

ENGINEERS AUSTRALIA

Australian Engineering Accreditation Centre

GUIDELINE FOR THE ACCREDITATION OF ENGINEERING EDUCATION PROGRAMS AT THE MASTERS LEVEL

1 FUNCTION AND SCOPE OF ACCREDITATION

Engineers Australia is the national authority responsible for accreditation of engineering education programs offered by Australian universities, educational institutions and training organisations. The prime function of accreditation is to ensure that a program of engineering education, in a holistic sense, will deliver graduates equipped with the competencies defined in the appropriate Stage 1 Competency Standard. The Competency Standards are defined for the occupational categories of Professional Engineer, Engineering Technologist and Engineering Associate. The accreditation process focuses only on programs that are designed to deliver the educational base necessary for initial entry to engineering practice at the appropriate occupational level. This educational base qualification, must by implication deliver the Stage 1 competencies defined for the occupational category.

Accreditation criteria covering the operating and delivery environment, the educational design of the program and the underpinning quality systems are defined separately for programs in each of the occupational categories. These criteria have been developed with the objective of ensuring that the academic standards of accredited programs are substantially equivalent to the expectations and graduate outcome statements set down by the separate educational Accords under the International Engineering Alliance.

The accreditation system encourages innovation in engineering education and expects an outcomes-based approach to educational design, based on delivery of the Stage 1 competencies. The accreditation system does not therefore prescribe program structure or content, other than to provide a guideline on balance of emphasis and minimum study periods for programs in each category. Programs that are accredited for delivery of a Professional Engineer outcome require 4 or more years of full time study from an Australian year 12 or equivalent entry. This aligns with the guideline statement that programs accredited at the level of the Washington Accord typically have 4 to 5 years of post school study.. This range of study duration embraces both the traditional 4-year Bachelor of Engineering model as well as the emerging 3+2 year (typically) two cycle model within the European EUR-ACE accreditation framework.

Since 1980 in Australia the four-year full-time Bachelor of Engineering or equivalent has provided the educational base for graduates commencing practice as a Professional Engineer. Nurtured professional development then leads to the attainment of Stage 2 competencies and professional registration. For the Engineering Technologist, the educational base is the Bachelor of Technology, Bachelor of Engineering Technology, Bachelor of Engineering Science or equivalent. For the Engineering Associate outcome, the Associate Degree or the Advanced Diploma typically provides the base qualification.

There are many categories of engineering education programs that are outside of the scope of accreditation. These provide professional development pathways, rather than aiming to deliver the base qualification that a graduate needs to commence engineering practice in a particular occupational category. These programs build additional specialist technical knowledge and skills or broader professional capabilities and can be categorised either as award programs offered by registered educational institutions and training providers or modular short courses. Award programs at the masters, graduate diploma and graduate certificate levels have become popular vehicles for the Professional Engineer and Engineering Technologist to build advanced technical and/or professional capability. For the Engineering Associate the equivalent award program would be the vocational graduate certificate and vocational graduate diploma.

2 EVOLUTION OF THE MASTER OF ENGINEERING

Engineering education at the masters level in Australia has developed significantly over the past three decades. The masters by coursework, as distinct from the research based masters, has been manifested in a wide variety of formats and under a wide range of degree titles. The range of offerings has covered a vast range of specialist fields of engineering practice as well as broad professional domains.

The objectives set out for these offerings also vary considerably. Traditionally, the coursework masters programs have focussed on professional development for qualified, practising engineering professionals and so have not been subjected to the accreditation system operated by Engineers Australia. These programs typically focussed on building high level, specialist technical and/or research capability, or appropriate professional skills and knowledge in areas such as management, leadership and business enterprise. Such programs, built on a professional development platform, are clearly outside of the scope of accreditation at this stage.

The past decade, in particular, has seen the emergence of masters level programs with an articulation agenda. Such programs generally (but not always) require a primary bachelor level qualification, at either the 3 or 4 year level, but this foundation will not necessarily be at the Bachelor of Engineering (or equivalent) level, nor necessarily be in the same field of practice. In fact, in many cases, a non-engineering foundation bachelor degree is acceptable as an entry pre-requisite. The objective in these cases is to provide an articulation pathway for candidates and deliver an outcome that will be recognised in Australia at the Professional Engineer level. This means that accreditation is an essential process if graduates are to be deemed to be equipped with the Engineers Australia Stage 1 competencies. This category of masters program could be described as a “conversion” style masters, since these programs are aimed at achieving a professional engineer outcome for candidates whose educational backgrounds are either:

- a) a professional qualification such as a bachelor degree (3 or 4 years) in a non engineering domain;
- b) a 4-year Bachelor of Engineering qualification (or equivalent) in the same field of practice that is not recognised under the Washington Accord system;
- c) a 3-year technologist level qualification in a congruent field of practice;
- d) a Bachelor of Engineering qualification (or equivalent) in a different field of practice;
- e) a 3-year bachelor degree qualification constituting the first cycle of a 2-cycle Bologna style sequence.

A wide variety of masters level programs with varying study durations and delivery modes has thus emerged. Such variance is very much justified on the grounds of achieving a compatible outcome standard, given the wide ranging educational backgrounds of enrolled students.

3 ACCREDITATION OF CONVERSION STYLE ENGINEERING EDUCATION PROGRAMS AT THE MASTERS LEVEL

Over the past 5 years, the Australian Engineering Accreditation Centre has considered a range of conversion style masters degrees for accreditation. Engineers Australia strongly encourages all educational institutions to seek accreditation of this class of engineering masters program to confirm the integrity of educational outcomes such that graduates are fit to enter practice as professional engineers and enjoy the recognition, mobility and professional development benefits that an accredited qualification ensures.

Accreditation experiences to date have revealed significant discrepancies between educational institutions with regard to advanced standing policy, nominal program duration, targeted graduate outcome standards and the degree of commonality of course material with that offered to undergraduates. In some cases submitted programs have been deemed to be unacceptable by the Accreditation Board and changes to program structure, content and/or admission conditions have been requested.

The following policy statements have been prepared to clarify the expectations of the Accreditation Board for conversion style engineering masters programs. It is hoped that this information will be a resource to educational institutions seeking accreditation of conversion style masters programs designed to deliver a Professional Engineer outcome.

4 ACCREDITATION POLICY STATEMENTS

1. The objective for Engineers Australia is to assess the program against the accreditation criteria and to determine, with confidence, that the Stage 1 Competencies will be delivered, in a holistic sense, to all graduates.
2. Notwithstanding the above requirement, there is an expectation of the Accreditation Board that a post-graduate program will deliver a standard of graduate capability that is demonstrably superior to that of a bachelor degree graduate in the same field of practice. In some regard, the standard of expected outcome would thus be argued to be, in some way, beyond that mandated by the Stage 1 Competency Standard. This expectation is consistent with the descriptors in the Australian Quality Framework.
3. The Board recognises that post-graduate programs may share some curriculum materials and content with those deployed in undergraduate engineering programs, but also expects masters candidates to be assessed at and attain a standard of performance that is clearly more advanced than undergraduates. (See note 1)
4. The minimum study duration for a conversion style masters program aimed at the Professional Engineer outcome should be nominally 3-years (full time study), on the basis of a candidate entering with a non-engineering bachelor degree, but satisfying minimum entry requirements for mathematics and general sciences. (See note 2)
5. Any required preparatory studies to build foundation skills and knowledge for candidates entering with a non-engineering bachelor degree must be structured and formalised as a component of the overall (nominally 3-years full time) study program and submitted as an integrated package. A 2-year full time structured masters program preceded by ad-hoc preparation studies prescribed on a case by case basis for such candidates would not be acceptable for accreditation.
6. For candidates entering a conversion style masters with an engineering foundation qualification, it may be acceptable for advanced standing credits to be granted for part, if not all of this 1-year preparation period. For example, candidates with a recognised Engineering Technologist qualification, or with a recognised or non-recognised Bachelor of Engineering, or those with a first cycle 3-year engineering qualification under the Bologna style model may well be entirely exempted from the preparation year and simply undertake a 2-year (full time) sequence of study to obtain the masters outcome.
7. For masters level programs that restrict intakes to particular categories of bachelor graduates (such as those from a specific program within their own institution), the preparation program may be reduced or eliminated within the program specification.
8. In special circumstances where there is a rigid coupling specified between an undergraduate engineering foundation program and the follow-on masters program, perhaps also with prior professional practice experience requirements, there may well be a case for reducing the masters study period to less than 2-years (full time), but this would need to be considered on a case by case basis.

Note 1 This could be achieved for instance with a capstone project activity that is of extended duration and has higher research requirements. Where curriculum material is common with an undergraduate bachelor degree, masters level attainment could be demonstrated through the use of more advanced assessment/project/assignment activity. The degree of differentiation beyond the bachelor level is not prescribed, nor objectively measured by the accreditation processes, but should be clearly apparent to an accreditation panel and equally clear to potential and current students.

Note 2 This could be achieved for example with a 3-year masters program structure, or alternatively with a graduate certificate/graduate diploma preparation sequence followed by a 2-year masters program.