ENGINEERS AUSTRALIA

ACCREDITATION MANAGEMENT SYSTEM

Accreditation Criteria User Guide – Higher Education

AMS-MAN-10

Version 2.0

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Accreditation Criteria User Guide – Higher Education

1. Introduction

1.1 Purpose

The purpose of this document is to provide guidelines for interpretation of the accreditation criteria for use in conjunction with the Procedures Manual – Higher Education.

1.2 Scope

The Accreditation Criteria User Guide - Higher Education applies to programs that deliver higher education qualifications for all categories of the engineering team, namely:

- Professional Engineer
- Engineering Technologist
- Engineering Associate

The accreditation standards for programs delivered in a competency-based framework typical of VET programs are <u>not</u> within the scope of this document.

1.3 Document Classification

This document (AMS-MAN-10) is classified as a <u>Manual</u> (instructional), and therefore is mandated for consideration by Education Providers when demonstrating compliance with the accreditation criteria set out in the Accreditation Standard – Higher Education (AMS-STD-10). In an outcomes-based accreditation process, however, alternate means of demonstrating compliance can be provided, so that the text under each accreditation criterion, while instructional, constitutes guidance only.

This document (AMS-MAN-10) is intended for use in close conjunction with the associated Procedures Manual – Higher Education (AMS-MAN-11).

1.4 Definitions and Acronyms

1.4.1 Definitions

Accreditation criteria

> Accreditation criteria are the full set of factors that are considered by an agency in evaluating the quality of a program. Accreditation criteria refer to program outcome standards, that is, statements of assessable attributes to be displayed by graduates that indicate that the purpose of the program has been achieved (References [1], [2])

Outcomes terminology at the level of a <u>*Program*</u> (see Figure 1):

Engineers Australia Stage 1 Competency Standards

Expected learning outcomes

Program learning outcomes

Graduate Capabilities

Outcomes terminology at the level of a *Unit of Study* (see Figure 1):

Unit learning outcomes

Unit capabilities

1.4.2 Acronyms

AP Academic Program

EA Engineers Australia *or* Engineering Associate

ET Engineering Technologist

IEA International Engineering Alliance

OE Operational Environment

PE Professional Engineer

QS Quality Systems

VET Vocational Education and Training

1.5 References

[1] International Engineering Alliance Graduate Attributes and Competency Standards, Version 3.0, 21 June 2013

[2] International Engineering Alliance and European Network for Engineering Education. Best Practice in Accreditation of Engineering Programmes: an Exemplar, 13 April 2015 (joint document)

[3] Engineers Australia Stage 1 Competency Standard – Professional Engineer

[4] Engineers Australia Stage 1 Competency Standard – Engineering Technologist

[5] Engineers Australia Stage 1 Competency Standard – Engineering Associate

[6] Engineers Australia AMS-MAN-11 Procedures Manual – Higher Education

[7] Engineers Australia AMS-STD-01 Accreditation Standard – Higher Education

[8] Engineers Australia AMS-POL-01 Accreditation Principles

[9] Australian Qualifications Framework, Australian Government Department of Education and Training, Version 2, January 2013

[10] Higher Education Standards Framework (Threshold Standards), Australian Federal Register of Legislation, October 2015

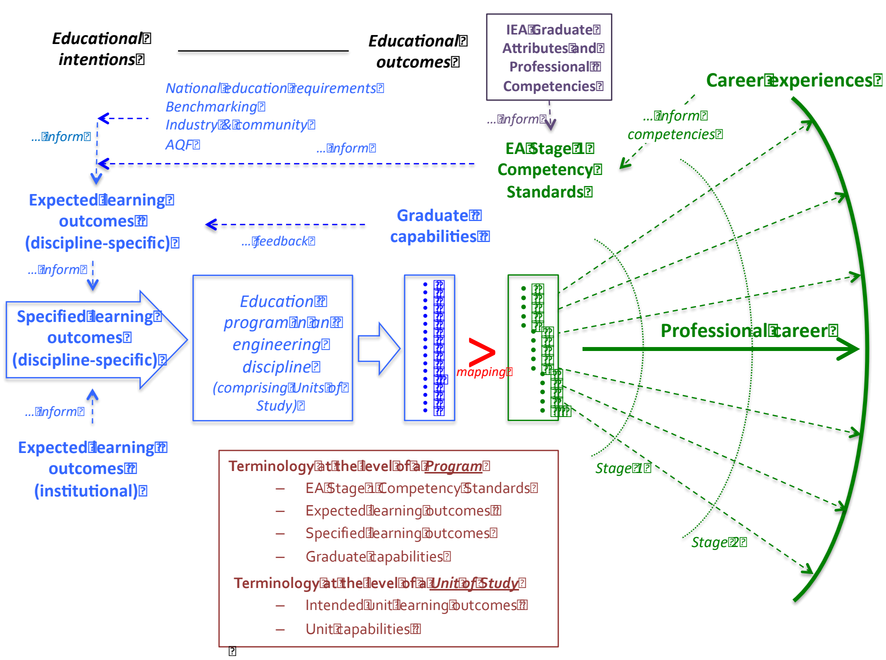
2. Introduction

Accreditation is an evidence-based evaluation process of education programs against a set of defined accreditation standards, usually called accreditation criteria. The evaluation process adopted by Engineers Australia uses accreditation criteria to assess the suitability of an education program to prepare graduates to enter professional practice in engineering.

The evaluation process leads to one of several possible outcomes depending on the status of the program implementation: Full Accreditation or Conditional Full Accreditation; Provisional Accreditation or Conditional Provisional Accreditation. In addition, the Accreditation Board may defer making a decision on accreditation pending more information or action by the provider, or may decline to accredit the program. Conditional Accreditation implies that one or more accreditation criterion is not adequately met, and that the provider must provide supplementary information on deficiencies. Provisional Accreditation may be accorded to a program before it has been completed by any students; the program will be further evaluated after completion by one or more cohorts.

The accreditation criteria incorporate (but are not limited to) professional competency standards that the profession deems as the minimum required for graduates to enter the profession in the three engineering occupational categories. In Australia, these standards are known as the Engineers Australia Stage 1 Competency Standards (References [3] to [5]) that have been developed over time by incorporating feedback from the career experiences of practising engineers. This feedback process is illustrated in Figure 1 (below).

Figure 1 Diagram showing the influence of the EA Stage 1 Competency Standards



The Engineers Australia Stage 1 Competency Standards are organised in three groupings:

- Professional and personal attributes, which highlight the human side of engineering practice
- Knowledge and skill base, which expand on the technical side of engineering practice
- Engineering application ability (especially design), which is the creative bridge between human needs and the technical elements of the solution

The Stage 1 standards are defined in each of the three occupational categories recognised by Engineers Australia: Professional Engineer (PE), Engineering Technologist (ET), and Engineering Associate (EA).

The Stage 1 standards define competencies that are the expected attributes of early career professionals. However, the evaluation process does not directly accredit individual graduates but their academic program. Graduates of accredited programs are deemed to have attained all of the competencies at a minimum or threshold level.

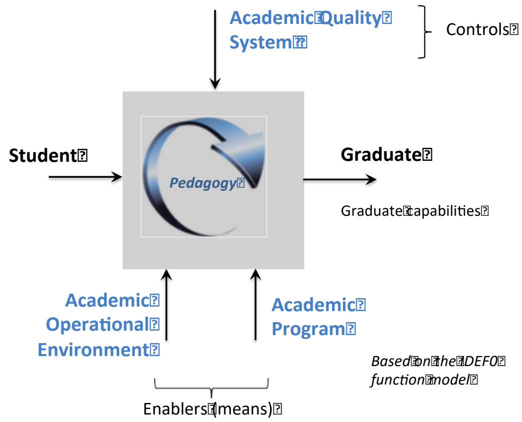
The accreditation criteria themselves are common to all occupational categories, but call up the professional competency standards applicable to the program under consideration. For accreditation, each academic program is evaluated in detail against a subset of the accreditation criteria – the Academic Program (AP) criteria. These criteria largely evaluate the program in its present state. In particular, the academic program design is evaluated through criteria that assess how the graduate capabilities are developed across the program as implemented.

The normal duration of accreditation is five years, so an accreditation review panel needs to be confident that the achieved accreditation standard at the time of the evaluation (present state) will be maintained throughout the five years (future state). Two other sets of criteria are employed to do this: Operating Environment (OE) criteria, and Quality Systems (QS) criteria. The Quality Systems criteria also evaluate the capacity for continuing improvement of the education program over the five years.

The three component groups that comprise the EA Accreditation Criteria can be conceptualized in an engineering-style function model of an education program (Figure 2 below). In the function model, the Academic Program and Operational Environment components are enablers of the education function, while the Quality System component is a control. This conceptualisation differs from that employed in much of the education community, where all three sets are often loosely classified as "inputs". The function model allows a richer discussion and deeper evaluation of the education function.

Accreditation is an evidence-based activity; accordingly, education providers are required to provide not just claims of compliance, but also unambiguous evidence in relation to each criterion (if not in the self-assessment report, then during the accreditation visit).

Figure 2 Function model of an education program



3. Academic Program

The Accreditation Board will look for evidence that educational intentions and implemented outcomes for a particular program of education are aligned, and that they are commensurate with the range and depth expected by employers and consistent with international practice.

In judging the adequacy of a program's curriculum and its implementation framework the accreditation process will evaluate the approaches and steps taken in setting program outcome targets, designing the educational process, and developing the curriculum and its delivery. EA strongly recommends that learning outcomes and assessment activities defined for each unit of study are mapped to demonstrate how they aggregate to validate and verify program learning outcomes and graduate capabilities.

3.1 AP1 Development of the educational specification for the program

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Purpose: To establish a clear design specification for the education program, inclusive of Program Learning Outcomes, incorporating and driven by the EA Stage 1 Competency Standard

Suggested evidence of attainment:

- **a.** An entry to practice program that is designed to meet the Engineers Australia Stage 1 Competency Standard, in a clearly identified engineering discipline with a matching and appropriate program title
- **b.** Explicit and comprehensive specification of graduate capabilities that demonstrate:
  - i. A rationale based on analysis of industry and community needs, trends in professional practice and benchmark indicators
  - ii. Attainment of the Engineers Australia Stage 1 competency elements (PE/ET/EA), integrated with specific details of the technical knowledge and engineering application skills that are uniquely targeted for the specified engineering discipline
  - iii. Attainment of institutionally-specified graduate capabilities
- **c.** Systematic review process inclusive of all teaching staff and the ongoing input from external constituencies, that:
  - i. Is holistic and outcomes driven
  - ii. Addresses the full range of program learning outcomes/graduate capabilities
  - iii. Is specific to each program
- **d.** Ongoing evaluation of engineering practices, industry needs and demand

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Each program submitted for accreditation must be an entry to practice program in a clearly identified engineering discipline. The program must be supported by a specification of intended educational outcomes (Program Learning Outcomes) incorporating and driven by the relevant EA Stage 1 Competency Standard.

The Engineers Australia National Generic Competency Standards – Stage 1 Competency Standards for Professional Engineer (Reference 3), Engineering Technologist (Reference 4) and Engineering Associate (Reference 5) provide detailed generic descriptions of the expected knowledge, capabilities and attributes expected of graduates. The Stage 1 Competency

Standards provide the generic template to be interpreted for the designated field of engineering practice and/or specialisation(s) of the program. The specified program learning outcomes embody the educational specification for delivering the desired capabilities of graduates during the first years of their career following graduation.

The educational specification needs to be appropriate within a broad definition of engineering – a profession trusted by society for conceiving, designing, implementing, maintaining, managing and ultimately disposing of infrastructure, products, processes and services within broad contextual criteria.

The specification must also be tailored to the program's particular field(s) of practice and associated area(s) of specialisation. The specification should also justify the inclusion or omission of any specialist title.

To be eligible for accreditation, a program must include the word engineering and/or technology in its name and, unless the circumstances are exceptional, must lead to a qualification that includes engineering and/or technology in its award title. Professional Engineering degrees are expected to include the word 'Engineering' in their name and award title.

Engineering programs must aim to deliver graduates with capabilities appropriate to a designated field of engineering practice. This will most commonly be reflected in the name of the program and/or degree title, or cited as a major field of study in the academic transcript. It is not essential for any nominated specialisation to appear in the name or title. The key requirement is that the program engages students with a coherent area of engineering providing an appreciation of current technical issues and developing appropriate levels of competence in handling technical issues and technical/operations management problems.

Where a name or title denotes specialisation in a particular field of practice, the program must impart an appropriate level of technical skills and knowledge in that specialisation. A program that omits coverage of substantial topics in the field implied by its name, that a graduate in the field could reasonably be expected to have competence, may not be eligible for accreditation.

New program names and award titles may be expected to arise in response to evolving industry practice. These new programs may draw on several existing fields of specialisation, and may incorporate new knowledge or the application of knowledge in new practice environments. The Accreditation Board does not wish to be prescriptive about award titles, nor does it wish to encourage a proliferation of specialist titles that may have transitory lifetimes. It reserves the right to query a title or field of practice that it regards as inappropriate, or to decline to accredit.

The educational specification should include a statement of broad educational objectives as well as targeted graduate capabilities in the specified field for the program. Engineering schools will need to make decisions on the breadth and depth of coverage of the field of practice and selected specialist areas when developing the outcomes specification. These decisions should be guided by external advisory mechanisms, benchmarking, and resources such as guidelines provided by professional engineering bodies.

External stakeholder input is critical to the development (and review and monitoring) of attainment of these program outcomes, as exemplified by Graduate Capabilities. The rationale for the educational specification should be founded on the needs of industry and the community, trends in professional practice and comparisons with programs of similar nature available nationally or internationally.

The specification of graduate capabilities must be consistent with the relevant Stage 1 – Competency Standard. The Stage 1 Competency Standards develop detailed elements of generic engineering competency and indicators of performance under the headings of Knowledge and Skills Base, Engineering Application Ability and Professional and Personal Attributes. The standards provide a generic template or model for building a detailed educational outcome specification that is customised for a particular education program in a nominated field of engineering practice.

Technical skills and knowledge, and engineering application skills appropriate to the designated field of practice and/or specialisations, should be clearly specified, supplementing the generic capabilities and attributes that are relevant to all fields of practice. Targeted graduate capabilities should encompass a balanced and integrated development of enabling skills and knowledge, technical competence and engineering application skills along with personal and professional capabilities. Appropriate breadth and depth of competence must be clearly demonstrated in the technical domains comprising the field of practice and through appropriate levels of knowledge and skills in nominated specialist areas.

The specified Program Learning Outcomes should also relate to the mission of the host education provider as well as any specialist technical focus, anticipated career destinations of graduates, and the needs of appropriate external stakeholders.

There should be formal, documented processes for setting, and systematically reviewing and revising the detailed educational specification and graduate capabilities targeted for each program offered for evaluation. Systematic review of the educational specification, including Program Learning Outcomes should occur and be inclusive of all staff engaged in the delivery of the program, and on-going input of external constituencies (see QS1).

Reviews should be specific to each program, comprehensive and consider the full range of Program Learning Outcomes. Review processes should ensure that the educational specification is appropriate for delivering both generic and targeted graduate capabilities aligned with the relevant Stage 1 Competency Standard, external practices, specific industry needs, and the intentions of the provider institution. The specification should be informed by ongoing evaluation of engineering practice, industry needs and demands.

As with development of the educational outcomes specification, external stakeholder input is essential to the review and revision of these outcomes to accommodate changing needs of industry and the community, trends in professional practice and comparisons with programs of similar nature available nationally or internationally.

3.2 AP2 Approach to program and curriculum design

Purpose: To explain the educational design approach and process employed to achieve the specified learning outcomes for the program (Also see AP4 and AP5)

Suggested evidence of attainment:

a. Systematic top down/bottom up process for setting, reviewing and verifying achievement of the specified learning outcomes in the design of the program

b. Units of study that contain progressive emphasis on independent learning, reflective practices, critical review, peer and self-assessment as the program progresses

d. Integrated design of an adequate range of assessment tasks (with grading schema) that maps to validate attainment of intended learning outcomes at the unit of study level, and which aggregates to verify graduate capabilities matching the specified learning outcomes for the program

e. Inclusion of reflective, self-assessment processes, referenced to relevant standards and benchmarks, which enable students to track their progressive attainment of graduate capabilities that will ultimately match the specified learning outcomes for the program

f. Systematic curriculum review processes that incorporate input from students, engineering practitioners and appropriate peer review and benchmarking

The mapping developed for AP5 d. may also be used as evidence for AP2

The specification of Program Learning Outcomes should provide a platform and reference for continuing educational design and review processes, at the program level, and for ensuring its constituent units of study contribute to delivering the targeted program outcomes. A structured, 'top-down' approach to learning design should determine the specific and measurable learning outcomes for each unit within the program, and their contributions to the overall program outcomes and graduate capabilities.

The Program Learning Outcomes should also inform processes for 'bottom-up' tracking and 'aggregation' of unit learning outcomes and assessment measures that can be used to validate the alignment and attainment of actual or delivered program outcomes and graduate capabilities with the specified individual unit learning outcomes.

The overall goal of the learning design process is to ensure that the curriculum as a whole addresses the educational outcomes set for the program in a substantial, coherent and explicit way, emphasising contextual relationships. For example, in relation to communication skills development, it would not be sufficient to expect an adequate skill level (across the range of communications skills expected) to be established within one or two dedicated tasks or units at particular points in the program. Nor would it be sufficient to say that all or most of the units involve communication in one form or another, and no further explicit attention is necessary. As well as a pervading expectation of good communication practices, there should be a series of structured engineering-based exercises (such as team projects and outreach activities) that expressly require effective communication of an appropriate order and focus. These should involve technical and non-technical communications with peers, other professionals, and the community generally. Such exercises should involve conveying information, and receiving and responding to it.

Each Program Learning Outcome should include measurable performance indicators that provide evidence of demonstrated learning outcomes and a basis for monitoring the levels of attainment. The multi-dimensional performance metric in each case is likely to involve quantitative and qualitative measures with inputs from a range of sources. Such measures would draw considerably on formal assessment processes of individual units as well as from the feedback and direct input of various stakeholders.

At the unit level, the learning design process should lead to the development of appropriate learning activities and formative and summative assessment approaches to ensure the delivery of the specified unit learning outcomes, and measure students' performance, as progressive unit capabilities. Closing the loop on learning outcomes, learning activities and assessment measures at the unit level should be a central feature of educational design.

A systematic mapping of the unit learning outcomes and assessment measures from individual units of study to the targeted graduate capabilities for the program should be a prime reference tool emerging from these processes and underpin the outcomes-based educational design of the program (see AP5). The progressive aggregation of unit learning outcomes to deliver the intended program learning outcomes, together with critical evaluation of the student assessment through the units of study allow closing the loop on the delivery of the program graduate capabilities. This is a key element in curriculum design and on-going review and improvement process.

The design of the curriculum should promote a graded transition of learning experiences from a structured beginning to a more independent learning approach as the program progresses. The early stages of the program should be tailored to the backgrounds of commencing students and provide appropriate pathways for each group admitted. These should include special support programs for students admitted from disadvantaged or unconventional backgrounds, or with language difficulties (see also AP3 and OE4). There should be emphasis on developing students' skills in reflective practice and critical review to assist them to track their own attainment of the program learning outcomes. Peer and self-assessment, typically in curriculum units associated with engineering applications invoking synthesis, design and research, can develop students' capabilities in these areas.

The development of student assessment and performance monitoring systems must be an integral part of the educational design, review and evaluation processes for any particular program. A program should demonstrate the inclusion of a range of assessment activities that provides systematic opportunities for students to demonstrate progress towards the development of graduate capabilities and the professional competencies. The assessment regime should address the full range of specified learning outcomes and targeted graduate capabilities, including personal and professional skills development. Unit assessments should be selected, timed, sequenced and weighted in ways that support progressive achievement of the Program Learning Outcomes. There should be evidence of various forms of assessment in the program; tailoring of assessment to year-level; and assessment tasks that provide opportunities for the development of more independent learning as the program progresses. All assessment items should be mapped against unit and Program Learning Outcomes and targeted graduate capabilities. Such mapping is essential to validate and verify program outcomes and their alignment with the educational specification for the program.

There should be evidence that the student assessment tasks and processes within individual units of study are rigorously and explicitly aligned with the designated unit learning outcomes. There should also be evidence that credible and consistent processes are in place for judging the quality of students' performance in assessment tasks. These should be referenced to performance measures and standards that provide a sound basis for such judgments. These should include marking rubrics and/or grading descriptors for calibrating levels of attainment.

Summative and formative assessment activities may include examinations, tests, quizzes, project reports, seminar and project presentations, self, peer, and mentor appraisals, log books, portfolios and journals, oral examinations and interviews and behavioural observations. A rigorous moderation process should be in place to monitor and manage the unit assessment (also see QS5).

Other sources of unit and program performance data could include surveys, focus and discussion groups, questionnaires and professional interviews. Collectively these widespread measures will provide the inputs for program performance evaluation and monitoring delivery of outcomes at all levels (also see QS3).

The program design should incorporate self-reflection processes that provide opportunities for students to monitor and evaluate their progress towards fulfillment of both unit and program learning outcomes and levels of attainment. Credible and transparent reference standards and benchmarks (including marking rubrics, grading criteria, and other descriptors for performance recognition, particularly where these are used in student assessments) should be provided to students (also see QS4).

A systematic and comprehensive approach to curriculum review must be evident. Review and improvement processes should be inclusive of all staff engaged in the delivery of the program, and involve the on-going input of external constituencies (see QS1) as well as feedback and input from the student body (see QS2) Reviews must be appropriately informed by ongoing evaluation of engineering practice and the industry and employer needs and demands.

3.3 AP3 Program structure and implementation framework

Purpose: To articulate the education concept and program architecture consistent with the design approach

Suggested evidence of attainment:

a. Program structure compatible with delivery of the specified learning outcomes for the program

b. Dual degree implementations which do not compromise the delivery of the full range of specified learning outcomes for the host engineering degree

c. Implementation pathways such as electives, major and minor sequences, cooperative learning modes, study abroad, project/thesis options, workplace learning, online learning, distance mode and articulation routes that provide equivalence of graduate outcomes

d. Structure has flexibility to allow students with advanced standing to progress; and implementation allows for the range of student backgrounds, individual learning abilities (covered in OE4 g.)

e. Implementation is inclusive of the internationalised student population and global dimensions of engineering

f. Adequate processes for analysing, monitoring and ensuring the equivalence of alternative implementation pathways and delivery modes

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The program structure must be appropriate to the development of the specified learning outcomes including in depth technical competence in the designated field of practice and in nominated specialist areas. The program structure should facilitate an integrated approach to:

- developing enabling skills and knowledge
- developing in depth technical competence in the nominated field of specialisation
- providing practical and laboratory learning, problem solving, design and project-based learning
- developing personal and professional capabilities
- exposure of students to relevant engineering practice

The program structure should be sufficiently flexible to provide for diversity in the background and prior learning of students as well as for the differences in individual learning ability.

Design and implementation of the curriculum itself are addressed in AP4 and Ap5.

The normal minimum program duration requirements of accredited engineering qualifications in Australia align with the volumes of learning (post secondary school certificate) specified in the Australian Qualifications Framework (Reference 9). The Australian school education system specifies thirteen years of compulsory schooling (Foundation to Year 12).

Engineering occupation	AQF level	Post school academic years of full-time study	Qualification (typical)	International Accord
Professional Engineer	9 8	5 4	MEng BEng(Hons)	Washington
Engineering Technologist	7	3	BEngTech	Sydney
Engineering Associate	6	2	Associate Degree Advanced Diploma	Dublin

The conventional academic year involves two semesters (each normally 4 units of study) of formal study and examination, offering apparent scope for accelerated-progression by utilising the remainder of the calendar year. In considering any program that offers completion in a shorter time than the calendar year equivalent of full-time study, the Accreditation Board will need to be assured that the program provides adequate opportunity for personal and professional skills development and the full equivalence of specified learning outcomes.

Program durations exceeding the normal full-time study volumes of learning may be appropriate in some circumstances. Assessment will always be based on the assumed delivery of an appropriate category of Program Learning Outcomes, commensurate with the applicable generic framework of the Stage 1 Competency Standards and appropriate to the designated field of practice.

Increasing numbers of programs take the form of combined, dual or double degrees, in which the engineering outcome within a nominated specialist field is awarded with a second outcome in either a non-engineering discipline or in a second specialist field of engineering. In most instances, two individual degree testamurs are awarded, but sometimes a combined outcome is specified on a single testamur. Typically, such programs of study take substantially less time than would the two programs taken separately. This is achieved by identifying content and learning experiences that may validly be counted towards both qualifications.

Accreditation of the engineering program within a combined/dual/double degree requires the accreditation criteria to be met and demonstrated in full. The expected proportions of the learning experience, cited above, are to be interpreted as applying to the full-time study volume of learning for the engineering qualification, or their equivalent in other modes.

Where a combined/dual/double degree program comprises two separate engineering outcomes, each in a designated specialist field, the accreditation criteria must be satisfied for each individual outcome. Obviously there will be common development of some of the enabling skills and knowledge, as well as personal and professional capabilities. However, for each of the two degree outcomes there will need to be evidence of the development of the appropriate depth of technical skills and knowledge, design and problem solving capability and appropriate exposure to practice in each specialist field.

Programs offered via alternative implementation pathways (elective units and study sequences, workplace learning options, defined articulation routes, part-time attendance, online mode, offshore and remote campus) must be demonstrably equivalent in terms of overall content, in the delivery of program outcomes.

Flexible delivery options are usually implemented as alternative implementation pathways within a single program definition. Such pathways can range from specialised entry routes, alternative units of study selected from a list of electives for a student studying on the home campus, major and minor elective sequences, optional cooperative modes, project and/or thesis options, workplace learning options including industry or research placements and internships, distance modes and various articulation routes right through to study abroad programs or an offshore implementation of the program. The program structure must accommodate such alternative pathways in such a way as to assure the equivalence of learning outcomes for every individual student. The early stages of the program should be tailored to the backgrounds of commencing students and provide appropriate pathways for each group admitted. These should include special support programs for students admitted from disadvantaged or unconventional backgrounds, or with language difficulties (see also AP2 and OE4).

The program structure should have sufficient flexibility to accommodate effective articulation pathways that facilitate the transfer and progression of students from other related programs of study (either domestic or international). Articulation pathways generally enable the recognition of successful, relevant studies completed with another education provider. This may include the award of specified credit or advanced standing towards the program. There should be rigorous processes controlling credit transfer arrangements and admissions to the program to assure successful articulation pathways accommodating a range of student backgrounds. In particular, entry to practice master's degree programs must have clear input specifications (in terms of the expected attainment of Graduate Capabilities) from which the Program Learning Outcomes can be designed and implemented (Reference [8], section 7).

The program structure should also be able to accommodate and promote the globalised nature of engineering practice and expectations arising from associated international mobility of engineering practitioners and students. Implementation frameworks should be able to accommodate inward and outward movements of international and domestic students and their participation in onshore and offshore educational experiences contributing to the internationalization of engineering education and students' preparation for global practice.

There must be rigorous processes for monitoring and managing alternative implementation pathways and delivery modes within a particular program definition, and for assuring the equivalence of educational learning outcomes for the program as a whole.

Systematic documentation of the educational design is crucial as education providers consider alternative implementation pathways to cover initiatives such as online, workplace, cooperative and offshore delivery options and to provide for recognised articulation routes including those from offshore and international providers.

The formal and systematic mapping of unit learning outcomes against the targeted program learning outcomes as required in addressing AP5 is necessary to underpin learning design at the unit level to ensure equivalence and validity of alternative implementation pathways and delivery modes.

3.4 AP4 Engagement with professional practice

Purpose: To describe how the graduate capabilities related to professional practice are developed throughout the entire program

Suggested evidence of attainment:

AP4 and AP5 should be considered together

a. Engagement with professional practice (other than formal work placement), used as an integrated learning activity embedded within units of study and contributing in a defined manner to the delivery of graduate capabilities matching the specified learning outcomes

b. Formal work placements, where implemented, are documented with appropriate intended learning outcomes traced to the applicable EA Stage 1 Competency Standard

c. Appropriate systems for recording, tracking and assessing delivery of the intended learning outcomes (such as e-portfolios)

d. Experience with the working of engineering teams

Sound professional judgement is expected of experienced engineers, defining the vision for the professional journey from student engineer to competent practitioner. An engineer acts to meet an obligation in relation to an engineering task, requiring professional judgement to be applied and a decision to be made. The result is offered as a responsible, reliable and useful output of a professional, fit for downstream use by others.

The guiding objective for engagement with professional practice (EPP) in engineering education is to initiate the development of sound professional work practices and methods that underpin reliable professional judgement and decision-making, and to embed these work practices and methods so that they continue beyond the education program. Student engineers need in addition to knowledge, formative experiences of how engineering professionals:

a) Think, work and continually learn

b) Develop professional judgment

c) Make decisions while conforming with the EA Code of Ethics

d) Earn the trust of all stakeholders in those decisions

Professional practice experiences need to be delivered in environments (which may be simulated, virtual, industry, or a mix of these) that provide experiential learning. These environments are materially different from the usual education environment. These differences, which offer guidance to the development of simulated or virtual environments, include:

- Systems for managing work – all engineering organisations have documented work practices and procedures that facilitate the orderly management of the professional task
- Professional communications – communications in the professional workplace are very different from student communications, especially when communicating with clients
- Modeling of professional behaviours – constructive role models of professional behaviour are powerful in the development of professionalism
- Constraints of commerce – in the delivery of an engineering task, engineers do not work in isolation, interacting with other business functions that are part of the broader business team, constraining how engineers deliver their outputs
- Experiences "in the wild" – the professional work environment is subject to many inputs and disturbances that are not under the control of the engineering team, potentially disrupting normal work activities

Suitable formative experiences may be provided both from within the taught curriculum and from a separate professional environment. The nature of the separate environment and the extent of its engagement is not prescribed, but Engineers Australia strongly advocates that all student engineers be required to build a meaningful portion of their experiences from workplaces where engineers exercise professional judgment in the practice of engineering.

Preparation must begin within the taught curriculum to provide a practice framework for subsequent experiential learning, regardless of where and how the formative professional experience is obtained. Engagement with professional practice must be an integral learning activity within the education design and make a significant and planned contribution to the delivery of graduate capabilities. The objectives of EPP need to be understood by all stakeholders (student engineers, staff and supervising professional engineers), they must be documented as formal learning activities within the program curriculum and mapped to the applicable EA Stage 1 Competency Standard.

There should be formal monitoring and assessment of the learning outcomes associated with EPP through, for example, a journal or portfolio system where student engineers record and reflect on their experiences against the targeted graduate capabilities.

EPP must culminate in a set of meaningful experiences that result in the habituation of professional working styles through placement in activities engaged in actual or simulated commerce, internships, volunteering or similar activities.

In addition, EPP could include, but is not limited to, a combination of the following:

1) Systematic contact with practising professionals, for example, through on-going project reviews, mentoring, or professional society activities
2) Engineering information management, especially management of an engineering baseline
3) Direct industry input to authentic problem-solving, projects and evaluation tasks
4) Industry-based investigations and case studies, including final year projects
5) Industrial site visits that contribute to learning outcomes
6) Inclusion of staff with industry experience in curriculum delivery
7) Guest lectures by industry practitioners
8) Application of industry standards, codes, practices and methods
9) Structured interviews of engineering professionals

The outcome should be that student engineers are able to aggregate different experiences towards their portfolio of EPP. For maximum pedagogical value, education programs should be designed to enable student engineers to complete this requirement prior to the final study period (semester, trimester, term, etc). The recommended EPP is nominally the equivalent of

60 days (12 weeks) at the Professional Engineer level, 40 days (8 weeks) at the Engineering Technologist level and 30 days (6 weeks) at the Engineering Associate level in a workplace placement. For accreditation, documentation must be provided explaining how the various experiences contribute to the recommended EPP equivalent period (e.g. 60 days, 40 days or 30 days), and how they contribute to the overall education design. The overall EPP experiences should enhance a graduate's capacity to move with ease into a professional workplace.

Where EPP is incorporated within the four-year equivalent curriculum through credit-bearing units of study, it must embody assessable requirements comparable with other curriculum elements that attract similar credit. Where elements of EPP occur outside of credit-bearing coursework, appropriate assessment of claims against the professional outcomes must likewise be demonstrable to an accreditation panel.

3.5 AP5 Program curriculum (learning outcomes, content, pedagogy, assessment)

Program curriculum (learning outcomes, content, pedagogy, assessment)
Purpose: To verify that the education specification is achieved in the detail design of the program

Suggested evidence of attainment:
AP4 and AP5 should be considered together

a. Specifications of intended learning outcomes for individual units of study, aggregating to deliver graduate capabilities matching the specified learning outcomes for the program (demonstrated by systematic mapping)

b. Evidence that the Engineers Australia content guideline informs design of the program

c. For each unit of study, a description of its intended learning outcomes, content, learning tasks, and assessments (including rubrics), as provided to students. Inclusion of mapping information to demonstrate linkage between intended learning outcomes and assessment measures as well as demonstrating the contributions that the unit of study is designed to make towards developing and validating the prescribed learning outcomes for the program

d. Specific mapping to demonstrate how intended learning outcomes and assessment tasks from individual units of study aggregate to validate delivery of graduate capabilities which will match the specified learning outcomes

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An integrated and pervasive approach to detailed educational design of a program must focus on the design of the units of study prescribed for the designated program and how they contribute to the attainment of the specified educational outcomes for the program as a whole. The units will be delivered through a wide range of learning and assessment activities spread throughout all stages of the program.

The accumulated output of all program learning activity must rigorously and explicitly confirm, for example by a suitable mapping, that the program learning outcomes are delivered via progressive aggregation of the unit learning outcomes. Similarly, unit assessments should be mapped to demonstrate that students are adequately assessed across the range of specified program learning outcomes and graduate capabilities.

The curriculum must comprise an integrated and coherent set of tasks and structured learning experiences that delivers the specified unit and program outcomes, and by implication, satisfactory attainment of the generic attributes. Providing the program learning outcomes and program design have been referenced to Engineers Australia Stage 1 Competency Standard these mappings will provide assurance that graduates from the program will attain the required generic competencies.

Accredited Professional Engineering and Engineering Technologist and Engineering Associate programs are expected to include the following areas of content, where the percentages indicate the proportions of student effort within the total learning experience.

	Proportions of Learning by qualification		
Areas of content (student effort)	*Professional Engineer*	*Engineering Technologist*	*Engineering Associate*
Underpinning mathematics, science, engineering principles, skills and tools appropriate to the discipline of study and qualification	*≥ 40%*	*≥ 40%*	*30%*
Engineering design and projects	*≈ 20%*	*≈ 20%*	*30%*
An engineering discipline specialisation	*≈ 20%*	*≈ 20%*	*15%*
Integrated exposure to professional engineering practice, including management and professional ethics (approximately 10%	*≈ 10%*	*≈ 10%*	*15%*
More of any of the above elements, or other elective studies	*≈ 10%*	*≈ 10%*	*10%*

These proportions are not mutually exclusive. While some are principally related to content, others relate more to learning processes. A particular learning activity may consist of several of these areas and/or concurrently contribute to a range of learning outcomes.

Substantial departure from the specified proportions must be justified as consistent with the targeted program outcomes and graduate capabilities.

The detailed unit and program mapping processes should confirm the delivery of the desired balance of enabling or underpinning knowledge and skills, technical competence, engineering application skills and personal and professional capabilities, as specified in the program learning outcomes. These are summarised as follows.

Enabling Knowledge and Skills: Enabling knowledge and skills in mathematics; physical, life and information sciences, and in engineering fundamentals must adequately underpin the development of appropriate levels of technical capabilities, and engineering application work within the designated field of practice and selected specialisation(s).

Technical Competence: Graduates must have appropriate levels of in-depth knowledge of the major technical areas in the field(s) of practice, and competence in applying mathematics, science and engineering science to the formulation, analysis and solution of representative problems, experimental and laboratory practices, and situations and challenges in those fields.

Graduates must be able to ensure that all aspects of an engineering project or task are soundly based in theory and fundamental principles, and recognise assumptions, results, calculations or proposals that may be ill-founded, identifying the underlying source and nature of the problem and where appropriate, suggest or take corrective action.

Engineering Application Experience: Engineering application activities must pervade the curriculum and include problem solving, design and project work at the appropriate level. It is expected that programs will embody at least one major engineering project experience, which draws on technical knowledge and skills, problem solving capabilities and design skills from several parts of the program and incorporates broad contextual considerations as part of a full project life cycle. Students should work independently and in teams. The curriculum should also develop engineering design capability, appropriate to the field of practice. Ideally a program will contain multiple design tasks, project activities, and research (as appropriate) throughout all stages of the program.

Engineering application work should be representative of the field of practice and include technical and non-technical considerations. A key objective should be to develop an appreciation of the interactions between technical systems and the social, cultural, ethical, legal, political, environmental and economic context in which they operate.

Personal and Professional Skills Development: The development of personal and professional skills should be addressed by the curriculum as a whole. An integrated and pervasive educational design approach will ensure the development of these skills through a wide range of learning activities and assessments spread throughout all stages of the program.

Practical and 'Hands-On' Experience

There must be substantial hands-on practical experience manifested through specifically designed laboratory activities, investigatory assignments and project work. The specific learning contributions from practical work should be thoroughly understood, mapped and documented as an integral part of the learning design process within any particular unit. Practical learning experiences should engage students with the use of facilities, equipment and instrumentation reflective of current industry practice.

The Stage 1 Competency Standard provides detailed indicators of graduate performance across these areas.

Each unit of study should have a unit description or profile which provides an overview of the unit, description of the unit content, intended unit learning outcomes, learning activities and resources, and assessment items. Information about each unit assessment task should be provided and include the following: the form of the task (e.g. report, examination, prototype demonstration), a description of the task, the criteria and standards to be used for assessing the task (e.g. marking rubrics and grading schema), and information on how each assessment task contributes to attainment of unit learning outcomes and the specified program outcomes and targeted graduate capabilities. Current unit profiles should be available to students before they enroll in the unit (also see QS4).

Unit profiles should also be available to other stakeholders and used as a key resource for unit implementation and review, curriculum planning, and quality assurance. It is expected that units undergo regular revision.

4. Operating Environment

4.1 OE1 Organisational structure and commitment to engineering education

Organisational structure and commitment to engineering education

Purpose: To show how the organisation is aligned to deliver the program

Suggested evidence of attainment:

a. Substantive, organisational entity with clearly designated and devolved accountability for leadership and management of engineering education programs

b. Long term, institutional commitment and strategic management to assure the development of the engineering discipline and the provision of appropriate resources

c. Formally constituted committee structures and mechanisms for program review and approval

There must be an identifiable organisational entity responsible for engineering education within the education provider awarding the qualification. Most commonly this will take the form of a department, division, faculty or school that provides a 'home' and takes responsibility for engineering education and scholarship. In the Accreditation Management System, the organisational entity responsible for engineering education is referred to as the 'engineering school'. It is unlikely that an engineering program would be accredited if it were taught and managed in isolation by a handful of staff, primarily qualified and practising in a non-engineering discipline.

It is expected that the engineering school (as defined above) has leadership responsibility, and subject to the processes of the education provider, internal structure of designated roles for managing the educational design, delivery, support and management of the engineering programs, and associated resources, including staffing (see OE2, OE3, OE4). If this is not the case, the education provider will need to demonstrate how sufficient engineering expertise is brought to bear on decisions in these areas.

A large and multi-field engineering school is likely to offer several programs for accreditation. The delegated accountability within the engineering school for the management and delivery of each engineering education program should be clearly specified.

There must be evidence that the host education provider regards engineering education as a significant and long-term component of its activity, and has adequate arrangements for planning, development, delivery, and continuous quality improvement of its engineering programs. This would most commonly be evident from a provider's mission statement and strategic plans, from the approved mission statement and strategic plans of the engineering school, perhaps from corporate responses to engineering school planning submissions or initiatives, and from the outcomes of formal reviews and performance evaluations.

Within the engineering school there must be formal committee structures and effective mechanisms for the ongoing review and improvement of programs and for formal approval of new program proposals and program amendments. These should engage relevant stakeholders, including representatives of industry, and students (see QS1 and QS2).

4.2 OE2 Academic and support staff profile

Academic and support staff profile

Purpose: To demonstrate how the staff profile and supporting practices enable delivery of the program

Suggested evidence of attainment:

a. Adequate academic staff numbers, with:

i. Appropriate depth, mix and distribution of qualifications, experience and engineering practice exposure, scholarship and professional standing to match the range of specialist program offerings

ii. Gender balance across academic appointment levels

iii. Appropriate student/staff ratios

b. Effective use of sessional and industry presenters to enrich staff skills profile and the exposure of students to practice

c. Effective academic workload policies and practices

d. Effective student learning support staffing and systems

e. Appropriate technical and administrative support staff teams

f. Adequate student counselling and advisory services

The teaching staff must be sufficient in number and capability to assure the quality of the engineering program and the attainment of its stated outcomes. As a guide, a viable engineering school would be expected to have a minimum of eight full-time-equivalent academic staff employed on a continuing basis, and not less than three full-time equivalent staff with specialist engineering knowledge and experience in any field in which a designated degree or major is offered. Where a program has little or no overlap with other programs offered, more than three specialist staff members are likely to be necessary. In no case should an area of specialisation (e.g. a designated 'major') be dependent on a single individual.

There should be a suitable balance of full and part-time continuing academic appointments across academic levels to provide program leadership, expertise and student support. Engineering specialisations would be expected to be led by well qualified academics at levels D or E. It is expected that all continuing academics would have opportunities for professional engagement and development outside of their teaching roles.

There should be a reasonable gender balance within and between academic appointment levels, or policies and strategies in place to achieve such balance. Ideally, a program teaching team would have a diversity of backgrounds, embodying a mix of academic experience and engineering-practice experience in non-academic environments, preferably international as well as Australian. They would also contribute to the engineering school's research and/or professional activities, including interactions with industry and other communities.

In addition to the full or part-time continuing academic staff, engineering schools will typically employ sessional or casual teaching staff. The engagement of practising engineering professionals in such roles, or as guest lecturers, is strongly encouraged. There must be adequate arrangements for the recruitment, induction and supervision of all such staff.

In gauging the capabilities of the teaching team, the Accreditation Board will look at individuals' qualifications (both in engineering and in education), research and engineering practice, teaching experience, and contributions to the advancement of engineering knowledge, practice and education. Their involvement in professional societies; chartered status and/or registration on the National Professional Engineers Register and effective participation in on-going professional development are also relevant indicators.

The Accreditation Board will also look for evidence that overall, the teaching staff numbers and teaching loads permit adequate interaction with students and support for the range of learning experiences and study modes. Provider policies and practices for workload management should support these objectives.

It is recognised that programs will increasingly be staffed and delivered in a variety of modes in which students are supported to undertake learning activities at locations other than the 'host' provider campus. These study modes may include workplace and cooperative learning programs, distance delivery and through offshore arrangements. Education providers may form partnerships with both traditional and non-traditional providers to facilitate the delivery of engineering education. The provider/s making the award are considered responsible for assuring the capabilities of all staff involved, and the Accreditation Board will require evidence of how this is achieved. Reference [8] (AMS-POL-01) provides Board policies on accreditation of offshore and off-campus programs.

There must be evidence of sufficient qualified and experienced members of technical and administrative staff to provide adequate support to the design and delivery of the education program. It is recognised that some of these staff may be located (physically and organisationally) outside the engineering school itself.

The engineering school and/or the education provider must also have sufficient staff and facilities to provide adequate levels of student counselling, support services, and interaction with relevant constituencies such as employers and graduates.

4.3 OE3 Academic leadership and educational culture

Academic leadership and educational culture
Purpose: To demonstrate the key leadership features that drive education delivery

Suggested evidence of attainment:

a. Effective program teams, with effective team leadership, to drive the educational design, implementation and improvement processes

b. Cohesive program team inclusive of all teaching and relevant support staff

c. Dynamic, cooperative learning community, inclusive of gender, culture, social differences; and engaged with:

i. Progressive pedagogical frameworks and adoption of best practice in engineering education
ii. Cooperative industry and community outreach
iii. Encouraging diversity and the development of individual staff as learning facilitators
iv. Interlinked research and teaching programs

d. Staff role modelling the professional competencies of engineering practice

e. Appropriate policy and record of staff development – in both pedagogical and professional practice skills

f. Staff awareness of gender and cross-cultural issues, inclusive teaching approach

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For each program there should be a clearly identified academic leader(s) and an associated teaching team(s). Team leaders should have clear role descriptions, and the team should have clear terms of reference, accountabilities and reporting obligations that are understood by all stakeholders. There should be significant, ongoing involvement of all teaching and relevant support staff in the processes of setting educational outcome targets, detailed educational design, program delivery, curriculum review and continuous quality improvement. The full involvement of all teaching staff as a team should be evident to students.

The teaching team would be expected to meet regularly to consider input and feedback from the full range of stakeholders internal and external to the provider, and use this in the design, implementation and on-going improvement of the program. The teaching team should monitor, using declared performance criteria, the attainment of the targeted learning outcomes for the program as a whole as well as the learning outcomes of individual units.

The Accreditation Board will look for evidence of a dynamic, innovative and outward-looking intellectual climate in the engineering school. In particular, there should be an awareness amongst teaching staff of current educational thinking and developments and a proactive attitude to engaging with progressive pedagogical frameworks and the adoption of best practice in engineering education.

Policy and practice should clearly demonstrate active and productive research links, and industry and community interaction with teaching to enrich the student experience and facilitate the on-going professional development of staff.

Teaching staff should actively role-model the competencies defined in the appropriate Engineers Australia Competency Standard and should be continually aware of their responsibility to do so.

Within the education provider's context, the engineering school's appointment, performance management, promotion and development policies and practices should enable academic and other staff to develop as professional practitioners and educators.

The Accreditation Board will expect to see evidence of an educational environment that reflects cultural and gender inclusivity amongst staff and students, in which staff recognise and act on disparities in equity. Continuing professional development programs may address these matters, as well as developing capabilities in educational design, the use of new delivery methodologies and learning quality management systems, and enhancing staff members' professional standing within their specific engineering discipline. The engineering school should ensure an appropriate range of development opportunities is made available to staff and the extent and impacts of staff participation should be monitored.

4.4 OE4 Funding, facilities and educational resources

Funding, facilities and educational resources

Purpose: To ensure that resources appropriate for a professional education program are available through the accreditation period

Suggested evidence of attainment:

a. Sound business planning for current commitments and proposed developments

b. Appropriate principles for distributing funding to and within the engineering school

c. Ongoing viability - capacity to deliver current commitments and projected developments

d. Appropriate experimental and project-based facilities to support both structured and investigatory learning within the specified engineering discipline

e. Adequate IT facilities and support

f. Access to simulation, visualisation, analysis, design, documentation, planning, communication and management tools as well as test and measurement equipment and information resources appropriate to current industry practice

g. Learning support facilities appropriate to the development of the full range of graduate capabilities and matching the needs of individual students, including those with a disability

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The funds provided through the education provider to the engineering school, from all sources, including government grants, fee income, and direct income earned through research and entrepreneurial activity, must be sufficient to adequately support the program(s) under consideration. The provider and school's business planning cycle and funding distribution models must ensure predictable and adequate levels of support to ensure on-going viability of the engineering program(s).

Resources provided to the engineering school are frequently dependent on student numbers. A criterion for viability is therefore a continuing level of demand for admission from adequately-qualified candidates in sufficient numbers to maintain the program. On-going viability should be monitored through rigorous demand analysis. Decisions on changes to program offerings should be taken systematically and on appropriate time scales.

For on-campus and external students alike there must be adequate classrooms, learning-support facilities, study areas, library and information resources, computing and information-technology systems, and general infrastructure to fully support the achievement of the targeted learning outcomes for each specific program. Remote campuses (including offshore) and remote students must be supported with communication facilities sufficient to provide students with learning experiences that are equivalent to on-campus attendance.

Appropriate experimental, project and studio facilities must be available for students to gain substantial experience in understanding and operating engineering equipment, of designing and conducting experiments and undertaking engineering project work. The equipment available must be reasonably representative of contemporary engineering practice and set up to ensure sound learning. Laboratory facilities need to support structured learning development, including active demonstrations, experiments of an investigatory nature, and open-ended projects.

Access to modern analysis, synthesis, design, visualisation, simulation, documentation, planning, communication and management software tools as well as to physical test and measuring tools in the engineering, sciences, and business domains of engineering practice is expected.

Where practical work is undertaken remote from the host campus, such as at another education provider or in an industry environment, the arrangements must be such as to provide appropriate facilities, supervision and equipment access and an assured equivalence of learning outcomes.

Access to all learning and experimental facilities and equipment must be inclusive of all students enrolled in the program, including those with a disability, and embedded across the whole of the program, to ensure the range of program learning outcomes are delivered to all students.

4.5 OE5 Student administration and strategic management of the student profile

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Student administration and strategic management of the student profile
Purpose: To ensure the student learning baseline is managed and verifiable at individual and cohort levels

Suggested evidence of attainment:

a. Appropriate policies and robust systems for:

- i. Student records data management
- ii. Defining and maintaining student admission standards
- iii. Analysis, assessment and verification of prior learning and prior experience for awarding advanced standing; individual student progress monitoring, performance warning and exclusion
- iv. Determining qualification eligibility and awarding academic merit, commensurate with performance indicators
- v. Student advice
- vi. Monitoring success, retention and graduation rates
- vii. Monitoring enrolment trends and program viability

Policies and systems should be in place to provide the engineering school with reliable and timely access to student records and data sets that provide a basis for evidence-based evaluations of program performance and viability, and the academic performance and progress in the program of individual students and cohorts.

There must be transparency in program admission requirements for all pathways, and only qualified candidates should be admitted. The engineering school should track aggregated data on relationships between students' basis of admission and mode of study, and their success, student retention and graduation rates. There must be policies and processes for the validation of formal prior learning and analysis of prior learning or concurrent learning in non-formal settings. Where advanced standing is offered, there must be clearly defined and rigorous processes for the analysis, assessment and verification of prior learning (see AP3).

There should be formal policies and processes for tracking individual students' progress, issuing advice and providing timely warnings to students at risk. Students in the latter category may be offered systematic remediation. There should be clear exclusion and appeal policies and processes.

Determination of academic merit, such as classes of Honours, must be based on a sound rationale that reflects relevant standards of attainment across the program learning outcomes. The processes for determining academic merit should be clearly documented, and benchmarked to comparable educational practice standards.

There should be systems, formal policies and processes requiring monitoring and reporting on student demand, enrolment, retention, academic success and graduation rates for a specific program and particular student cohorts within that program. Monitoring of such cohort and program performance measures is expected to inform program development, review and continuous improvement processes.

The records management system must enable auditing of the above processes at any time and provide confirmation of integrity.

5. Quality Systems

Appropriate policy, processes and practices must be in place at all levels within the education provider to assure the quality of engineering education. The dimensions of the educational quality system must embrace the following components.

5.1 QS1 Engagement with external stakeholders

Engagement with external stakeholders
Purpose: To ensure input from downstream stakeholders drives continuous improvement

Suggested evidence of attainment:

a. Ongoing, regular input to the establishment, review and attainment monitoring of specified learning outcomes from a formal advisory body which includes representation of industry, the community and professional organisations

b. External stakeholders facilitating appropriate professional practice exposure opportunities for students

c. Productive industry linkages through collaborative project work and research, contributing to the professional development of staff and students

d. Graduate, alumni, employer, advisory body and community input mechanisms

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Valid preparation of students for professional engineering practice requires interaction between the engineering school and industry (and other employers of engineers) on a continuing basis. There continue to be many messages from industry and employer peak bodies, often from their highest levels, that educational institutions have insufficient appreciation of the real needs of the changing world of employment and must learn the real-world lessons of fitness for purpose, quality assurance and continuous interaction with clients. In short, education providers must "get closer to industry". Engineers Australia acknowledges that engineering schools are responding seriously to these injunctions, and this criterion requires that they should. For educators' responses to these criticisms to be effective, industry must also make a serious commitment to the partnership with educational providers in return. Some companies are exemplary in this regard; many more are needed for the benefits of partnership to be fully realised.

To effect the desired level of engagement, the engineering school must establish a formally-constituted advisory body (or alternative mechanism) that involves program stakeholder constituencies generally and industry in particular. The engineering school must secure the active participation of practising professional engineers, recent graduates and alumni, professional bodies and leading employers of engineering graduates in defining, updating and evaluating educational outcomes for each program.

At least some members of the advisory body should be at senior level. In order for the body to be effective, its business must be well structured and well managed. Its terms of reference must be clear. The engineering school must present real issues for debate and must be seen to be responsive to comments made. Consultative dialogue should be bilateral or multilateral, involving active contributions and making use of the expertise of all downstream stakeholder groups.

The form of advisory body is not prescribed. Depending upon the providers' organisational structures, there may be a case for a two tiered approach to provide both strategic direction and advice as well as specific input to the educational design, review and performance monitoring of individual program(s). In this case the senior body would be expected to operate mainly at the strategic level by providing insights and analysis of industry needs and trends and by the review and performance monitoring of broad program objectives and graduate capability targets. Discipline-based sub-groups would have input to establishing performance standards and strategies for monitoring the development of graduates' technical competence, engineering application skills and personal and professional skills for particular programs and for providing advice and assistance in learning design at more detailed, operational levels. Members of advisory bodies may also serve as adjunct staff and have academic teaching roles.

Effective and productive industry engagement is also crucial in providing opportunities for student exposure to the necessary range of engineering practice, collaborative project work and research, and the professional development of staff.

There must be formal processes for securing specific and systematic input and feedback on the programs(s) from stakeholders, including the advisory boards(s), graduates, employers of engineers and informed representatives of the wider community. There should be evidence of the systematic use of such input and feedback in conjunction with other quantitative measures, in the school's program and unit review processes.

External stakeholder feedback and input should be considered seriously in monitoring the development, delivery and attainment of program objectives and graduate capability targets and informing continuing improvement processes (see QS3).

5.2 QS2 Engagement with students

Engagement with students
Purpose: To ensure student feedback informs ongoing improvement

Suggested evidence of attainment:

a. Use of staff-student consultation forums, focus groups or other direct input mechanisms for on-going review and improvement
b. Appropriate use of survey instruments and other means of obtaining systematic feedback

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The program and unit review process must involve regular interaction with students, and receive on-going input and feedback from the student body. Direct involvement of the student body as partners in the processes of continuous quality improvement is strongly encouraged. Staff-student consultation forums, focus groups and commissioned submissions from students can facilitate productive involvement as well as providing direct educational experiences for the student in the processes of quality assurance.

The use of appropriate survey instruments for collecting student feedback on their program is strongly recommended. These should include student evaluations of units of study and teaching and the overall program experience. Graduate employment rates and destinations should be monitored. Systematic review of relevant data obtained from national, institutional, and local student surveys should inform program revisions.

5.3 QS3 Continuous improvement of the education program

Continuous improvement of the education program

Purpose: To embed continuous improvement as a normal education activity

Suggested evidence of attainment:

a. Continuous improvement process involving all teaching staff

b. Driven by a clear understanding of the 'big-picture' graduate capabilities

c. Documented records of improvement processes

d. Closing the loop within units of study: intended learning outcomes - learning activities – and assessment of unit capabilities

e. Closing the loop on delivery of graduate outcomes matching the specified learning outcomes for the program

f. Documented processes for:

i. New program approval, including demand analysis, establishing rationale, specification of program learning outcomes, educational design

ii. Program amendment

Each program should be subject to a continuous quality improvement process. This should be based on regular systematic review involving all staff engaged in the design and delivery of the program, and include input from external stakeholder groups (see QS1) as well as feedback and input from students, individually and collectively (QS2). Program performance assessment should involve a variety of measures (key performance indicators), apply to all program levels, and receive input from an appropriate range of stakeholders. The program and unit improvement cycle should be driven by substantiated evidence.

There should be formal, documented processes for setting, reviewing and revising the detailed program learning outcomes and graduate capability targets for each program as a whole. These processes should ensure that the outcomes specification remains aligned with the relevant Stage 1 Competency Standard, as well as external practices and specific industry needs appropriate to the designated field of practice and/or specialisation(s).

At the unit of study level, the review and improvement processes should be based on monitoring the effectiveness of the learning activities and the formative and summative assessments for delivering the unit learning outcomes. Closing the loop on learning outcomes, learning activities and assessment measures at the unit level should be a prime objective. Minor unit review may be conducted annually, with major revision on a longer cycle.

Tracking and validating the delivery and assessment of the program learning outcomes and graduate capabilities as aggregated from the contributions of individual units should be a further priority and key component of the review and improvement process. The aggregated outcomes of unit assessments together with input and feedback from the full range of stakeholders should enable overall program performance to be evaluated. Specifically, this should substantiate satisfactory attainment of the targeted program learning outcomes and the delivery to a sufficient level, of each of the Stage 1 elements of competency. Identified shortcomings would be the priority for subsequent improvement.

There must be in place formal documented processes and records not only for the ongoing review and improvement of programs but also for formal approval of new program proposals and program amendments. There must be formal approval processes associated with program and curriculum planning and amendment, with due reference to demand analysis, the input of external stakeholders, and quality management processes.

5.4 QS4 Dissemination of educational expectations to students

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Dissemination of educational expectations to students
Purpose: To provide the professional context of the program to students

Suggested evidence of attainment:
a. Adequate documentation of the prescribed learning outcomes and the educational design philosophy in program and individual unit of study documents

b. Clear mapping of the component contributions from individual units of study to the specified learning outcomes for the program

c. Clear linkage between the intended unit learning outcomes, learning activities and performance assessment within the individual unit of study

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Dissemination of the overall educational program design philosophy, such as its emphasis on problem-based learning, studio work, and industry engagement, would normally be through published program guides (see also AP5c). Program guides will typically summarise the structure of the program and include commentary on the range of career outcomes. Program guides should also reference the program learning outcomes, and the Stage 1 competencies, as appropriate.

The published guide to each unit of study should include clear descriptions of the unit learning outcomes, and learning and assessment activities. The contributions of the assessments to the unit learning outcomes should be described. The guide should also demonstrate how the unit learning outcomes contribute to the program learning outcomes. Where appropriate, reference should be made to the Stage 1 competencies.

5.5 QS5 Benchmarking

Benchmarking

Purpose: To comply with Higher Education Standards and facilitate strategic improvements to the program

Suggested evidence of attainment:

a. Implementation of regular processes for external referencing of specified learning outcomes and observed graduate capabilities against the expectations of employers as well as national/international practice

b. Implementation of appropriate processes for comparing

i. standards of specified learning outcomes and observed graduate capabilities against the expectations of employers, as well as national/international practice

ii. currency of educational theory and practice underpinning the curriculum

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For the purpose of quality improvement, the national Higher Education Standards Framework [Reference 10] section 5.3 clause 4 refers to "external referencing of the success of student cohorts against comparable courses of study, including:

a. analyses of progression rates, attrition rates, completion times and rates and, where applicable, comparing different locations of delivery, and

b. the assessment methods and grading of students' achievement of learning outcomes for selected units of study within courses of study [programs]."

As a member of a global profession, Engineers Australia expects to see engineering schools engaging in regular activities and analysis to ensure that their graduates are comparable with national and international expectations. Benchmarking comparisons between providers may be undertaken by a variety of methods, including external/peer assessment or moderation of samples of final year project work and final year units. At the program level it should be evident, for example, that the award of an academic merit designation, such as a class of Honours (see OE5), is comparable across the national system.

While the processes referred to above apply to academic standards, Engineers Australia also expects to see graduate capabilities referenced to the expectations of employers. The activities and measures referred to in QS 3 may be applicable.

Further systems and inter-institution benchmarking could include exchanges of teaching and assessment materials, visits and discussion forums, and exchanges of data collected under the auspices of the Australian Council of Engineering Deans and the Associate Deans (Learning and Teaching) group.

Beyond this, systematic benchmarking should be undertaken to assist with identifying best practices in engineering education and its quality assurance, and thereby contribute to deciding on specific directions for improvement. While the EA accreditation process will periodically evaluate programs against these criteria, education providers should engage in benchmarking as part of their continuous quality improvement processes, and not rely on the accreditation system for this.

AMS Hierarchy for this Document

POLICY	*Statement of accreditation principles*	
	AMS-POL-01	**Accreditation Policy**

STANDARDS	*Standards against which compliance is evaluated*	
	EA Stage 1	**Competency Standards** (see Engineers Australia website)
	AMS-STD-10	**Accreditation Standard – Higher Education**
	AMS-STD-20	Accreditation Standard – VET

MANUALS	*Instructions for accreditation*	
This document	**AMS-MAN-10**	**Accreditation Criteria User Guide – Higher Education**
	AMS-MAN-11	**Procedures Manual – Higher Education**
	AMS-MAN-20	Accreditation Criteria User Guide – VET
	AMS-MAN-21	Procedures Manual – VET

HANDBOOK	*Contextual information on professional practice*	
	AMS-HBK-01	**Engineering Handbook** (not yet available)

TEMPLATES	*Documents with specified format and structure*	
	Various	Not listed here

PRACTICE NOTES	*Information about, and examples of, good accreditation practice*	
	Various	Not listed here (none available yet)

Revision History of this Document

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Date	**Version**	**Description**	**Author**
18 April 2018	1.0	Initial release	EGM, PSP
26 August 2019	2.0	Section 3.4 amended to reflect Exposure to Professional Practice requirements for Technologists (equivalent to 40 days) and Associates (equivalent 30 days)	EGM, PSP