ACCREDITATION CRITERIA AND DOCUMENTATION REQUIREMENTS

ACC 02

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engineering new zealand
te ao rangahau

DOCUMENT AND VERSION CONTROL

Version	Action	Approver	Date
2.1	Formatted	Standards and Accreditation Board	February 2014
2.2	Changes to terminology Renumbering of criteria	Standards and Accreditation Board	May 2016
2.3	Clarification of the purpose of the Knowledge Profile Revision to criterion 3.3 – Assessment; 4.1 – Academic Staff Changes to incorporate accreditation of postgraduate programme (new Part C) Inclusion of Contents Page	Standards and Accreditation Board	February 2017
3.1	Reformatted to align with Engineering New Zealand Brand. Revision to criterion 2.7 – Practical work experience in industry	Standards and Accreditation Board	October 2020
4.1	New version incorporating Version 4 of IEA Graduate Attributes and applicant guidance previously provided in ACC03	Standards and Accreditation Board	April 2024
	Next Review	December 2024 following initial review of implementation of version 4.1	

CONTENTS

SECTION 1: INTRODUCTION

BACKGROUND AND SCOPE

Engineering New Zealand accredits engineering programmes against outcomes-based standards that have been established by the Dublin, Sydney and Washington Accords to define the general academic standards for entry-to-practice in the engineering profession.

This document sets out the accreditation criteria and the documentation requirements for programmes intended to be assessed for accreditation (or provisional accreditation) by Engineering New Zealand. It also includes guidance to support interpretation of change to Graduate Attributes introduced with Version 4 of the International Engineering Alliance (IEA)Exemplar Graduate Attributes. Accreditation typically relates to undergraduate engineering programmes, namely New Zealand Diploma in Engineering, Bachelor of Engineering Technology degrees and Bachelor of Engineering (Honours) degrees. However, the criteria are also able to accommodate:

- “Entry to Practice” postgraduate programmes that have been designed to systematically develop students to an Accord standard as a basis for entry to practice in a particular engineering occupational role.
- Other taught postgraduate programmes that develop a specific body of knowledge or capability that has been identified by the profession as necessary for practice in a specialised or specific area of practice. This might include practice areas with particular legal or safety implications. Accreditation is intended to such programmes as meeting a defined need as identified by the engineering community. It does not signify a programme as meeting a particular Accord outcome. Amended criteria for the accreditation of such postgraduate programmes are provided in Schedule 4.

STRUCTURE OF DOCUMENT

Section 2 sets out accreditation criteria and associated submission requirements. Section 2, Part I requires the organisation seeking accreditation to produce a succinct summary of the programme and the organisational arrangements to deliver it. Part II and Part III set out requirements for a self-review against the criteria for accreditation. In this, there are prescribed requirements, with these being supported by the opportunity to hyperlink to supporting documents. The criteria are generic between Accords, other than those in Part II, Section 1.2 in which each Accord has a different knowledge profile and graduate attributes.

Where the request is for provisional accreditation, it may not be possible to provide all the information requested e.g. some of the intended academic roles may not yet be filled. In such cases, applications should describe the current state **and** set out future expectations.

The organisation seeking accreditation is expected to follow the numbering and organisation of this document in its submission. Where the programme for accreditation has more than one major/specialisation, then each major should be separately documented. However, if there is a core of common material used to achieve particular learning outcomes then that core need only be reported once.

SECTION 2: ACCREDITATION CRITERIA AND APPLICATION REQUIREMENTS

PART I: PROGRAMME AND ORGANISATION OVERVIEW

This section is intended to establish a broad context in which the engineering programme is delivered, and to describe the high-level programme design. Where there is more than one major/specialisation do not repeat material from one major to another, but rather group common material. Use the following headings and introduce sub-headings as seems appropriate.

A. Names of programmes for which Accreditation (or Provisional Accreditation) is sought

Provide a precise list of the programme(s) and any major/specialisation titles. These must be as they appear on the graduate certificate and testamur.

B. The Institution and its Role in Engineering Education

Give a brief outline of the overall tertiary education organisation and how engineering is organised within it. If there are multiple campuses, set out which are relevant for engineering. Give a brief history of engineering education and future plans. (max: 2 pages)

C. The Organisational Structure for Delivery of Engineering

Describe the organisational structure of the academic unit(s) delivering engineering programmes. Describe the full range of engineering qualifications delivered. Use an organisational diagram to identify the key leadership. (max: 4 pages)

D. Programme rationale and structure

Provide a brief (1 page) summary of the rationale for the programme, the programme structure and core components.

Present a schematic diagram of the programme structure (the course titles within each semester/year of the programme) for each major. Use colour coding to:

- Identify any common core applicable to all, or a sub-group of the majors
- Courses taught outside the organisational units delivering engineering programmes
- Courses taught by other engineering organisation units to that with primary responsibility for a particular major
- Electives where students select from within a group of engineering courses
- Electives where students may select courses from outside engineering

Hyperlink each course title to a course outline that sets out the learning outcomes, staff responsible for delivery, a description of course content, the assessment breakdown.

Identify and describe (briefly) any non-credit requirements which students must successfully complete, e.g. for workshop training, safety, practical work experience.

Provide a summary of any structural changes to programmes since any previous accreditation process. Additionally, where a programme is subject to transitional change provide the present structure, the transitional arrangement and the longer-term structure.

PART II: PROGRAMME DESIGN, GRADUATE ATTRIBUTES AND ASSESSMENT

The focus of this section is assurance that the programme design, delivery and assessment is producing graduates with the relevant Accord graduate attributes.

Organisations seeking accreditation should use the exact numbering system used below and start each section of their self-review by placing at the top of each section the relevant accreditation criterion (including any indicators of attainment), ideally italicised, and located in a text box. Where the programme for accreditation has more than one major/specialisation, then each major should be separately documented. However, if there is a core of common material used to achieve particular learning outcomes then that core need only be reported once.

CRITERIA	Documentation required
1. Programme Design:	
1.1. Programme graduate outcomes are defined for the programme that are substantially equivalent to the exemplar Graduate Attributes of the relevant Accord.	Present a comparison table; in the left column containing the relevant Accord attributes, and in the right column, the mapping of the programme attributes against the Accord attributes. Below the table, provide any commentary on apparent differences or gaps.
1.2. The programme is structured to provide for the logical, progressive development and assessment of the programme graduate outcomes and the embedded knowledge profile.	Provide a high-level summary of the overall approach to programme design and the development of broad areas of student capability, for example; fundamental and specialist knowledge, design and research capabilities, professional and interpersonal skills. Your more detailed approach to the development of individual graduate attributes should then be detailed in your response to 2.1 below.
1.3. The programme title and name of any major/specialisation within the programme is consistent with both the level of and the content of underpinning body of knowledge covered by the programme.	Provide a self-review against the criterion, referencing any defined body of knowledge that the programme has been benchmarked to and quoting any relevant policy requirement of the institution or higher education authority.

CRITERIA	Documentation required
1.4. The programme design reflects the advice of likely employers and target industries. Approaches to obtaining this advice must include a structured industry advisory committee mechanism, but can also involve seeking feedback from graduates, employers, representatives of the engineering community.	Describe (briefly) the (ongoing) consultative mechanism with industry, setting out the composition and terms of reference of the relevant industry advisory committee. Provide a hyperlink to two most recent sets of committee minutes. Provide an example of where advice from the industry advisory committee has been adopted and changes implemented. If other means of obtaining feedback are used, explain these and give an example of their application.
1.5. The programme includes substantive, integrative project work (incorporating design or development of solutions) which is assessed against a range of overall programme graduate outcomes. The complexity of student project work must reflect the attributes of problem complexity defined for the relevant Accord. At the Washington Accord level, commensurate with definitions of NZQF level 8 study, students are expected to demonstrate some originality and an ability to handle uncertainty and incomplete information. ***WA:*** *Programmes at this level are also required to include sufficient individual research work to satisfy requirements for the award of an Honours degree. Integrative design and research components may be organised into separate courses or within a single course/project, which has distinct research and design elements, in which case the overall project is expected to be of at least 45 and ideally 60 credits in size.* ***SA:*** *Integrative design work should account for at least 30 credits and may be structured into separate projects or a single project course* ***DA:*** *Integrative design work should account for at least 15 credits and may be structured into separate projects or a single project course*	Identify the integrative project work by reference to the particular course(s) and their learning outcomes and provide any necessary written commentary.
1.6. (WA only) Students undertake at least two work placements supervised or monitored, assessed and employer verified work in industry, totalling	Describe (briefly) the key elements of the relevant policy and systems in place for students obtaining work, getting approval, monitoring in the workplace, reporting and assessment of

CRITERIA	Documentation required
about 800 hours, and critically reflect and report on how that experience has contributed to their development, as measured against programme-level graduate attributes. *Note: Ideally, all work experience will have a direct link to professional engineering work or an engineering-based industry and might include practical workshop or site-based work. However, an organisation may choose to accept up to 50% from general work experience. Work experience may occur on a full-time or part-time basis and can include work within the organisation in support of academic research projects (particularly for students contemplating postgraduate study and/or an academic or research-based career).*	practical work. In approval processes explain how it is ascertained that the proposed work experience will have a direct link to professional engineering work or an engineering-based industry where the student might undertake practical workshop or site-based work. Where up to 50% general work experience is allowed, explain how students are mentored to identify and report on those elements of the work experience that are relevant to engineering. If work experience can include work within the tertiary education organisation, e.g. in support of research projects, explain how steps are taken to make the student experience as similar as possible to the experiences that would be gained in industry. Provide hyperlinks to a small number of student reports.
2. Graduate Attributes and Assessment	
2.1. The full range of programme graduate attributes is developed through the programme.	Refer to Schedule 1 (Washington Accord), Schedule 2 (Sydney Accord) or Schedule 3 (Dublin Accord) for the relevant set of Graduate Attributes, Indicators of Attainment and documentation requirements at each Accord level. These Schedules reflect Version 4 of the relevant Accord Graduate Attributes, which were approved by signatories in 2021. Changes from Version 3 are highlighted in red and will be assessed without consequence for accreditation in 2024. Providers may choose to substitute Version 3 of the Graduate Attributes into the relevant Schedule and report separately on the current level of alignment with Version 4 changes.
2.2. There are clearly identified and specific assessment activities that demonstrate students' achievement, by completion of the programme, of each of the programme graduate attributes. ***[constructive alignment]***	Either as an extension of, or addendum to, the tables provide in 2.1 above, prepare a table listing in columns: a) the relevant graduate attribute

CRITERIA	Documentation required
	b) the course code, title and learning outcomes at advanced level that are relevant to that attribute (may be more than one course) – this should reflect most advanced course(s) documented in 2.1, c) the nature of the assessment task used and its percentage weighting in the course outcomes d) hyperlinks to assessment tasks used in the last two years and associated marking rubrics, and e) hyperlinks to examples of student work at the pass/fail line. Provide brief written commentary on any other matter considered relevant to the criteria.
2.3. Assessment tools within each course are suitably chosen in relation to the learning outcomes and validly assess those learning outcomes to an appropriate academic standard. ***[assessment validity]*** Indicators of attainment: • Assessment tasks consistently set out to directly assess the relevant learning outcomes. • Assessment tasks are at an appropriate level of complexity. • Marking rubrics are valid and likely to lead to fair grading. • Appropriate tools and other mechanisms are used to detect whether students are submitting their own work. • Valid methods are applied to fairly identify and separately grade each student when combined group work is submitted for assessment.	The information provided in 2.2 will also be key evidence used by Accreditation Panels to evaluate assessment validity. However, provide a brief self-review against this criterion, including a summary of the methods used to: • ensure that students are submitting their own work for assessment. • fairly identify personal contributions and separately grade each student when combined group work is submitted for assessment. Provide brief written commentary on any other matter considered relevant to the criteria.

PART III: CAPACITY AND CAPABILITY FOR ONGOING DELIVERY

The focus of this section is assurance that the programme will be delivered to a consistent standard meeting Accord requirements over the next delivery cycle and beyond.

<table>
<tr><th>CRITERIA</th><th>Documentation required</th></tr>
<tr><td colspan="2">3. ACADEMIC STAFF</td></tr>
<tr><td>3.1. The academic staff devoted to the programme:
i. are sufficient in number, breadth of experience and interest, to cover all relevant subjects and provide a range of learning experiences for students, without critical dependence on any particular individual.
ii. collectively possess appropriate academic qualifications in engineering at a level higher than that of the programme.
iii. have experience in industry and/or engineering research.
iv. collectively have involvement in the wider profession, including through:
a. consultancy and running short courses for industry,
b. involvement in professional body activities, and/or
c. undertaking some of their professional engagement outside of academia.</td><td>• Prepare a summary table containing the information set out in Schedule 4 -Table 1 for each academic staff member delivering significant components of the programme,
• For the organisational unit primarily responsible for delivery of the programme, provide a summary table covering at least three years giving:
a) the equivalent fulltime student numbers (EFTs),
b) academic staff FTE,
c) other teaching staff FTE (including tutors and teaching assistants), and
d) student:staff ratios, calculated on both the bases of permanent academic and total teaching staff.
• Provide brief written commentary on any other matter considered relevant to the criteria.</td></tr>
<tr><td>3.2. Delivery of key design/capstone project courses involves staff members who are currently competent in engineering practice, e.g., as exemplified by recent success in a competence assessment.</td><td>• Provide a brief self-review against the criterion explicitly identifying the relevant staff and how their current competence is maintained and authenticated.</td></tr>
</table>

CRITERIA	Documentation required
3.3. Academic staff collectively demonstrate commitment to continuous improvement of teaching and learning practices, such as through engagement in engineering education research and applying contemporary tertiary teaching and assessment pedagogies.	• Provide a brief self-review against the criterion. Identify key individuals leading work in this area.
3.4. Academic Staff collectively demonstrate commitment to engineering professionalism through: i. role-modelling of professional behaviour and support for professionalism (including absence of unconscious biases based on gender or ethnicity), ii. actively supporting relevant professional bodies and learned societies to engage with students, and iii. facilitating student societies/groups that run beneficial collegial activities amongst the student cohort.	• Provide a brief self-review against the criterion. Identify key individuals leading work in this area. Note: criterion 3.4.i is difficult to evidence in a written submission and accreditation panels may seek collaborating evidence from discussions with staff and students
3.5. Academic staff workloads are managed to allow them to provide the necessary levels of student interaction and mentoring, this monitored through regular evaluation and active management of student:staff ratios (SSR).	Provide a brief self-review against this criterion. You are encouraged to cover matters including: • use of any staff workload monitoring tool • typical loading for a 1 FTE equivalent academic staff member • how any temporary teaching staff are deployed • recent impacts of staff vacancies or unavailability due to sabbatical or other leave granted • expectations on academic staff to be available outside formal timetable hours to assist students • any issues of concern about staff workload

CRITERIA	Documentation required
4. TECHNICAL AND SUPPORT STAFF	
There are sufficient, competent technical and support staff to service practical teaching facilities and ensure student project work can include design, construction and testing of processes, artefacts, systems or structures.	Prepare a table containing the information set out in Schedule 5 – Table 2 for technical and support staff supporting significant components of the programme. Provide brief written commentary on any other matter considered relevant to the criteria.
5. PRACTICAL TEACHING FACILITIES AND LEARNING RESOURCES	
5.1. There is sufficient capacity within, and appropriately equipped practical teaching facilities, reflecting current and emerging technologies, to support students' practical and project-based study.	Provide a table containing the information set out in Schedule 5 – Table 3 for each of the main laboratories, digital and virtual infrastructure and other practical teaching facilities that students are taught in or otherwise utilise, these listed downwards in order of importance for the programme, listing those 'owned' by the primary organisational unit delivering the programme first, and those of other organisational units in the second part of the table. Provide written commentary (no more than 2 pages) about the modes of operations of the main laboratories/facilities including matters such as the number and size of student groups working on experiments/tasks, the extent of supervision or monitoring of groups, the extent of labelling and instruction to assist students learn how to use equipment. Provide brief written commentary on any other matter considered relevant to the criteria.
5.2. There is an adequate planned programme, and means, for obtaining sufficient financial resources for the on-going maintenance and renewal of equipment, software and other resources.	Provide a written self-review describing how the maintenance and renewal programme works, the extent to which maintenance and progressive renewal is funded from annual operating budgets, the process by which funding for large items is obtained, and whether lack of funding has adversely affected the intended programme. Set out any concerns about the currency of equipment or facilities that is affecting programme delivery.

CRITERIA	Documentation required
5.3. Health and safety policies and practices in practical teaching spaces satisfy legal requirements, are in line with good practice in industry, are actively enforced, and encourage an active, pre-emptive culture towards safety amongst students.	Provide a written self-review for the primary organisational unit delivering the programme against the criteria covering aspects such as regular hazard analysis undertaken and follow-on steps, signage, safety clothing and other protective equipment, training requirements on students, supervision, operating rules, who has primary responsibility in each facility, how safety is monitored, how incidents recorded and followed up. Include a scan of a recent logbook for recording safety incidents.
5.4. Students have access to sufficient literature, computer resources and personal study spaces to support their learning.	Provide a written self-review against each element (3) of the criterion.
5.5. Students have sufficient independent access to adequate workspaces, facilities and equipment for their investigative/ research/design projects.	Provide a written self-review describing access rules and procedures, including requirements for ensuring safety and security of students.

6. QUALITY ASSURANCE AND MANAGEMENT SYSTEMS

CRITERIA	Documentation required
6. ADMISSION AND STUDENTS WITH SPECIFIC NEEDS	
6.1. Admission standards are in place to ensure students have the educational background needed to have a reasonable chance of succeeding in their first year of study, and thereby progress through the programme. The suitability of the admission standard is reflected in student retention rates.	Set out the minimum entry standards for entry into the programme including level of academic attainment, and any pre-requisite requirements. Describe common scenarios for students who seek to enter with less-than-ideal previous academic study, how many such cases occur annually, what are the types of advice given, and what mentoring and monitoring is carried out? If possible, include quantitative data showing the rates of progression Provide the information in Schedule 5– Table 4 setting out progression of recent cohorts of students in the programme. Provide a multi-year summary of the average progression percentages from the start of the programme to completion.

CRITERIA	Documentation required
6.2. Different entry points and pathways are available for applicants with appropriate prior learning and/or experience.	Describe common scenarios for both students who seek recognition of prior learning. How many such cases occur annually, what are the types of advice given, and what mentoring and monitoring is carried out? If possible, include quantitative data showing the rates of progression. Provide hyperlinks to any relevant policy. Document any formal articulation or academic transfer arrangements that are in place from other programmes/institutions and summarise any data on relative rates of academic progression for these cohorts of students
6.3. Admission standards require sufficient proficiency in both written and oral English, and students admitted with marginal English language proficiency receive appropriate support.	Describe the relevant admission standard, explain how students in the programme with marginal communication proficiency are identified and the support programmes put in place for them.
6.4. Programmes are in place to i. support individuals or groups of students with specific needs (e.g. through disability, through disadvantage arising from deficiency in their prior learning), and ii. address issues that limit the participation or progression of under-represented groups of students, and iii. address unconscious or other biases detrimental to any such group.	Set out the key groups of students that are identified for support under one or other element of this criterion, the support mechanisms in place for those groups of students, how they are mentored and monitored individually, and any special facilities made available. Describe how any individual student with a particular need (e.g., physical disability) is, or would be, assisted to participate or undertake different but equivalent activities to other students. Explain how staff and other students are educated to avoid situations potentially prejudicial to those from under-represented groups e.g., gender-based or cultural inappropriateness.
7. QUALITY SYSTEMS AND PROCESSES	
7.1. Documented processes for developing, reviewing and amending programmes (which cover programme planning, curriculum development and programme approval) are suitable and applied consistently.	Describe (briefly) the key elements of the policies, systems and processes for academic approval of major programme changes or developments, and those for incremental change/improvement. Use recent examples to illustrate how approval for changes in engineering curricular were achieved. Provide hyperlinks to key policy documents.

CRITERIA	Documentation required
7.2. Internal moderation processes for monitoring academic standards and grading in course assessments are suitable and consistently applied to ensure that all courses are assessed to an appropriate academic standard.	Describe (briefly) the systems and processes used to ensure that academic standards are applied consistently between courses, including determining the proportion of passing students and the assignment of grades. If possible, use anonymised examples of how apparently anomalous draft results for a course were managed within those systems. Provide hyperlinks to key relevant policy documents.
7.3. There are adequate systems in place to externally benchmark and/or utilise external moderation advice to ensure suitability of the level of attainment required to complete the programme.	Provide a summary of the most recent benchmarking carried out against other institutions delivering similar programmes. In this describe the elements found to be in common with other programmes and what were distinct differences. Did the differences correlate with the advice of the industry advisory committee, or did they reflect the interests of academic staff? Provide a hyperlink to further detail if appropriate. Explain the extent to which external moderation is used. If used, name the external moderators, describe their role and how their feedback is utilised. Provide hyperlinks to their reports in the last two years and evidence of how any critical elements of the moderation report led to change.
7.4. Feedback and comment on delivery of courses is sought from students and recent graduates and applied to the continuing improvement of the quality of learning, teaching and assessment.	Describe (briefly) the systems used for gaining student feedback on course delivery, including the frequency of use of surveys and other tools, the typical return rate, how results are collated and communicated to teaching staff, and how mentoring and monitoring to improve teaching and assessment within a course is carried out. Provide hyperlinks to recent examples of survey results. Describe (briefly) the systems by which groups or individual students may raise concerns about teaching and/or assessment, and how such issues are managed and resolved. If possible, use anonymised examples.
7.5. There are documented audit processes that ensure the consistent application of documented policies and procedures.	Describe (briefly) the relevant audit processes and give a recent example of their application that led to identification and correction of an issue or concern.

CRITERIA	Documentation required
8. MANAGEMENT, LEADERSHIP AND INSTITUTIONAL SUPPORT	
8.1. There is an identifiable engineering-rich management structure that: i. ensures engineering expertise is central to decision-making relating to the design, content and delivery of engineering programmes, ii. manages use of financial resources and makes appointments of relevant staff.	Provide a written self-review against the criteria, identifying key roles and responsibilities of engineers in senior roles, and where relevant senior roles are not held by engineers, how those seek and utilize engineering expertise to assist them.
8.2. Creative and strategic leadership is available within the engineering department, school, college or faculty.	Provide a brief self-review against the criteria, including descriptions of any key leadership team or committee structures. Highlight any key recent strategic decisions and their impacts
8.3. Engineering education is seen as a significant long-term component of the tertiary education organisation's activity.	Provide a written self-review. Provide hyperlinks to any key policy or strategy documents.
8.4. The organisation has adequate policies and mechanisms for attracting, appointing, retaining, further developing and rewarding sufficient well-qualified staff, including recognising the value of staff engagement with industry.	Provide a written self-review, highlighting any strengths or weaknesses perceived that are beneficial or detrimental to the recruitment and career advancement for engineering staff. Provide hyperlinks to any key policy or strategy documents.
8.5. The organisation is committed to allocating sufficient financial resources on an ongoing basis for the remainder of the proposed period of accreditation for funding the operation of its engineering programmes, including providing capital for updating and/or expanding infrastructure, buildings and equipment systems.	Provide a self-review setting out the method for allocating both operating and capital funding to engineering education, and ideally to the specific programme. Describe the success or otherwise of any recent funding applications. Provide a table setting out recent year budgets, and commentary on whether those have been sufficient or required economies such as increasing student:staff ratios, deferred maintenance, or delayed replacement of equipment.

CRITERIA	Documentation required
9. Topical Issue (if any)	The Standards and Accreditation Board may identify a topical issue for providers to report against during an accreditation period or cycle. These are not issues that directly impact accreditation outcomes but are intended to gather information on the sector's response to a particular issue.

SCHEDULE 1: WASHINGTON ACCORD GRADUATE ATTRIBUTES AND KNOWLEDGE PROFILE

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
WA1: Engineering Knowledge: 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. WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of 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. WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering 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. Additionally, the programme provides familiarisation with engineering knowledge from Matauranga Māori that is relevant to the discipline.	This section is critical in that it should clearly define the technical body of knowledge covered by the programme. To best address the different aspects of WA1, break down your response to address each WK. For each of WK1 to 4, provide a brief written summary and present a schematic diagram of the programme structure annotated to show the ascending, progressive development of that component of the knowledge profile. Provide brief written commentary on any other matter considered relevant to the criterion, including alignment with any defined Body of Knowledge for the discipline – e.g., Software Engineering Body of Knowledge (SWEBOK), Structural Engineering Body of Knowledge and Skills – SESOC. Identify those aspects of relevant engineering knowledge within Matauranga Māori, and set out those courses in which they are covered.	***Computing fundamentals*** SAB does not anticipate significant changes to programmes arising from making explicit the need to apply computing fundamentals. However, independent of the Version 4 Changes to the WA, SAB recognises that there is a need for curricula change so that all engineering graduates are equipped to understand the advantages and limitations of emerging technologies, including Generative AI relevant to their engineering discipline. ***Awareness of relevant social sciences*** This change reflects the growing complexity of the social context in which engineers operate, including the need to foster a diverse, inclusive profession that can serve diverse communities. SAB acknowledges that the relevance of particular social sciences will vary by discipline, but a common focus would be on social science aspects underpinning an ethical, global, diverse and inclusive profession. SAB is open to various approaches to meet this change but expects this is most likely to be achieved through the inclusion of basic social science theory into existing courses rather than a specific social science course requirement. We note that 'awareness' is the lowest rung on Blooms taxonomy of knowledge. ***Matauranga Māori*** SAB believes that knowledge from Matauranga Māori is, in New Zealand, specialist knowledge for accepted practice areas in engineering disciplines

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
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* ** Represented by the 17 UN Sustainable Development Goals (UN-SDG)* ***Underpinning knowledge drawn from:*** WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of 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. WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering 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. ***Indicators of attainment:*** • Identifies all relevant constraints and requirements and formulates an accurate description of the problem.	Prepare a schematic diagram showing the progressive development of this WA graduate attribute. The diagram should use several text boxes of the type below which identify the courses in which both the underpinning knowledge and the graduate attribute are progressively developed and assessed. Show the most advanced contributing course at the top of the diagram. Do not include any courses in which development of the attribute is implicit or occurs on an 'as needed' basis. Show arrows to demonstrate the progressive development/ scaffolding of learning. *Course Code + Title (hyperlinked to course outline)* **Relevant Learning Outcome(s)** / **Description of assessment task (value %)** • xxxx / • xxxxx (5%)	*"Engineers of the future will require greater abilities to find and define problems before finding solutions."[1]* ***Holistic considerations for sustainable development*** This change has overlap with changes to WA6 and highlights the importance of integrated consideration of sustainable development alongside other aspects of problem analysis, particularly as part of the problem definition stage. This change, and others that incorporate sustainable development considerations into other graduate attributes, suggests that sustainable development considerations should be scaffolded into problem analysis-related papers through the programme and not only included in the problem analysis associated with capstone design. ***17 UN-SDGs*** SAB considers the SDGs provide a useful high-level framing for the identification of sustainable development considerations, but the expectation is for the development of a general awareness of the UN SDGs and a level of holistic consideration of the role of engineers rather than detailed evaluation, particularly outside the capstone design course.

[1] Engineering Futures 2035. Engineering Education Programmes, Priorities and Pedagogies, ACED

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Gathers engineering knowledge from the open literature and discerns the most relevant. • Develops from the qualitative description of the problem mathematical, physical or computational models/solutions based on fundamental principles and justifiable assumptions. • Selects appropriate analysis tools and applies those proficiently to implement the model/solution. • Evaluates the analysis for accuracy and validity of assumptions made. • Undertakes problem analysis while handling uncertain and/or incomplete information.	Provide: • a brief written description of the approach to the development of this attribute; • a brief written explanation to highlight the extent to which indicators of attainment are achieved; • a brief explanation of how new aspects of the Graduate Attribute introduced with Version 4 of the IEA GA&PCs (shown in red) are delivered, including any plans for future change to address.	
WA3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design systems, components or processes to meet identified ~~specified~~ 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. ***Underpinning knowledge drawn from:*** 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.	As above in WA2.	Changes to WA3 extend the scope of how design solutions are evaluated, with an expectation of a more open-ended analysis ("identified" rather than "specified"). References to "appropriate consideration" and "as required" makes it clear that treatment is likely to differ by discipline, as will the emphasis within different projects. ***Engagement with Māori communities*** Modern engineering design practice in New Zealand will often involve partnering or co-development with relevant Māori communities throughout a project.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
Indicators of attainment: • Identifies all relevant constraints and requirements, including any need to partner with or co-develop with relevant Māori communities through the project. • Identifies information requirements and selects what is relevant from the open literature. • Demonstrates originality in developing design solutions that incorporate social values and consideration of sustainable development impacts. • Screens alternative solutions systematically. • Applies modern design theories and methodologies to develop/design possible solutions. • Evaluates the feasibility of several possible solutions in all relevant contexts which, as appropriate to the problem, may include: technical, sustainability, suitability for implementation, economic, aesthetic, ethical, health and safety, societal, environmental and cultural. • Undertakes analysis to confirm the robustness of the proposed solution in the light of uncertain and/or incomplete information and data. • Describes the preferred solution and presents the findings in a coherent written form and defends those findings orally.		
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)	As above in WA2.	***Change to WK 8*** This change impacts both WA4 and the re-numbered WA11. This change represents more of an explicit statement of a previously implicit expectation – a level of development of critical thinking and creativity. We note that 'awareness' is the lowest rung on the

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
Underpinning knowledge drawn from: 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. ***Indicators of attainment:*** • Reviews the open research literature. • Identifies the needs for research or investigation. • Identifies appropriate research or investigation methodologies. • Designs and executes valid forms of research, experimentation or measurement. • Calibrates/validates the data collection methods and equipment. • Analyses the data including considering sources of error. • Draws valid conclusions and justifies those conclusions.		knowledge ladder in Bloom's taxonomy and do not expect this change to require a major emphasis.
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. ***Underpinning knowledge drawn from:*** 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	As above in WA2.	The minor change to WK2 here clarifies a focus on non-trivial use of analytical tools and the proposed change to the indicator of attainment reinforces this. The current complex problem definition already points to a need for students to demonstrate a depth of first principles analysis and originality to develop suitable analytical models, so the level of change is expected to be minimal. However, SAB also notes the need for programmes to keep pace with emerging tools and technologies, of which Generative AI is a recent and significant example.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline ***Indicators of attainment:*** • Identifies the range of current tools and resources available, selects one or more suitable tools and/or appropriate resources, and justifies the selection including considerations of the limitations of the tools available. • Applies such tools to simulate behaviour or model outcomes that might resolve a complex engineering problem, checks the results for validity, evaluates results and recognises the limitations on those results.		
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. *[NB; Consolidation of WA6 and WA7 from version 3* *WA6: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.* *WA7: Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.]* ***Underpinning knowledge drawn from:*** WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.	As above in WA2.	The focus of the change here is on the more direct application of contextual knowledge to the application of complex engineering problems. It represents a tightening of the application of contextual knowledge - *"analyse and evaluate impacts…" rather than "[be] informed by…."* Taken together with the other changes to WA2 and WA3, this is a call for students to be introduced to sustainable design practice and progress to achieving a sustainable design solution by the end of their studies. Once again, the inclusion of reference to the UN SDGs provides a useful high-level framing for analysis ***Māori Tikanga*** SAB considers that an understanding of the tikanga associated with partnering with relevant Māori communities is critical to engineering practice in New Zealand and has included an indicator of attainment to reflect this.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
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. 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 ~~sustainability~~ sustainable development.* ** Represented by the 17 UN Sustainable Development Goals (UN-SDG)* ***Indicators of attainment:*** • Identifies the responsibilities of a professional engineer generally, and demonstrates an awareness of the issues associated with international engineering practice and global operating contexts. • Identifies both direct and indirect, and short- and long-term impacts (including through Treaty of Waitangi obligations) on people, communities and the environment. • Identifies the relevant steps to be undertaken to address cultural (including Treaty of Waitangi) or community concerns. • Understands the tikanga for partnering with relevant Māori communities and identifies the steps to be undertaken to address other cultural or community concerns. • Undertakes life-cycle analysis to determine the sustainability of any proposed outcomes. • Evaluates the impacts of any relevant legislation or regulations and justifies relevant steps to be taken to ensure compliance.		

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Identifies risks, develops and evaluates risk management strategies to minimise the likelihood of significant consequences (such as injury or loss of life, major environmental damage, or significant economic loss) occurring in unusual or unexpected circumstances. • Identifies hazards and justifies relevant strategies and systems to reasonably assure public health and safety (including as appropriate to the discipline, safety in construction/fabrication, operation, maintenance, deconstruction/disposal, failing-safe and occupational health and safety). • Identifies and justifies specific actions required for environmental protection in the event of failure. • Advanced student project work involves students developing sustainable design solutions.		
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) ***Underpinning knowledge drawn from:*** 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	As above in WA2.	***National and international laws*** Adherence to national and international law represents a baseline requirement for engineering practice and the change to WA7 makes this explicit. ***New WK9*** The inclusion of specific expectations around diversity and inclusion and the new WK 9 represent a broadened view of professional ethics and societal norms. In a NZ context, this broader representation of ethics should also be reflected in understanding of obligations to Māori. Ethics is something instilled as well as taught. SAB acknowledges that many approaches are possible, and they can also vary based on the discipline taught. However, SAB considers that the changes lend

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
***Indicators of attainment*:** • Demonstrates an understanding of the moral responsibilities of a professional engineer including: the need to self-manage in an orderly and ethical manner, to balance obligations to Māori and the wider public interest with the interests of employers and clients, and to uphold standards in the engineering profession. • Identifies and justifies the use or otherwise of new technologies, such as but not limited to, Generative AI. • Identifies and justifies ethical courses of action when confronted with complex situations that might arise in the work of a professional engineer. • Comprehends how legislative, regulatory, contract law, other common law and professional obligations apply and manages own activities to comply.		themselves to integrated, holistic consideration, rather than being individual curriculum topics to check off. The new indicator of attainment reflects the importance of considering the ethical implications of emerging technologies, such as Generative AI. WK9 also formally introduces important elements of the social sciences for students to be made aware of (WA 1 refers).
WA8: Individual and Collaborative Team Work: 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. ***Underpinning knowledge drawn from:*** 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. ***Indicators of attainment:*** • Manages own activities with honesty and integrity and in an orderly manner to meet deadlines.	As above in WA2.	These extensions to the graduate attribute reflect the changing expectations for practicing engineers, and so result in an expectation to require more on this graduate attribute. Ideally, the programme should expose students to a range of project settings, working with diverse groups. Like the changes to WA7 above, SAB would expect institutions to both directly and indirectly act to advance this broader achievement. SAB acknowledges that many approaches are possible, and they can also vary based on the discipline taught. The value of developing critical reflection skills is reflected in the inclusion of a new Indicator of Attainment.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• In group situations students are guided to develop empathy for others and to adopt inclusive behaviour and language. • Contributes constructively to team decision making, earns the trust and confidence of other team members. • Students have opportunities to contribute to a diverse range of team-based settings. • Provides leadership in a team environment by making informed decisions, keeping the team motivated and accepting and delegating responsibility. • Critically evaluates the effectiveness of their individual and overall team performance.		
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. ***Indicators of attainment:*** • Presents a range of written reports and other documentation relevant to the engineering discipline that convey information effectively and respectfully to both technical and diverse audiences.	As above in WA2. *Note: It would normally be expected that communication of integrative project work in the last part of the programme would provide opportunity for assessment of overall proficiency in both written and oral presentation.*	*"Both problem definition and solution will require a deeper ability to communicate and empathise with a broader range of stakeholders than has been required in the past."*[2] The SAB envisions minor changes are needed by institutions to be able to demonstrate this broader graduate attribute. Changes here are reinforced by the change to WA1 and SAB sees opportunities to underpin student's practical communication skills with a broader social science awareness. Again, the value of critical reflection justifies the inclusion of a new Indicator of Attainment.

[2] Engineering Futures 2035. Engineering Education Programmes, Priorities and Pedagogies, ACED

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Presents work verbally in a clear, appropriate and articulate manner, using visual aids appropriately in a range of contexts. • Comprehends and responds appropriately to written and verbal instructions and appropriately instructs or briefs others in group exercises. • Produces engineering specifications or design documentation that satisfy the requirements of the design brief. • Critically evaluates the effectiveness and appropriateness of their own communication methods.		
WA10: Project Management and Finance: 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. ***Indicators of attainment:*** • Selects and justifies appropriate forms of contract for delivery of work by consultants or contractors. • Selects and applies relevant systems or techniques for managing quality, reliability and risk in the context of engineering projects. • Selects and applies relevant project management techniques to the planning and execution of future work. • Estimates the capital and on-going costs of engineering work.	As above in WA2.	No change.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment)	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
WA11: Lifelong Learning: 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). ***Underpinning knowledge drawn from:*** 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. ***Indicators of attainment:*** • Applies independent learning practices. • Demonstrates self-awareness of own level of competence. • Identifies opportunities to extend own competence in a timely manner. • Reflects on the potential impacts of technological change. • Comprehends the importance of engaging with a professional and intellectual community, learning from its knowledge and standards, and contributing to their maintenance and advancement.	Provide a brief written self-review setting out how graduates achieve the three elements of the graduate attribute. Refer to specific learning outcomes in particular courses if possible.	***Technological change*** As highlighted in other areas, there is a need for some demonstration that graduates are prepared to adapt to technological change and that students are exposed to contemporary and emerging technologies. ***Critical thinking and creativity*** These attributes have long been considered key attributes for a professional engineer and are implicit within the definition of complex engineering problems solving, which references abstract thinking, originality and first principles analytical thinking. While the change for WK8 asks for awareness of the power of critical thinking, the change to WA 11 is greater with a need for an ability for critical thinking, albeit in the narrower context of technological change. There are different ways that institutions may choose to incorporate these changes, however these might include exposure of students to: • foresighting and backcasting techniques; • systems thinking; • elements of logic in argument; • increasingly open-ended problems.

DEFINITION OF COMPLEX ENGINEERING PROBLEMS

Several graduate attributes use the notion of *complex engineering problems* as a key differentiator between programme levels. *Complex engineering problems* have been characterised by International Engineering Alliance signatories as follows:

Attribute	Complex Engineering Problems have characteristic WP1 and some or all of WP2 to WP7
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
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 ~~and other issues~~
Depth of analysis required	**WP3:** Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	**WP4:** Involve infrequently encountered issues or novel problems
Extent of applicable codes	**WP5:** Address problems not encompassed by standards and codes of practice for professional engineering [NB: re-worded, but no material change]
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
Interdependence	**WP7:** Are high level problems including many component parts or sub-problems that may require a systems approach

SCHEDULE 2: SYDNEY ACCORD GRADUATE ATTRIBUTES AND KNOWLEDGE PROFILE

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
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. SK1: A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences. 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. SK3: A systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline SK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline. Additionally, the programme provides familiarisation with engineering knowledge from Matauranga Māori that is relevant to the discipline.	For each of SK1 to 4, present a schematic diagram of the programme structure annotated to show the ascending, progressive development of that component of the knowledge profile. For each of SK1 to 4 provide a separate or embedded supportive table(s) corresponding to the relevant schematic diagram setting out for the major contributing courses: (a) Course code and title, (b) relevant learning outcomes, (c) percentage of the course relevant to that SK, and (d) hyperlinks to examples of most advanced assessment tasks relevant to that SK. Provide brief written commentary on any other matter considered relevant to the criterion, including alignment with any defined Body of Knowledge for the discipline – e.g., Software Engineering Body of Knowledge (SWEBOK), Structural Engineering Body of Knowledge and Skills – SESOC.	***Computing fundamentals*** SAB does not anticipate significant changes to programmes arising from making explicit the need to apply computing fundamentals. However, independent of the Version 4 Changes to the SA, SAB recognises that there is a need for curricula change so that all engineering graduates are equipped to understand the advantages and limitations of emerging technologies, including Generative AI (Artificial Intelligence) relevant to their engineering discipline. ***Awareness of relevant social sciences*** This change reflects the growing complexity of the social context in which engineers operate, including the need to foster a diverse, inclusive profession that can serve diverse communities. SAB acknowledges that the relevance of particular social sciences will vary by discipline, but a common focus would be on social science aspects underpinning an ethical, global, diverse and inclusive profession. SAB is open to various approaches to meet this change but expects this is most likely to be achieved through the inclusion of basic social science theory into existing courses rather than a specific social science course requirement. We note that 'awareness' is the lowest rung on Blooms taxonomy of knowledge. ***Matauranga Māori*** SAB believes that knowledge from Matauranga Māori is, in New Zealand, specialist knowledge for accepted practice areas in engineering disciplines.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
	Identify those aspects of relevant engineering knowledge within Matauranga Māori, and set out those courses in which they are covered.	
SA2: Problem Analysis: 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). ***Underpinning knowledge drawn from:*** SK1: A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences. 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. SK3: A systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline. SK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline. ***Indicators of attainment*** • Identifies relevant constraints and requirements and develops an accurate description of the problem. • Gathers engineering knowledge from sources such as textbooks, reviews, codes of practice and standards and identifies the most relevant.	Prepare a schematic diagram showing the progressive development of the SA graduate attribute. This diagram should use several text boxes of the type below which identify the courses in which both the underpinning knowledge and the graduate attribute are progressively developed and assessed. Show the most advanced contributing course at the top of the diagram. Do not include any courses in which development of the attribute is implicit, or occurs on an 'as needed' basis. Show arrows to demonstrate the progressive development/ scaffolding of learning. *Course Code + Title* *(hyperlinked to course outline)* **Relevant Learning Outcome(s)** / **Description of assessment task (value %)** • xxxx / • xxxxx (5%)	No change.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Selects from the qualitative description of the problem a suitable form of mathematical, physical or computation model and justifies that choice. • Selects appropriate analysis tools, which may include relevant standards and codes of practice, and applies those proficiently to implement the model. • Systematically checks the analysis for accuracy and validity of assumptions made.	Provide: • a brief written description of the approach to the development of this attribute; • a brief written explanation to highlight the extent to which indicators of attainment are achieved; • a brief explanation of how new aspects of the Graduate Attribute introduced with Version 4 of the IEA GA&PCs (shown in red) are delivered, including any plans for future change to address.	
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 ~~specified~~ 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). ***Underpinning knowledge drawn from:*** 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.	As above in SA2.	Changes to SA3 extend the scope of how design solutions are evaluated, with an expectation of a more open-ended analysis (“identified” rather than “specified”). References to “appropriate consideration” and “as required” makes it clear that treatment is likely to differ by discipline, as will the emphasis within different projects. ***Engagement with Māori communities*** Modern engineering design practice in New Zealand will often involve partnering or co-development with relevant Māori communities throughout a project.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
Indicators of attainment • Identifies all relevant constraints and requirements, including any need to partner with or co-develop with relevant Māori communities through the project. • Identifies information requirements and obtains information from the relevant industry literature. • Demonstrates creativity to propose possible solutions that consider social values and sustainable development impacts. • Screens alternative solutions systematically. • Develops/designs at least two possible solutions. • Evaluates the feasibility of possible solutions in the most relevant contexts which, as appropriate to the problem, include some of technical, suitability for implementation, economic, aesthetic, ethical, health and safety, societal, environmental and cultural. • Makes informed choices between alternatives based on sound analysis. • Evaluates the robustness of the proposed solution in the light of uncertain information and data. • Documents a preferred solution and presents the findings in a coherent written form.		
SA4: Investigation: 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).	As above in SA2.	***Change to SK 8*** This change impacts both SA4 and the re-numbered SA11. This change represents more of an explicit statement of a previously implicit expectation – a level of development of critical thinking and creativity. We note that 'awareness' is the lowest rung on the

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
Underpinning knowledge drawn from: SK8 Engagement with the current technological literature of the discipline and awareness of the power of critical thinking. ***Indicators of attainment:*** • Reviews relevant textbooks, databases and guidance documents. • Identifies the needs for investigation. • Identifies an appropriate investigation methodology. • Designs and executes valid forms of experimentation or measurement. • Calibrates/validates the data collection methodology and equipment. • Analyses the data including considering sources of error. • Draws valid conclusions.		knowledge ladder in Bloom's taxonomy and do not expect this change to require a major emphasis.
SA5: Tool Usage: 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). ***Underpinning knowledge drawn from:*** 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. SK6: Knowledge of engineering technologies applicable in the sub-discipline.	As above in SA2.	No change.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
Indicators of attainment: • Understands the range of tools available, selects a suitable tool and justifies the selection including consideration of the limitation of the tools available. • Applies such tools, checks results for validity, draws and explains conclusions and limitations on those conclusions.		
SA6: The Engineer and the World: 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). [NB; Consolidation of SA6 and SA7 from version 3 SA6: Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technology practice and solutions to broadly defined engineering problems. SA7: Understand and evaluate the sustainability and impact of engineering technology work in the solution of broadly defined engineering problems in societal and environmental contexts]. ***Underpinning knowledge drawn from:*** SK1: A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences. 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. SK7 Knowledge of the role of technology in society and identified issues in applying engineering technology, such as public safety and ~~sustainability~~ sustainable development.*	As above in SA2.	The focus of the change here is on the more direct application of contextual knowledge to the application of broadly defined engineering problems. It represents a tightening of the application of contextual knowledge - *"analyse and evaluate impacts…" rather than "[be] informed by…."* Taken together with the other changes to SA3, this is a call for students to be introduced to sustainable design practice and progress to achieving a sustainable design solution by the end of their studies. ***17 UN-SDGs*** SAB considers the SDGs provide a useful high-level framing for the identification of sustainable development considerations, but the expectation is for the development of a general awareness of the UN SDGs and a level of holistic consideration of the role of engineers rather than detailed evaluation, particularly outside the capstone design course. ***Māori Tikanga*** SAB considers that an understanding of the tikanga associated with partnering with relevant Māori communities is critical to engineering practice in New Zealand and has included an indicator of attainment to reflect this.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
** Represented by the 17 UN Sustainable Development Goals (UN-SDG).* ***Indicators of attainment:*** • Identifies the responsibilities of an engineering technologist generally, and demonstrates an awareness of the issues associated with international engineering practice and global operating contexts. • Identifies both direct and indirect impacts (including through Treaty of Waitangi obligations) on people, communities and the environment. • Identifies the relevant steps to be undertaken to address cultural (including Treaty of Waitangi) or community concerns. • Understands the tikanga for partnering with relevant Māori communities and identifies the steps to be undertaken to address other cultural or community concerns. • Identifies and evaluates the major factors that have impact on the sustainability of any proposed outcomes. • Identifies the impacts of any relevant legislation or regulation and sets out relevant steps to be taken to ensure compliance. • Identifies risks, develops and evaluates risk management strategies to minimise the likelihood of significant consequences (such as injury or loss of life, major environmental damage, or significant economic loss) occurring in unusual or unexpected circumstances. • Identifies hazards and explains relevant steps to be taken to reasonably assure public health and safety (including as appropriate to the discipline, safety in construction/fabrication, operation, maintenance,		

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
deconstruction/disposal, failing-safe and occupational health and safety). • Identifies and explains means for ensuring environmental protection in the event of failure. • Advanced student project work involves consideration of sustainable development impacts.		
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). ***Underpinning knowledge drawn from:*** 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. ***Indicators of attainment*:** • Demonstrates an understanding of the moral responsibilities of an engineering technologist including: the need to self-manage in an orderly and ethical manner, to balance obligations to Māori and the wider public interest with the interests of employers and clients, and to uphold standards in the engineering profession. • Identifies and justifies ethical courses of action when confronted with situations that might arise in the work of an engineering technologist, including in the use of new technologies.	As above in SA2.	***National and international laws*** Adherence to national and international law represents a baseline requirement for engineering practice and the change to SA7 makes this explicit. ***New SK9*** The inclusion of specific expectations around diversity and inclusion and the new SK9 represent a broadened view of professional ethics and societal norms. In a NZ context, this broader representation of ethics should also be reflected in understanding of obligations to Māori. Ethics is something instilled as well as taught. SAB acknowledges that many approaches are possible, and they can also vary based on the discipline taught. However, SAB considers that the changes lend themselves to integrated, holistic consideration, rather than being individual curriculum topics to check off. The new indicator of attainment reflects the importance of considering the ethical implications of emerging technologies, such as Generative AI. SK9 also formally introduces important elements of the social sciences for students to be made aware of (SA 1 refers).

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Comprehends how legislative, regulatory, contract law, other common law and professional obligations apply and manages own activities to comply.		
SA8: Individual and Collaborative Team Work: 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). ***Underpinning knowledge drawn from:*** 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. ***Indicators of attainment:*** • In group situations, students are guided to develop empathy for others and to adopt inclusive behaviour and language. • Manages own activities with honesty and integrity and in an orderly manner to meet deadlines. • Students have opportunities to contribute to a range of team-based settings. • Contributes constructively to team decision making, earns the trust and confidence of other team members. • Provides leadership in a team environment by making informed decisions, keeping the team motivated and accepting and delegating responsibility.	As above in SA2.	These extensions to the graduate attribute reflect the changing expectations for practicing engineers, and so result in an expectation to require more on this graduate attribute. Ideally, the programme should expose students to a range of project settings, working with diverse groups. Like the changes to SA7 above, SAB would expect institutions to both directly and indirectly act to advance this broader achievement. SAB acknowledges that many approaches are possible, and they can also vary based on the discipline taught.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
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. ***Indicators of attainment:*** • Presents clearly written reports for both technical and lay audiences, as is appropriate. • Presents work verbally in a clear, appropriate and articulate manner, using visual aids appropriately. • Comprehends and responds appropriately to written and verbal instructions and appropriately instructs or briefs others in group exercises. • Produces engineering specifications or design documentation that satisfy the requirements of the design brief.	As above in SA2. *Note: It would normally be expected that communication of integrative project work in the last part of the programme would provide opportunity for assessment of overall proficiency in both written and oral presentation.*	*"Both problem definition and solution will require a deeper ability to communicate and empathise with a broader range of stakeholders than has been required in the past."*[3] The SAB envisions minor changes are needed by institutions to be able to demonstrate this broader graduate attribute. Changes here are reinforced by the change to SA1 and SAB sees opportunities to underpin student's practical communication skills with a broader social science awareness.
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.	As above in SA2.	No change.

[3] Engineering Futures 2035. Engineering Education Programmes, Priorities and Pedagogies, ACED

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
Indicators of attainment: • Comprehends how legislative, regulatory, contract law, other common law and professional obligations apply and manages own activities to comply • Selects and applies relevant project management techniques to the planning and execution of future work • Selects appropriate forms of contract for delivery of work by consultants or contractors • Selects relevant techniques for managing quality, reliability and engineering risk • Estimates the capital and on-going costs of engineering work		
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). ***Underpinning knowledge drawn from:*** SK8 Engagement with the current technological literature of the discipline and awareness of the power of critical thinking. ***Indicators of attainment:*** • Applies independent learning practices. • Demonstrates self-awareness of own level of competence. • identifies opportunities to extend own competence in a timely manner that reflects the impact of technological change. • Comprehends the importance of engaging with a professional community, learning from its knowledge and standards.	Provide a brief written self-review setting out how graduated achieve the three elements of the graduate attribute. Refer to specific learning outcomes in particular courses if possible.	***Technological change*** As highlighted in other areas, there is a need for some demonstration that graduates are prepared to adapt to technological change and that students are exposed to contemporary and emerging technologies. ***Critical thinking*** This has long been considered a key attribute for engineering professionals and is implicit within the definition of broadly defined engineering problem solving. While the change for SK8 asks for awareness of the power of critical thinking, the change to SA 11 is greater with a need for an ability for critical thinking, albeit in the narrower context of new technologies.

DEFINITION OF BROADLY-DEFINED PROBLEMS

Several graduate attributes use the notion of *broadly-defined engineering problems* as a key differentiator between programme levels. *Broadly-defined engineering problems* have been characterised by International Engineering Alliance signatories as follows:

Attribute	Broadly defined Engineering Problems have characteristic SP1 and some or all of SP2 to SP7
Depth of Knowledge Required	**SP1:** Cannot be resolved without engineering knowledge at the level of one or more of SK4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed technology.
Range of conflicting requirements	**SP2:** ~~Involve a variety of factors which may impose conflicting constraints~~ Involve a variety of conflicting technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements.
Depth of analysis required	**SP3:** Can be solved by application of well-proven analysis techniques and models.
Familiarity of issues	**SP4:** Belong to families of familiar problems which are solved in well-accepted ways.
Extent of applicable codes	**SP5:** Address problems that may be partially outside those encompassed by standards or codes of practice. [NB: reworded but no material change]
Extent of stakeholder involvement and conflicting requirements	**SP6:** Involve different engineering disciplines and other fields with several groups of stakeholders with differing and occasionally conflicting needs.
Interdependence	**SP7:** Address components of ~~parts of, or~~ systems within complex engineering problems.

SCHEDULE 3: DUBLIN ACCORD GRADUATE ATTRIBUTES AND KNOWLEDGE PROFILE

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
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. DK1: A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences. DK2: Procedural mathematics, numerical analysis, statistics applicable in a subdiscipline. DK3: A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline. DK4: Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline. Additionally, the programme provides familiarisation with engineering knowledge from Matauranga Māori that is relevant to the discipline.	For each of DK1 to 4, present a schematic diagram of the programme structure annotated to show the ascending, progressive development of that component of the knowledge profile. For each of DK 1 to 4 provide a separate or embedded supportive table(s) corresponding to the relevant schematic diagram setting out for the major contributing courses: (a) Course code and title, (b) relevant learning outcomes, (c) percentage of the course relevant to that DK, and (d) hyperlinks to examples of most advanced assessment tasks relevant to that DK. Provide brief written commentary on any other matter considered relevant to the criterion, including alignment with any defined Body of Knowledge for the discipline – e.g., Software Engineering Body of Knowledge (SWEBOK), Structural Engineering Body of Knowledge and Skills – SESOC.	***Awareness of directly relevant social sciences*** This change reflects the growing complexity of the social context in which engineers operate, including the need to foster a diverse, inclusive profession that can serve diverse communities. SAB acknowledges that the relevance of particular social sciences will vary by discipline, but a common focus would be on social science aspects underpinning an ethical, global, diverse and inclusive profession. SAB is open to various approaches to meet this change but expects this is most likely to be achieved through the inclusion of basic social science theory into existing courses rather than a specific social science course requirement. We note that 'awareness' is the lowest rung on Blooms taxonomy of knowledge. ***Matauranga Māori*** SAB believes that knowledge from Matauranga Māori is, in New Zealand, specialist knowledge for accepted practice areas in engineering disciplines.

<table>
<tr><th>Graduate Attribute (with underpinning knowledge profile and indicators of attainment</th><th>Self-review instructions</th><th>Guidance to guide interpretation of changes to Graduate Attributes</th></tr>
<tr><td></td><td>Identify those aspects of relevant engineering knowledge within Matauranga Māori, and set out those courses in which they are covered.</td><td></td></tr>
<tr><td>DA2: Problem Analysis:
Identify and analyze well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity. (DK1 to DK4).
Underpinning knowledge drawn from:
DK1: A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences.
DK2: Procedural mathematics, numerical analysis, statistics applicable in a subdiscipline.
DK3: A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline.
DK4: Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline.
Indicators of attainment:
• Identifies relevant constraints and requirements and sets out an accurate description of the problem.
• Gathers engineering knowledge from sources such as standards and codes of practice and identifies the most relevant.
• Applies established diagnostic processes and codified methods to define problems.</td><td>Prepare a schematic diagram showing the progressive development of the DA graduate attribute. This diagram should use several text boxes of the type below which identify the courses in which both the underpinning knowledge and the graduate attribute are progressively developed and assessed. Show the most advanced contributing course at the top of the diagram. Do not include any courses in which development of the attribute is implicit or occurs on an ‘as needed’ basis. Show arrows to demonstrate the progressive development/ scaffolding of learning.
Course Code + Title (hyperlinked to course outline)
<table><tr><th>Relevant Learning Outcome(s)</th><th>Description of assessment task (value %)</th></tr><tr><td>• xxxx</td><td>• xxxx (5%)</td></tr></table></td><td>No change.</td></tr>
</table>

<table>
<tr><th>Graduate Attribute (with underpinning knowledge profile and indicators of attainment</th><th>Self-review instructions</th><th>Guidance to guide interpretation of changes to Graduate Attributes</th></tr>
<tr><td>Systematically checks the analysis for accuracy and validity of assumptions made.</td><td>Provide:
a brief written description of the approach to the development of this attribute;
a brief written explanation to highlight the extent to which indicators of attainment are achieved.</td><td></td></tr>
<tr><td>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).
Underpinning knowledge drawn from:
DK5: Knowledge that supports engineering design and operations based on the techniques and procedures of a practice area.
Indicators of attainment:
Identifies all relevant constraints and requirements, including any need to partner with or co-develop with relevant Māori communities through the project.
Identifies information requirements and obtains information from the relevant industry literature.
Demonstrates creativity to propose possible solutions.
Screens alternative solutions systematically.
Develops/designs at least one possible solution.</td><td>As above in DA2.</td><td>Engagement with Māori communities
Modern engineering design practice in New Zealand will often involve partnering or co-development with relevant Māori communities throughout a project.</td></tr>
</table>

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Considers contextual factors and in particular ensures that health, safety and sustainability imperatives are addressed as an integral part of the design process. • Makes informed choices between alternatives and justifies approach. • Verifies the robustness of the proposed solution against clearly specified user requirements. • Documents a preferred solution and presents the findings in a coherent written form.		
DA4: Investigation: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements (DK8). ***Underpinning knowledge drawn from:*** DK8: Engagement with the current technological literature of the practice area. ***Indicators of attainment:*** • Reviews relevant textbooks, databases and guidance documents. • Identifies the needs for data collection and/or testing. • Identifies an appropriate data collection or testing methodology. • Selects and applies established methods of data collection and measurement. • Safely implements laboratory test and measurement procedures.	As above in DA2.	***New DK8*** Makes explicit the expectation that students are engaging with current technological literature – codes, standards etc.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Calibrates/validates the data collection methods and equipment. • Analyses the data including considering sources of error. • Draws valid conclusions.		
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). ***Underpinning knowledge drawn from:*** DK2: Procedural mathematics, numerical analysis, statistics applicable in a subdiscipline. DK6: Codified practical engineering knowledge in recognized practice area. ***Indicators of attainment*** • Understands the range of tools available, selects a suitable tool and explains the selection including consideration of the limitation of the tools available. • Applies such tools, check the results for validity, identifies and draws conclusions and limitations on those conclusions.	As above in DA2.	No change.
DA6: The Engineer and the World: 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). [NB; Consolidation of DA6 and DA7 from version 3.	As above in DA2.	The focus of the change here is on the more direct application of contextual knowledge to the application of broadly defined engineering problems. This calls for students to be introduced to sustainable design practice and progress to achieving a sustainable design solution by the end of their studies. ***17 UN-SDGs***

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
DA6: Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well defined engineering problems. DA7: Understand and evaluate the sustainability and impact of engineering technician work in the solution of well-defined engineering problems in societal and environmental contexts.] ***Underpinning knowledge drawn from:*** DK1: A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences. DK5: Knowledge that supports engineering design and operations based on the techniques and procedures of a practice area DK7: Knowledge of issues and approaches in engineering technician practice, such as public safety and ~~sustainability~~ sustainable development.* ** Represented by the 17 UN Sustainable Development Goals (UN-SDG).* ***Indicators of attainment:*** • Demonstrates knowledge responsibilities of an engineering technician generally, and demonstrates an awareness of the issues associated with international engineering practice and global operating contexts. • Identifies practical impacts (including through Treaty of Waitangi obligations) on people, communities and the environment. • Identifies the relevant steps to be undertaken to address cultural (including Treaty of Waitangi) or community concerns. • Understands the tikanga for partnering with relevant Māori communities and identifies the steps to be undertaken to address other cultural or community concerns.		SAB considers the SDGs provide a useful high-level framing for the identification of sustainable development considerations, but the expectation is for the development of a general awareness of the UN SDGs and a level of holistic consideration of the role of engineers rather than detailed evaluation, particularly outside the capstone design course. ***Māori Tikanga*** SAB considers that an understanding of the tikanga associated with partnering with relevant Māori communities is critical to engineering practice in New Zealand and has included an indicator of attainment to reflect this.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Identifies the major factors that have impacts on the sustainability of practical and technical project work. • Demonstrates knowledge of the impacts of any relevant legislation or regulation and identifies relevant steps to be taken to ensure compliance. • Applies established risk management strategies to minimise the likelihood of significant consequences (such as injury or loss of life, major environmental damage, or significant economic loss) occurring in the event of failure. • Identifies operational hazards and sets out relevant steps to be taken to lower the risk to public health and safety (including as appropriate to the discipline, safety in construction/fabrication, operation, maintenance, deconstruction/disposal, failing-safe and occupational health and safety). • Applies established methods for ensuring environmental protection in the event of failure.		
DA7: Ethics: 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). ***Underpinning knowledge drawn from:*** 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.	As above in DA2.	***National and international laws*** Adherence to national and international law represents a baseline requirement for engineering practice and the change to DA7 makes this explicit. ***New DK9*** The inclusion of specific expectations around diversity and inclusion and the new DK9 represent a broadened view of professional ethics and societal norms. In a NZ context, this broader representation of ethics should also be reflected in understanding of obligations to Māori.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
***Indicators of attainment*:** • Demonstrates an understanding of the moral responsibilities of an engineering technician including: the need to self-manage in an orderly and ethical manner, to balance obligations to Māori and the wider public interest with the interests of employers and clients, and to uphold standards in the engineering profession. • Identifies relevant clauses in the Engineering New Zealand code of ethics when confronted with situations that might arise in the work of an engineering technician, including in the use of new technologies. • Is aware of how legislative, regulatory, contract law, other common law and professional obligations apply and manages own activities to comply.		Ethics is something instilled as well as taught. SAB acknowledges that many approaches are possible, and they can also vary based on the discipline taught. However, SAB considers that the changes lend themselves to integrated, holistic consideration, rather than being individual curriculum topics to check off. The new indicator of attainment reflects the importance of considering the ethical implications of emerging technologies, such as Generative AI. DK9 also formally introduces important elements of the social sciences for students to be made aware of (DA 1 refers).
DA8: Individual and Collaborative Team Work: Function effectively as an individual, and as a member or leader in diverse and inclusive ~~technical~~ teams and in multi-disciplinary, face-to-face, remote and distributed settings (DK9). ***Underpinning knowledge drawn from:*** 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. ***Indicators of attainment:*** • In group situations, students are guided to adopt inclusive behaviour and language.	As above in DA2.	These extensions to the graduate attribute reflect the changing expectations for practicing engineers, and so result in an expectation to require more on this graduate attribute. Ideally, the programme should expose students to a range of project settings, working with diverse groups. Like the changes to DA7 above, SAB would expect institutions to both directly and indirectly act to advance this broader achievement. SAB acknowledges that many approaches are possible, and they can also vary based on the discipline taught.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
• Manages own activities with honesty and integrity and in an orderly manner to meet deadlines. • Contributes constructively to team decision making, earns the trust and confidence of other team members in a range of settings.		
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. ***Indicators of attainment:*** • Presents clearly written reports for both technical and lay audiences, as is appropriate. • Presents work verbally in a clear, appropriate and articulate manner, using visual aids appropriately. • Comprehends and responds appropriately to written and verbal instructions and appropriately instructs or briefs others in group exercises. • Prepares engineering documents including sketches, charts, plans, drawings and technical instructions. *Note: It would normally be expected that communication of integrative project work in the last part of the programme would provide opportunity for assessment of overall proficiency in both written and oral presentation.*	As above in DA2.	Change here is reinforced by the change to DA1 and SAB sees opportunities to underpin student's practical communication skills with a broader social science awareness.
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.	As above in DA2.	No change.

Graduate Attribute (with underpinning knowledge profile and indicators of attainment	Self-review instructions	Guidance to guide interpretation of changes to Graduate Attributes
Indicators of attainment: • Comprehends how legislative, regulatory, contract law, other common law and professional obligations apply and manages own activities to comply. • Selects and applies basic project management tools to the planning and execution of practical project work. • Identifies an appropriate form of contract for delivery of work by contractors. • Identifies relevant practical methods for managing quality, reliability and engineering risk. • Applies established methods for costing engineering work.		
DA11: Lifelong Learning: Recognize the need for, and have the ability for independent updating in the face of specialized technical knowledge (DK8). ***Underpinning knowledge drawn from:*** DK8: Engagement with the current technological literature of the practice area. ***Indicators of attainment:*** • Applies independent learning practices. • Demonstrates self-awareness of own level of competence. • Identifies opportunities to extend own competence in a timely manner. • Comprehends the importance of engaging with a professional community, learning from its knowledge and standards.	Provide a brief written self-review setting out how graduated achieve the three elements of the graduate attribute. Refer to specific learning outcomes in particular courses if possible.	No change.

DEFINITION OF WELL-DEFINED ENGINEERING PROBLEMS

Several graduate attributes use the notion of *well-defined engineering problems* as a key differentiator between programme levels. *Well-defined engineering problems* have been characterised by International Engineering Alliance signatories as follows:

Attribute	Well Defined Engineering Problems have characteristic DP1 and some or all of DP2 to DP7
Depth of Knowledge Required	**DP1:** Cannot be resolved without extensive practical knowledge as reflected in DK5 and DK6 supported by theoretical knowledge defined in DK3 and DK4.
Range of conflicting requirements	**DP2:** Involve several technical and nontechnical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements. ~~but with few of these exerting conflicting constraints issues~~
Depth of analysis required	**DP3:** Can be solved in standardised ways.
Familiarity of issues	**DP4:** Are frequently encountered and thus familiar to most practitioners in the practice area.
Extent of applicable codes	**DP5:** Addresses problems that are encompassed by standards and/or documented codes of practice. [NB: reworded but no material change]
Extent of stakeholder involvement and conflicting requirements	**DP6:** Involve a limited range of stakeholders with differing needs.
Interdependence	**DP7:** Address ~~are~~ discrete components of engineering systems.

SCHEDULE 4: SPECIFIC ACCREDITATION CRITERIA FOR THE ACCREDITATION OF POSTGRADUATE PROGRAMMES BASED ON SPECIFIC BODIES OF KNOWLEDGE

PART I: PROGRAMME AND ORGANISATION OVERVIEW

Section 2, Part I applies.

PART II: PROGRAMME DESIGN, GRADUATE ATTRIBUTES AND ASSESSMENT

CRITERIA	Documentation required
1. Programme Design	
1.1 Programme graduate outcomes are defined for the programme and incorporate the development of a coherent body of knowledge that is curated by a recognised industry group (that is viewed to own the body of knowledge) as necessary for specialist practice and/or "registration/licensure." It is expected that the industry group is clearly identified and recognised as authoritative or nationally representative of engineering practice in the area. The industry body is also expected to be able to demonstrate the capacity, capability and commitment to maintain the relevant Body of Knowledge over time.	Provide a clear statement of programme graduate outcomes for the programme. Provide a summary mapping of the graduate profile with the Body of Knowledge as defined by an appropriate industry group.
1.2 The programme is structured to provide for the logical, progressive development of the programme graduate outcomes and associated body of knowledge	Provide a high-level summary of the overall approach to programme design and the development of broad areas of student capability.
1.3 The programme title is consistent with the underpinning body of knowledge covered by the programme.	

CRITERIA	Documentation required
1.4 The programme design demonstrably takes into account the advice of likely employers and target industries, this advice obtained through a structured advisory mechanism or regular, formal engagement with the recognised industry body responsible for maintaining the Body of Knowledge.	Describe (briefly) the (ongoing) consultative mechanism with industry, setting out the composition and terms of reference of the relevant industry advisory committee. Provide a hyperlink to two most recent sets of committee minutes. Provide an example of where advice from the industry advisory committee has been adopted and changes implemented. If other means of obtaining feedback are used, explain these and give an example of their application.
2. Graduate Attributes and Assessment	
2.1 The full range of programme graduate outcomes is developed and assessed through the programme.	• Provide a brief written summary and present a schematic diagram of the programme structure annotated to show the ascending, progressive development of the key components of the graduate profile/body of knowledge. Identify those aspects of relevant engineering knowledge within Matauranga Māori, and set out those courses in which they are covered.
2.2 There are clearly identified and specific assessment activities that demonstrate students' achievement, by completion of the programme, of each of the programme graduate outcomes. *[constructive alignment]*	Either as an extension of, or addendum to, the tables provide in 2.1 above, prepare a table listing in columns: a) the relevant graduate attribute b) the course code, title and learning outcomes at advanced level that are relevant to that attribute (may be more than one course) – this should reflect most advanced course(s) documented in 2.1, c) the nature of the assessment task used and its percentage weighting in the course outcomes d) hyperlinks to assessment tasks used in the last two years and associated marking rubrics, and e) hyperlinks to examples of student work at the pass/fail line. Provide brief written commentary on any other matter considered relevant to the criteria.

CRITERIA	Documentation required
2.3 Assessment tools within each course are suitably chosen in relation to the learning outcomes and validly assess those learning outcomes to an appropriate academic standard. *[assessment validity]* ***Indicators of attainment:*** • Assessment tasks consistently set out to directly assess the relevant learning outcomes. • Assessment tasks are at an appropriate level of complexity. • Marking rubrics are valid and likely to lead to fair grading. • Appropriate tools and other mechanisms are used to detect whether students are submitting their own work. • Valid methods are applied to fairly identify and separately grade each student when combined group work is submitted for assessment.	The information provided in 2.2 will also be key evidence used by Accreditation Panels to evaluate assessment validity. However, provide a brief self-review against this criterion, including a summary of the methods used to: • ensure that students are submitting their own work for assessment. • fairly identify personal contributions and separately grade each student when combined group work is submitted for assessment. Provide brief written commentary on any other matter considered relevant to the criteria.
2.4 There are systems in place for external moderation of assessment standards with industry to ensure that the level of attainment required to complete the programme is aligned with industry requirements.	

PART III: CAPACITY AND CAPABILITY FOR ONGOING DELIVERY

CRITERIA	Documentation required
3. ACADEMIC STAFF – Criteria 3.1 and 3.3 - 3.5 from Section 2, Part III apply. *Note: In the case of those postgraduate programmes where the level of specialisation is high, it is accepted that individual courses may be critically dependent on individual lecturers. Nonetheless there is a requirement that the programme as a whole will be designed to be viable with respect to the graduate profile if individual academic staff become unavailable.*	
4. TECHNICAL AND SUPPORT STAFF Criterion 4 from Section 2, Part III applies.	
5. PRACTICAL TEACHING FACILITIES AND LEARNING RESOURCES Criterion 5 from Section 2, Part III applies	
6. ADMISSION AND STUDENTS WITH SPECIFIC NEEDS	
6.1. Admission standards and entry pathways are in place to ensure students have the educational background needed to have a reasonable chance of succeeding in their first year of study, and thereby progress through the programme. The suitability of the admission standard is reflected in student retention rates.	Set out the minimum entry standards and typical entry pathways for students entering the programme including level of academic attainment, and any pre-requisite requirements. Describe common scenarios for students who seek to enter with less-than-ideal previous academic study, how many such cases occur annually, what are the types of advice given, and what mentoring and monitoring is carried out? If possible, include quantitative data showing the rates of progression Provide the information in Schedule 5 – Table 4 setting out progression of recent cohorts of students in the programme. Provide a multi-year summary of the average progression percentages from the start of the programme to completion.
6.2 Admission material clearly articulates the relationship between the specialised or advanced body of knowledge developed by the programme and foundational	

CRITERIA	Documentation required
engineering knowledge and skills as typically required for general entry to practice as an engineer.	
6.3 Where programme entry criteria provide for the enrolment of students who do not hold an undergraduate engineering qualification recognised as satisfying general entry to practice requirements (typically a programme recognised under the Washington Accord), potential restrictions on future practice or professional registration or licensure are clearly articulated to prospective students.	
6.4 Any pre-requisite foundational engineering knowledge is clearly identified and consistently assessed. *Note: One of the risks with postgraduate programmes is the diversity of admission routes. Depending on the TEO's admission policy incoming students may not have an engineering qualification, or may have one in a different engineering discipline, or have one at a different level (e.g. diploma) or may have an overseas qualification. Engineering New Zealand is not prescriptive as to how the TEO determines and enforces its postgraduate admission criteria but does reserve the right not to recognise a graduate within the profession, even if the postgraduate programme has been accredited. Engineering New Zealand expects the TEO to manage this risk at admission and to faithfully communicate the implications to students[4].*	

[4] As noted in *Section 1 - Introduction*, programmes accredited under this Schedule are not recognised under an International Accord. As a result, graduates who do not have an accredited undergraduate engineering qualification may have to undergo an additional individual knowledge assessment as part of the professional recognition/registration/licensing process. For example, if a student with an undergraduate degree in mathematics was admitted to a postgraduate programme accredited under this Schedule and completed that programme, then the graduate would not automatically meet the academic benchmark for professional recognition, even in the specialised area of practice to which the accredited programme relates.

CRITERIA	Documentation required
7. QUALITY SYSTEMS AND PROCESSES Criterion 7 from Section 2, Part III applies. *Note: this criterion will be deemed to have been met by TEO's holding current Engineering New Zealand programme accreditation at an International Education Accord Level.*	
8. MANAGEMENT, LEADERSHIP AND INSTITUTIONAL SUPPORT Criterion 8 from Section 2, Part III applies. Note*: this criterion will be deemed to have been met by TEO's holding current Engineering New Zealand programme accreditation at an International Education Accord Level*	

SCHEDULE 5: STAFFING AND RESOURCING TABLES

TABLE 1: ACADEMIC STAFF

An overview of staff involved in delivering the programme. Please list in order of seniority.

Name	Position (Permanent/ Temporary)	Qualifications/ Dates	Professional memberships/ registrations and date attained	Major teaching roles	Industry Engagement	Research areas (if relevant)	FTE	Hyperlink to short CV
Mary Jones	Professor (P)	BE(Hons) 1988 PhD 2001	FEngNZ	ENGXXX Advanced Fluid Dynamics ENG XXX	Professional development workshops for NZGS on ground remediation Applied research project with XYZ Geotechnical Services (2021-)		1.0	
Joe Bloggs	Senior Lecturer (P)	BE(Hons) 2005 PhD 2008	CMEngNZ CPEng	ENGXXX Engineering Project	Design review for ABC Associates (2022) President of SESOC (2021-23) Team Member for Engineering New Zealand accreditation visits (2021)		1.0	
Peter Smith	Senior Tutor (T)	BE(Hons) 2014	MIMechNZ				0.5	

TABLE 2: SUPPORT STAFF

An overview of the staff who support the programme. Please list downwards in order of seniority

Name	Position (Permanent/ Temporary)	FTE	Primary role in supporting the programme	Qualifications/year	Service (years)	Hyperlink to brief CV (Key staff only)
Jane Brown	Technician (P)	1.0	Geomechanics laboratory technician	NZCE Civil, 1985	30	
John Doe	Administrator (P)	0.8	Department admin team	BA, 2001	10	
Ann Watson	IT support (T)	0.7	Computer suite support	BSc, 2004	6	

TABLE 3: FACILITIES AND EQUIPMENT

An overview of the facilities specifically dedicated to programme delivery. General institutional facilities are not included but may be included in the associated commentary.

Name	Primary purpose and contribution to programme delivery	Key Equipment	Usage*	Space m^2	Hyperlink to photo (ideally with students at work)
Fluid labs	Provides laboratory experience in fluid mechanics – includes pipe system experiments and open channel flow model. Utilised for final year UG research projects.	Four (4) flumes Four (4) pipe systems		250 m^2	
Computer suite	Provides computer workstations and study spaces for third and fourth year. Key analysis and design software as well as standard office tools are supported.	60 Windows workstations		150 m^2	

**Usage: For each course using the laboratory/facility, the course code and title, and the approximate number of hours students spend in the space during that course.*

TABLE 4: STUDENT PROGRESSION

Cohort	Year 1 enrolments	Year 2 enrolments	Year 3 Enrolments	Year 4 Enrolments	Graduate numbers
2019 intake	100	80	75	60	58
2020 intake	105	85	77	70	65
2021 intake	120	85	80	75	
2022 intake	110	90	85		
2023 intake	120	95			
2024 intake	125				
Average %age progression rate		%	%	%	%