ENGINEERS AUSTRALIA

ACCREDITATION BOARD

ACCREDITATION MANAGEMENT SYSTEM

FOR

ENGINEERING EDUCATION PROGRAMS

(CURRICULUM BASED)

IN THE OCCUPATIONAL CATEGORY OF ENGINEERING ASSOCIATE

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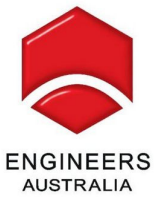
Title	Accreditation Criteria Summary



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1. INTRODUCTION

Engineers Australia as the National competency authority responsible for the accreditation of engineering education programs in Australia provides a range of documents within its Accreditation Management System. These documents provide a resource for both engineering educators and for those responsible for the accreditation function. An index of the documents comprising the Accreditation Management System is provided in

'Engineers Australia – Accreditation Management System – Document Listing for curriculum based programs at the level of Engineering Associate'

The key criteria underpinning the accreditation process are summarised in the discussion to follow. The accreditation criteria provide the basis for evaluation of engineering education programs and also provide, for engineering educators, a resource for the review and development of the teaching and learning environment, for the educational design and review tasks and for the processes of continuous quality improvement.

This accreditation criteria summary is for engineering education providers seeking Engineers Australia accreditation for a program at Australian Qualifications Framework (AQF) level 6 (Reference 5). Programs submitted for accreditation under these criteria must be designed from the outset to deliver graduates ready for commencement of practice in the occupational category of Engineering Associate (sometimes referred to as Engineering Officer). Programs that are designed primarily as a professional development vehicle for existing engineering practitioners are not considered under the accreditation system at this stage.

2. CONTEXTUAL SETTING

The generic attributes defined in the Engineers Australia Policy on Accreditation of Professional Engineering Programs, (Reference 1), provide a common platform for the design of educational programs aimed at preparing students for practice in a particular domain of engineering.

The Engineers Australia National Generic Competency Standards – Stage 1 Competency Standard for Engineering Associate, (Reference 2), provide a tool for direct assessment, in a generic sense, of the preparedness of a candidate not holding an accredited or recommended qualification for entry to the profession.

The Stage 1 competencies, elements of competency and associated performance indicators reflect, for the Engineering Associate, an appropriate interpretation and expected level of attainment of the generic attributes set down in the Accreditation Policy, (Reference 1).

The targeted graduate capabilities for a program in a particular discipline must, in a generic sense, be built on and reflect these Stage 1 competencies. Graduate capabilities would be expected to embrace enabling skills and knowledge, depth of knowledge and understanding of the selected field of engineering practice, engineering application skills as well as personal and professional capabilities. The accreditation criteria have been devised as a means of assessing the potential for a particular engineering education program, delivered within an appropriate learning setting, to deliver graduates equipped with the Stage 1 competencies defined in Reference 2.

The assessment of graduate outcomes by an educational institution will be multi-

dimensional and based on performance measures, feedback and inputs distributed throughout the program of study. The accreditation criteria address inputs, content, and processes as well as direct outcomes. As to be expected the criteria correlate strongly with the Stage 1 competencies and associated performance indicators.

3. THE ACCREDITATION CRITERIA

The criteria for accreditation can be listed in point form as follows.

3.1. The Operating Environment

- Organisational structure and commitment to engineering education.
- Academic and support staff profile.
- Academic leadership and educational culture.
- Facilities and physical resources.
- Funding.
- Strategic management of the student profile.

3.2. The Academic Program

- Specification of educational outcomes.
- Title of Program and award.
- Program structure and implementation framework.
- Curriculum.
- Exposure to engineering practice.

3.3. Quality Systems

- Formal processes for new program approval, development and amendment.
- Key external stakeholder input to continuous improvement processes.
- Student input to continuous improvement processes.
- Processes for setting and reviewing the educational outcomes specification.
- Approach to educational design and review.
- Approach to assessment and performance evaluation.
- Management of alternative implementation pathways and delivery modes.
- Dissemination of educational philosophy.
- Benchmarking.
- Formal processes for review and revision of an existing program.
- Student administration and support.

Performance indicators against each criterion are introduced in Section 4 of this document. Detailed discussion against each criterion is provided in the guidelines of Reference 3.

Reference 4 provides guidance in the preparation of accreditation submission documentation, and again systematically follows the accreditation criteria.

The criteria under Section 3.2 above, ***'The Academic Program'*** will need to be addressed independently for the evaluation of each individual program offered by a provider. The remaining criteria under the headings of ***'The Operating Environment'*** and ***'Quality Systems'*** must again be applied to each program however in many cases, a unified analysis either for all programs or groups of programs, will be appropriate because of a common operating environment.

4. ACCREDITATION CRITERIA – INDICATORS OF PERFORMANCE

The performance indicators listed in the following table provide an interpretation of the expectations associated with each assessment criterion. These performance indicators are included for guidance only and are not meant to be prescriptive. ***In submitting for accreditation, educational institutions are not expected to respond rigorously to every indicator. Sufficient information is expected to be provided such that an evaluation panel is able to make a holistic judgement against the criteria.***

The guidelines of Reference 3 more clearly demarcate the absolute requirements for accreditation from the expectations of performance. Again the emphasis is on encouraging innovation and diversity in educational design and delivery.

4.1. The Operating Environment

Criteria	Performance Indicators
4.1.1 Organisational structure and commitment to engineering education	• Substantive organisational entity with clearly designated and devolved accountability via engineering school or equivalent for leadership and management of engineering education programs. • Long term, institutional commitment and strategic management to assure the development of the engineering discipline and the provision of appropriate resources. • Formally constituted governance structures with policies, procedures and processes for program approval, development, implementation, registration, cyclic review process and continuous quality improvement.
4.1.2 Academic and support staff profile	• Adequate academic staff numbers with a balanced profile across academic appointment levels satisfying appropriate student/staff ratio. • Appropriate depth, mix and distribution of qualifications, engineering practice, work experience and teaching skills matching the program specialist fields of practice. • Effective workload policies and practices. • Appropriate gender balance. • Appropriate policy and record of staff development – both pedagogical and professional skills. • Staff awareness of gender and cross-cultural issues, promoting an inclusive teaching approach. • Strategic use of sessional and industry expert presenters to enrich staff skills profile and enhance the student learning experience. • Appropriate technical and administrative support staff job profiles.
4.1.3 Academic leadership and educational culture	• Effective leadership of a cohesive teaching team, driving the educational design and continuous improvement process at individual program level. • Program teaching team inclusive of all teaching and support staff. • Progressive learning environment, based on a sound pedagogical framework and adoption of best practice. • Cooperative industry and community outreach programs incorporating teaching and work placement linked to the program offerings. • Staff role modelling Engineers Australia's Stage 1 Competency Standards for Engineering Associate. • Inclusive learning environment – gender, culture, social differences – encouraging diversity and the development of the individual to their full potential.

4.1.4 Facilities and physical resources	• Appropriate IT facilities and support staff to underpin teaching and research needs and the continuous improvement of the educational institution's systems and processes. • Access to modern teaching resources, technical equipment and management tools as well as laboratory test and measurement equipment appropriate to current and emerging industry practice. • Appropriate learning support facilities (including counselling and career advice) to facilitate the development, delivery and assessment of the full range of educational outcomes and matching the needs of the individual.
4.1.5 Funding	• Sound business planning underpinning program development and implementation. • Appropriate budgeting and funding formula for distribution to and within the engineering school. • Ongoing viability and ability to deliver current commitments and projected developments.
4.1.6 Strategic management of the student profile	• Viable student numbers and enrolment trends. • Appropriate admission, induction, retention, progression and completion rates, Honours and graduation rates commensurate with performance indicators. • Rigorous processes for analysis, assessment and verification of prior learning for credit into a program, consistent with AQF RPL National Principles.

4.2. Academic Programs

Criteria	Performance Indicators
4.2.1 Specification of educational outcomes	• Clearly identified field of engineering practice and area(s) of application. • Explicit and comprehensive specification of program objectives and targeted graduate capabilities commensurate with AQF Level 6. • Satisfactory rationale based on analysis of industry and community needs and trends in engineering practice, use of benchmark indicators and key stakeholder feedback. • Targeted graduate capabilities embracing the balanced development of enabling skills and knowledge; personal and professional capabilities; engineering application skills; well defined technical knowledge and understanding appropriate to the nominated field of engineering practice. • In-built performance indicators commensurate with an appropriate monitoring methodology. • Explicit mapping of educational outcomes to demonstrate adequate level of attainment of the Stage 1 Competency Standards for an Engineering Associate – aligned with the IEA/Dublin Accord expectations.
4.2.2 Title of program and award.	• Title of program and award consistent with learning at the level of Engineering Associate. • Program titles matched to the designated field of practice, program content and specialist focus.
4.2.3 Program structure and implementation framework	• Program structure compatible with the delivery of the specified outcomes. • Alternative implementation pathways such as electives, major and minor sequences, cooperative mode, project options, workplace learning, distance mode and articulation routes providing equivalence of learning outcomes. • Flexible learning pathways that are adaptable to suit individual student backgrounds and their learning abilities. • An approach to program design which recognises that current and emerging engineering practice is global in nature, often with multi-national engineering teams engaged in systems, projects and products that will have worldwide application.

Criteria	Performance Indicators
4.2.4 Curriculum	• Appropriate range, depth, and balance of learning to provide for the development of enabling skills and knowledge, technical capabilities, engineering application skills, personal attributes, values and professional attitudes as specified in the Stage 1 Competency Standards for Engineering Associate and summarised below: • **Knowledge Base** which includes the following: - Knowledge of science and engineering fundamentals, - Knowledge and understanding of engineering and technology, - Knowledge and application of engineering techniques and resources, - General knowledge supporting the nominated field(s) of engineering practice, • **Engineering Ability** which includes the following: - Application of standards and codes of practice, - Specifying and installing systems, - Understanding of design procedures, - Assessing technical and policy options, - Observation, analysis and testing, - Specific training for (a) candidates whose background has included advanced equipment specific training, or (b) candidates from a mainly educational background, - Responsibility as a technical expert, - Understanding of the business environment. • **Professional Attributes** which includes the following: - Ability to communicate effectively with the engineering team and with the broader community, - Ability to manage information and documentation, - Capacity for creativity and innovation, - Understanding and commitment to professional and ethical responsibilities, - Ability to operate effectively as an individual or as a member of a multidisciplinary and multicultural team, - Ability to operate effectively as a team leader or as a manager in a diverse team based environment, - Capacity for and commitment to life long learning and continuing professional development, - Demonstration of professional attitudes. • Technical knowledge and capabilities appropriate for commencement of practice as an Engineering Associate in the field of engineering and selected specialisations. • Specific program is mapped to Stage 1 Competency Standards for Engineering Associate.
4.2.5 Exposure to engineering practice	• Exposure to engineering practice is embedded as an integrated and substantial learning activity contributing in a defined and understood manner to the delivery of the learning outcomes. • Appropriate methods for exposure to practice are used as suggested in section 3.2.5 of G02EA_Comp. • For students not concurrently employed in an engineering field of practice, it is recommended that they be exposed to at least six (6) weeks of continuous engineering practice in industry during the duration of the program.

4.3. Quality Systems

Criteria	Performance Indicators
4.3.1 Formal processes for new program approval, development and amendment	• Formal processes for new program approval, development and amendment including key stakeholder input – demand analysis, establishing rationale for the program, outcomes specification and systematic educational design alignment with the nominated field of engineering practice.
4.3.2 Key external stakeholder input to continuous improvement processes	• Ongoing, regular input to the establishment, review and continuous improvement of program outcome targets, educational design and performance evaluation. • Such input would normally be expected from a formally constituted program advisory body comprising representatives from industry, the broader community, staff alumni, students and relevant professional organisations. • Facilitation of appropriate opportunities for student exposure to current and emerging industry engineering practice. • Productive industry linkages delivered through collaborative project work, work placement and research contributing to the professional development of staff and students.
4.3.3 Student input to continuous improvement processes	• Use of staff-student consultation forums, focus groups, survey instruments or other direct input mechanisms for on-going feedback, review and continuous improvement. • Students seen as true partners in a culture of continuous quality improvement.
4.3.4 Processes for setting and reviewing the educational outcomes specification	• Clearly documented specification of program objectives and targeted graduate capabilities. • Holistic, outcomes driven approach specific to each individual program. • Addressing enabling skills and knowledge, technical competence, engineering application skills, personal and professional skills, attributes, values and attitudes detailed in 4.2.4 above. • Systematic review process inclusive of all teaching and support staff, students and the ongoing input from external constituencies. • Ongoing review of benchmark practices, industry needs and student demand.
4.3.5 Approach to educational design and review	• Holistic approach driven by a clear understanding of the 'big-picture' – program objectives and targeted graduate outcomes. • Continuous improvement processes involving all teaching, support staff and students. • Use of documented recording of improvement actions and processes for continuous quality improvement. • Systematic mapping of learning outcomes from academic units, aggregating to deliver targeted graduate capabilities. • Closing the loop within the development, delivery and assessment of academic units – program development – delivery of learning outcomes - learning activities – assessment methods and feedback via program evaluation. • Appropriate experiential, problem and project based learning methodologies to support structured, discovery and investigatory learning within the specified field of engineering practice. • Progressive emphasis on independent learning, reflective practices, critical review, peer and self assessment as the program progresses.

Criteria	Performance Indicators
4.3.6 Approach to assessment and performance evaluation	• Holistic approach which is integral to and aligned with the educational design processes detailed in 4.3.5 above. • Tracking and monitoring the attainment of the full range of graduate capabilities including personal and professional skills and standards of technical competence. • Adequate range and depth of assessment methodologies and processes, referenced to relevant standards or benchmarks, including appropriate use of reflective, student self-analysis against targeted learning outcomes and/or graduate capabilities. • Tracking the performance measures within academic units and how these aggregate to satisfy the capability metrics for the program as a whole. • Rigorous moderation processes. • Systematic and regular review of the program. •
4.3.7 Management of alternative implementation pathways and delivery modes	• Adequate processes for analysing, monitoring and ensuring the equivalence of alternative implementation pathways and delivery modes.
4.3.8 Dissemination of educational philosophy	• Adequate documentation of the program objectives targeted graduate capabilities and the educational design philosophy as well as the associated mapping processes in program handbooks and records, and/or in individual academic unit guidelines. • Clear mapping of the component contributions from individual academic units from the program to the targeted graduate capabilities. • Clear linkage between learning outcome targets, learning activities and performance assessment within the individual academic unit. • Processes in place to appropriately inform all stakeholders.
4.3.9 Benchmarking	• Appropriate processes for comparing standards of educational outcome targets and performance criteria against the expectations of employers as well as national/international practice. • Use of appropriate government, industry and educational benchmark statistics to drive continuous quality improvement.
4.3.10 Formal processes for review and revision of an existing program.	• Specific to each individual program and consistent with the requirements defined in 4.2.1 to 4.2.5 and 4.3.4 above. • Use of benchmark practices, reverification of industry needs and student demand. • Continues to address the full range of graduate capabilities. • Continues to be aligned with the Stage 1 Competency Standards for Engineering Associate. • Systematic formal regular program review processes are implemented at the institute / department level inclusive of all teaching and support staff, students and with ongoing input from key external stakeholders.
4.3.11 Student administration and support	• Robust systems for: - student records data management, - monitoring individual student progress, compliant resolution, performance warning and exclusion, - student support and advisory processes, - retention and progression monitoring, - defining and maintaining student admission standards.

5. REFERENCES

1 P02EA_Curr Engineers Australia Policy on Accreditation of Professional Engineering Programs

2 P05EA Engineers Australia National Generic Competency Standards - Stage 1 Competency Standard for Engineering Associate.

3 G02EA_Curr Accreditation Criteria Guidelines

4 G06EA_Curr Preparation of Submission Documentation

5 AQF Handbook Fourth edition 2007

http://www.aqf.edu.au/