledge.

Manage: means planning, organising, leading and controlling in respect of risk, project, change, financial, compliance, quality, ongoing monitoring, control and evaluation.

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

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

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

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

Subdiscipline: Synonymous with *engineering speciality*.

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

Well-defined engineering problems: a class of problem with characteristics defined in section 4.1.

Well-defined engineering activities: a class of activities with characteristics defined in section 4.2.

[4] This should be distinguished from: **Forefront of knowledge in an engineering discipline/speciality**: defined by current published research in the discipline or speciality.

Appendix B: History of Graduate Attributes and Professional Competence Profiles

The signatories to the Washington Accord recognized the need to describe the attributes of a graduate of a Washington Accord accredited program. Work was initiated at its June 2001 meeting held at Thornybush, South Africa. At the International Engineering Meetings (IEM) held in June 2003 at Rotorua, New Zealand, the signatories to the Sydney Accord and the Dublin Accord recognized similar needs. The need was recognized to distinguish the attributes of graduates of each type of program to ensure fitness for their respective purposes.

The Engineers Mobility Forum (EMF) and Engineering Technologist Mobility Forum (ETMF)[5] have created international registers in each jurisdiction with current admission requirements based on registration, experience and responsibility carried. The mobility agreements recognize the future possibility of competence-based assessment for admission to an international register. At the 2003 Rotorua meetings, the mobility fora recognized that many jurisdictions are in the process of developing and adopting competence standards for professional registration. The EMF and the ETMF therefore resolved to define assessable sets of competences for engineer and technologist. While no comparable mobility agreement exists for technicians, the development of a corresponding set of standards for engineering technicians was felt to be important to have a complete description of the competences of the engineering team.

Version 1
A single process was therefore agreed to develop the three sets of graduate attributes and three professional competence profiles. An International Engineering Workshop (IEWS) was held by the three educational accord and the two mobility fora in London in June 2004 to develop statements of Graduate Attributes and International Register Professional Competence Profiles for the Engineer, Engineering Technologist and Engineering Technician categories. The resulting statements were then opened for comment by the signatories. The comments received called for minor changes only.

The Graduate Attributes and Professional Competences were adopted by the signatories of the five agreements in June 2005 at Hong Kong as version 1.1.

Version 2
A number of areas of improvement in the Graduate Attributes and Professional Competences themselves and their potential application were put to the meetings of signatories in Washington DC in June 2007. A working group was set up to address the issues. The IEA workshop held in June 2008 in Singapore considered the proposals of the working group and commissioned the Working Group to make necessary changes with a view to presenting Version 2 of the document for approval by the signatories at their next general meetings. Version 2 was approved at the Kyoto IEA meetings, 15-19 June 2009.

Version 3
Between 2009 and 2012 a number of possible improvements to the graduate attributes were recorded. During 2012 signatories performed an analysis of gaps between their respective standards and the Graduate Attribute exemplars and by June 2013 most signatories reported substantial equivalence of their standards to the Graduate Attributes. This will be further examined in periodic monitoring reviews in 2014 to 2019. In this process a number of improvements to the wording of the Graduate Attributes and supporting definitions were identified. The signatories to the Washington, Sydney and Dublin Accords approved the changes resulting in this Version 3 at their meetings in Seoul 17-21 June 2013. Signatories stated that the objectives of the changes were to clarify aspects of the Graduate Attribute exemplar. There was no intent to raise the standard. The main changes were as follows:

- New Section 2.3 inserted;
- Range of problem solving in section 4.1 linked to the Knowledge Profiles in section 5.1 and duplication removed;

[5] Now the IEPA and IETA respectively.

- Graduate Attributes in section 5.2: cross-references to Knowledge Profile elements inserted; improved wording in attributes 6, 7 and 11;
- Appendix A: definitions of *engineering management* and *forefront of discipline* added.

Version 4

An agreement was signed at the IEAM 2015 for International Engineering Technicians. The Agreement for International Engineering Technicians (AIET) establishes an international benchmark standard for a practicing qualified engineering technician. An agreement now exists for technicians so that the standards included among Professional Competence Profiles for an engineering technician can be applied.

A UNESCO WFEO IEA Working Group was established in November 2019 following the renewal of the WFEO-IEA MoU and the Declaration on Engineering Education that was made in Melbourne at WEC2019. The Working Group has reviewed the Graduate Attributes and Professional Competences in order to ensure that they reflect contemporary values and employer needs, cover diversity and inclusion and ethics to reflect current and emerging thinking, address the intellectual agility, creativity and innovation required of engineering decision making as well as equip engineering professionals of the future to incorporate the practices that advance the United Nations Sustainable Development Goals (UN SDG). The main changes that resulted from the surveys, research, dissemination and consultation efforts during 2019-2021 were as follows:

- There were changes in all tables on Range of Problem Solving, Range of Engineering Activities, Knowledge and Attitude Profile, Graduate Attributes, and Professional Competence Profiles. These consisted of additions of new attributes as well as enhancements of the already existing ones. Some improvements in the wording and in clarity has also been a concern.
- Knowledge and Attitude Profile, Graduate Attributes, and Professional Competence Profiles Tables now refer to UN SDG. These references are intended to provide context for curriculum designers and for professional engineers seeking registration. They represent an internationally accepted example of how sustainability issues can be concisely understood and presented.
- Two rows on “Consequences, Judgement” at the end of Table 4.1 Range of Problem Solving that refer to Professional Competences are deleted as no differentiation was deemed necessary among the three categories.
- A new row of “Ethics, inclusive behavior and conduct” is introduced in the Knowledge Profile table, the name of which has been changed to the Knowledge and Attitude Profile.
- The breadth required of engineering education has been widened to emphasize digital literacy, data analysis, UN SDG, knowledge of relevant social sciences.
- Two rows of Graduate Attributes on “The Engineer and Society” and “Environment and Sustainability,” which have been based on the same knowledge profile have been combined under the heading “The Engineer and the World,” also supplementing the required knowledge profile.
- Knowledge and awareness of ethics, diversity, and inclusion have been emphasized.
- Critical thinking, innovation, emerging technologies, and lifelong learning requirements have been highlighted.
- The necessitated similar changes to Professional Competences have also been made.

The proposed revisions were introduced and discussed by member organizations through a series of extensive consultations, also through webinars organized by WFEO, in IEAM 2020 by IEA members, and via consultation web pages.

Document & Version Control

Version/Effective From	Summary of Changes	Approved	Minutes
2021.1 / Effective from 21 June 2021	Comprehensive review undertaken by joint working group to revise previous version (2013).	Approved by IEA Members (Signatories and Authorised Members) at IEAM June 2021 Use of WFEO & UNESCO Logos approved via email following meetings.	IEA21- IEA Forum Session