

# ENGINEERS AUSTRALIA

## ACCREDITATION BOARD

### ACCREDITATION MANAGEMENT SYSTEM FOR ENGINEERING EDUCATION PROGRAMS (CURRICULUM BASED)

#### IN THE OCCUPATIONAL CATEGORY OF ENGINEERING ASSOCIATE

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## 1. INTRODUCTION

In the following section, a glossary of terminology is provided as a fundamental reference to the Accreditation Management System for engineering education programs in the category of Engineering Associate.

## 2. GLOSSARY OF TERMINOLOGY

### 2.1. Key Bodies

In the Accreditation Management System document set:

- “the Council” means the Council of Engineers Australia,
- “the Board” means the Accreditation Board of Engineers Australia,
- “ACED” is the acronym for the Australian Council of Engineering Deans,
- “AaeE” is the acronym for the Australasian Association for Engineering Education.

Other acronyms are explained when first introduced in the documents.

### 2.2. Educational Outcomes

#### 2.2.1. Field of Practice

The designated field, branch or discipline of engineering (eg Civil Engineering) which defines a broad field and encompasses a range of foundation technical domains.

#### 2.2.2. Specialisation

The field of engineering (e.g. Civil Engineering) taken to an advanced and usually more focussed level in a particular program (eg. Structural or Geotechnical Engineering), and featured either in the title of the award or as a major study strand in the graduate’s transcript or statement of academic record.

#### 2.2.3. Enabling Skills and Knowledge

Underpinning mathematics, science, and engineering science foundations for developing specific and specialist capabilities appropriate to a designated field of engineering practice.

#### 2.2.4. Technical Domains

The skill and knowledge areas that are fundamental building blocks for practice within a broad field and provide a basis for the development of higher-level, specialist capabilities.

### **2.2.5. Technical Competence**

Ability to competently apply mathematics, science and engineering science fundamentals to problem solving in technical domains and specialist areas associated with a designated field of practice.

### **2.2.6. Personal and Professional Skills or Capabilities**

Appropriate attitudes and abilities of a generic nature including oral and written communication skills; information literacy; team skills and leadership ability; a capacity for lifelong learning; an understanding of and commitment to ethical, social, cultural, and environmental responsibilities of the Engineering Associate.

### **2.2.7. Engineering Application Skills**

Ability to apply underpinning skills and knowledge, technical capabilities and personal and professional skills to the structured solution of complex and often ill-defined problems, to engineering design and to the task of project management. Includes also the ability to operate within a business environment with appropriate skills in organisational and enterprise management as well as an understanding of the fundamental principles of business.

### **2.2.8. Practical, Laboratory or Hands-on skills**

Ability to undertake test, measurement and data collection activities as well as designing and conducting experiments following safe and sustainable laboratory and field practice procedures. Includes also abilities associated with the characterisation, selection and application of engineering systems, devices, components and materials, the development, selection and application of engineering resources, tools and models as well as critical reflection, error and fault diagnosis and outcome reporting.

### **2.2.9. Generic Attributes**

Essential characteristics and qualities of graduates from an engineering associate program within any discipline. A set of ten generic attributes has been identified by Engineers Australia in the Accreditation Policy.

### **2.2.10. Educational Objectives**

Statements consistent with the generic attributes and the mission of the educational institution which describe the expected characteristics and/or capabilities and/or achievements of mature graduates of a particular program, focussing on the first few years of their career.

### **2.2.11. Graduate Outcomes**

Measurable abilities of emerging graduates for a particular program, consistent with the educational objectives of the program and embracing the Stage 1 Competency Standard for Engineering Associate. Associated performance indicators should set out quantitative and/or qualitative measures for assessing level of attainment.

### **2.2.12. Educational Outcomes or Graduate Outcomes Specification**

A collective statement of the educational objectives and targeted graduate capabilities for a particular engineering education program.

### **2.2.13. Competency standards**

The level or threshold of capability achievement which is deemed to be acceptable for an appropriate career category and stage. Engineers Australia has developed competency standards for the career categories of Engineering Associate (Officer), Engineering Technologist and Professional Engineer. Stage 1 competency standards have been published for entry to practice and stage 2, for the mature, independent practitioner, seeking Chartered status and/or registration.

### **2.2.14. Stage 1 Competency**

The level or threshold of capability needed for entry to practice as a qualified member of the engineering team at the appropriate career category. Stage 1 competency corresponds to completion of an accredited or recognised educational qualification. The Stage 1 Competency Standard expands on the generic attributes defined in the Policy on Accreditation to provide a generic framework for building a program specific statement of graduate outcomes.

### **2.2.15. Stage 2 Competency**

The level or threshold of capability expected of a mature, independent and experienced engineering practitioner in the appropriate career category. Stage 2 competency is the requirement for Chartered membership of Engineers Australia.

## **2.3. Educational Organisation and Environment**

### **2.3.1. Educational Institution, Educational Organisation, Education Provider**

These terms are used to denote the host body authorised by legislation to award nationally recognised Australian Qualifications Framework (AQF) qualifications and or statements of attainment. The host body may include universities, private Higher Education providers or registered training organisations (RTOs). RTOs may be either private or public. Public RTOs are referred to as Technical and Further Education (TAFE) providers.

### **2.3.2. Operating environment**

The combination of physical infrastructure and resources, staff, organisational structure and governance that underpins the delivery of an engineering education program at any particular location.

### **2.3.3. Home campus**

The headquarters facility of the host educational institution and frequently the location hosting the primary implementation of a program.

### **2.3.4. Remote campus or Offshore Campus**

Alternative site for program implementation through a partner organisation or wholly owned facility.

### **2.3.5. Engineering School**

The entity responsible for the design, development, delivery and review of the

educational program/s to be accredited. In Australia this entity can be referred to as a division, faculty, school, department or other organisational element. In North America and elsewhere, the term faculty often denotes the teaching staff, and the organisational entity is often a College. Many Australian faculties of engineering or organisational divisions have sub-units called schools and/or departments and in some cases full accountability for engineering program design, development and delivery is devolved to this level.

### **2.3.6. Academic Staff or Teaching Staff**

The teaching team members employed by the host educational institution on a full or part time basis and responsible for the planning, educational design, delivery, review and continuous quality improvement of an engineering education program leading to the award of an engineering award. In North America the collective teaching team members would be known as faculty.

### **2.3.7. Sessional staff**

Members of the teaching team primarily assisting with the delivery of an educational program on a part time or casual basis. Sessional staff are sometimes practising industry professionals or post graduate students providing selected teaching input.

### **2.3.8. Support Staff**

Employees of the host educational institution responsible for the provision of technical and administrative support functions.

## **2.4. Quality Assurance**

### **2.4.1. Stakeholders**

All groups with a key interest in engineering education (or a particular program) and its outcomes - e.g. students, engineering employers and the profession generally, alumni, academic or teaching staff, education provider administrators, other professions and the wider community, school educators and career advisers, key interest groups within the profession.

### **2.4.2. Benchmarking**

A point of reference allowing critical comparison of operating environment, program design and delivery and quality systems as input to the processes of continuous quality improvement and leading to the development of best practices. For an individual provider the process of benchmarking may well be a comparison and sharing of ideas and approaches with similar or differentiated educational providers either in Australia or internationally.

### **2.4.3. Quality Systems**

The supporting framework which 'closes the loop' on program planning, development, delivery, review and continuous improvement. Aspects include engagement with external constituencies, feedback processes, determination of objectives and outcome targets, educational design, assessment, performance evaluation, benchmarking, dissemination of educational design philosophy and closing the loop at the program and academic unit levels.

#### **2.4.4. Australian Qualification Framework (AQF)**

AQF is the policy framework that defines all qualifications recognised nationally in post-compulsory education and training in Australia. The AQF comprises titles and guidelines that define each qualification, as well as the principles and protocols covering cross-sectoral qualification links and the issuing of qualifications and statements of attainment.

### **2.5. Education study program and award**

#### **2.5.1. Program**

The sequence of structured educational experiences undertaken by the student, leading on completion, and on satisfactory assessment of performance, to the award of an Engineering Associate qualification. In Australia, a curriculum based Engineering Associate program is normally of two years (full-time) duration or equivalent. The award will most commonly be an Associate Degree or in some cases an Advanced Diploma in a defined field of engineering or technology.

#### **2.5.2. Award or Qualification**

The certification confirming successful completion of a program of study. The Engineering Associate award usually offered in the higher education sector in Australia is the Associate Degree. Most educational providers have separate award titles for different disciplines or branches of engineering: for example Associate Degree of Civil Engineering, Associate Degree (Computer Systems Engineering). A generalised title is sometimes utilised, for example Associate Degree of Technology, Associate Degree of Engineering Technology or Associate Degree of Engineering. In these cases the specific branch of engineering is identified only in the graduate's statement of academic record (transcript) and not on the award certificate (testamur).

An alternative award title for a curriculum based program may be the Advanced Diploma and this is sometimes used in the higher education sector as well as in the vocational education sector. Associate Degrees and Advanced Diplomas are both classified as AQF level 6.

#### **2.5.3. Academic units or subjects or courses**

A curriculum based academic program leading to an Engineering Associate award will be defined by an academic structure comprising a number of mandated and elective discrete learning modules known as academic units, subjects or courses. A student enrolls separately in each learning module and upon successful completion attracts academic credit towards completion of the program and the award.

### **2.6. Engineering Education Process**

#### **2.6.1. Educational design**

Embraces the tasks of: - developing a structural framework and detailed content of an education program including the educational objectives and targeted



graduate capabilities (the educational outcomes specification); developing the structure of academic units and associated credits; developing the academic unit learning outcomes, learning activities and assessment design; mapping unit learning outcomes and performance measures to the delivery of graduate capabilities and thus closing the loop on learning outcomes, learning activities and assessment measures at the academic unit level.

### **2.6.2. Delivery mode**

The method of learning ranging from traditional classroom or face to face teaching through flexible learning options manifested as alternative implementation pathways within a particular program structure.

### **2.6.3. Flexible Delivery**

The use of optional delivery vehicles within a program definition offering students the benefits of learning modes other than the traditional on-campus classroom based approach. Examples of such vehicles could be the use of independent learning materials, remedial or supplementary support materials and pathways, computer/web based resources and self assessment systems, project and problem based learning, team or group learning, studio based approaches, work place and cooperative learning schemes.

### **2.6.4. Distance Mode or Distance Based Implementation or Distance Based Delivery**

Specific provision for learning in an off-campus mode. Such a delivery approach will require some periods of on-campus attendance however learning is undertaken largely in an independent mode using appropriately packaged resources and support systems.

### **2.6.5. Articulation**

Entry to a program at an advanced level, through appropriate recognition of prior learning.

### **2.6.6. Advanced Standing**

Academic credit granted for exempted academic study units within a program structure, on the basis of prior learning.

### **2.6.7. Implementation Pathways**

The various optional routes available to a student following a designated educational program. Such pathways can range from alternative academic units selected from a list of electives, defined major and minor academic unit sequences, optional cooperative modes, project and/or thesis options, workplace learning options, distance modes and various articulation routes right through to a remote campus or offshore implementation of a program.

### **2.6.8. Professional Practice Exposure**

Experiential learning in an engineering workplace setting and/or through direct interface with practising engineering professionals. Mechanisms include work placement, industrial internships, vacation work experience, cooperate learning schemes, site visits, industry and community based problem solving, assignments and projects, interviews with members of the engineering team and sessional teaching by practising professionals.

### **2.6.9. Performance Monitoring and Performance Evaluation**

Tracking the overall level of attainment of both individual students and a total cohort against targeted graduate outcomes and program objectives.

### **2.6.10. Assessment**

Judgement of a student's level of attainment against designated learning outcomes usually localised at the level of the individual academic unit. Tracking of assessment processes is critical in the evaluation of overall performance and the attainment of graduate capability targets.

### **2.6.11. Summative Assessment**

Measures of student attainment contributing to an assessment result at the academic unit level or to an overall achievement metric for the program as a whole. Examples of the latter being grade point average, weighted average score or the determination of Honours.

### **2.6.12. Formative Assessment**

Assessment instruments used as an integral part of the learning process, confirming for the individual student the validity of an approach or solution and providing an objective indication of learning progress.

### **2.6.13. Moderation**

The processes used to test and control assessment and performance measures to assure that standards are preserved across a student cohort, across academic units and programs, and across national and international boundaries.

## **2.7. Accreditation Process**

The evaluation of a professional engineering education program and consequent decision on its status of recognition by the relevant authority in accordance with standards of equivalence set by international accord.

### **2.7.1. Accreditation Criteria or Criteria**

Designated performance metrics guiding the evaluation and decision making steps of accreditation, and also providing an operating framework for educational design, development and delivery.

### **2.7.2. General Review**

The routine, cyclic process of evaluating existing and newly implemented education programs for accreditation. The general review process generally embraces the collective program offerings of a single educational institution at a particular campus or location.

### **2.7.3. Evaluation Panel or Panel**

The team of specialists appointed by the Accreditation Board to assess programs submitted by an educational institution for accreditation in accordance with the accreditation criteria. The panel submits recommendations on accreditation for final consideration by the Board.

#### **2.7.4. Accreditation Cycle**

The 5-year repetitive sequence of steps associated with implementing the general review task, beginning with negotiation of dates for submission documentation and visitation and concluding with the delivery of a final report and confirmation of accreditation.

#### **2.7.5. Engineers Australia Officers**

Employees or nominated representatives of Engineers Australia with responsibility for the accreditation function. One or two Engineers Australia officers are normally included as members of the evaluation panel along with academic and industry specialists.

#### **2.7.6. Panel Observers or Observers**

Additional persons approved by the Accreditation Board and the host educational institution to participate in the activities of the evaluation panel for the purposes of evaluating or witnessing the accreditation processes.

#### **2.7.7. Initial Documentation or Submission Document or Documented Submission**

Comprehensive material developed by the educational institution that systematically addresses the accreditation criteria. The submission should be prepared with the intention of providing *prima facie* evidence that the criteria are satisfied for each particular program under consideration.

#### **2.7.8. Panel Teleconference or Pre-visit Teleconference**

A meeting of the evaluation panel often conducted prior to a scheduled visit to consider submission documentation, to plan the remaining steps in evaluation process and to provide initial feedback to the education provider.

#### **2.7.9. Evaluation Visit or Visit**

A normal step in the accreditation process where a panel collectively travels to the home campus, remote campus or offshore site of an education provider to conduct interviews with a range of stakeholders, to inspect infrastructure and facilities and to consider documented teaching materials, student work and records associated with the quality system. The evaluation visit is normally an integral part of the general review process and often also necessary in the evaluation of newly introduced programs.

#### **2.7.10. Desktop Assessment**

Under particular circumstances an evaluation panel may finalise its recommendation on accreditation following consideration of just the submitted documentation and without the need for an evaluation visit. This can occur for instance in the provisional accreditation of new programs which are closely related to programs already accredited for implementation at a particular location and a particular institution.

### **2.8. Accreditation Outcomes**

Based on recommendations of the evaluation panel, the Accreditation Board will make a decision on the future accreditation status of programs under consideration for a particular institution.

### **2.8.1. Full Accreditation**

Granted to programs that are delivering or continuing to deliver graduates and which clearly satisfy the accreditation criteria. Accreditation is nominally accorded for a 5-year term, in accordance with the normal cycle of general reviews. Accredited programs are deemed to deliver graduates equipped with the competencies defined in the appropriate Stage 1 Competency Standard defined by Engineers Australia. Full accreditation is necessary before graduates from the accredited program can be recognised by Engineers Australia for the purposes of membership, chartered status and registration. Full accreditation is essential also before graduates can be recognised under the Dublin Accord once Engineers Australia attains signatory status with this Accord.

### **2.8.2. Provisional Accreditation**

Granted to new programs, usually in the first year of operation and applicable until such time as the program can be considered for transition to full accreditation once the first substantive cohort of graduates is about to emerge.

Provisionally accredited programs do not carry formal recognition by Engineers Australia for the purposes of membership, chartered status or registration.

### **2.8.3. Limited Term Accreditation**

Granted for a defined period of less than 5 years where a program marginally satisfies the accreditation criteria, but where urgent action is deemed necessary to alleviate risks and ensure that compliance with the criteria will be maintained in the longer term.