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| ENGINEERING COUNCIL OF SOUTH AFRICA <i>Standards and Procedures System</i> | |  E C S A |
| Criteria and Processes for Recognition of Educational Qualifications for Professional Categories | | |
| Status: Approved by Council | | |
| Document : E-17-P | Rev-1.1 | |

1. Purpose

- 1.1 This document defines the criteria and evaluation processes for recognition of educational qualifications and assessment of the level of educational achievement by applicants in candidate and professional categories. This document is structured as follows:
Section 2 reviews the statutory requirements and policy for educational achievement for registration and methods of satisfying the education requirements;
Section 3 expands on policy for holders of accredited qualifications or qualifications recognised under an international education agreement;
Section 4 details the evaluation of qualifications other than accredited or recognised qualifications and the evaluation of individual academic standing;
Section 5 describes practice in the case of applicants who do not meet the normal educational requirements.
- 1.2 This document does not cover the cases of applicants for registration via a mutual exemption agreement or an international register.
- 1.3 This policy supersedes “Recognition and Assessment of Academic Qualifications: Professional Engineers”.

2. Background

- 2.1 The Engineering Profession Act (Act No. 46 of 2000) requires that applicants who desire to register in a professional category must satisfy Council that they have:
- (a) demonstrated their competence as measured against standards determined by the Council for the relevant category of registration; and
 - (b) passed any additional examinations that may be determined by the Council.
- The latter is referred to as the *educational requirement* for registration. The determination of standards by Council is embodied in the policy in document R-01-P. The various ways of meeting the educational requirements are summarised below.
- 2.2 The educational requirement for registration as a candidate or a professional is normally an accredited qualification or a qualification recognised under an international agreement. This policy provides further detail on meeting the requirements via accredited or recognised qualifications. The policy defines the mechanism for meeting the educational requirement for

registration as a candidate or professional by persons without accredited or recognised qualifications.

2.3 ECSA's policy on registration, document R-01-P, recognises four methods, denoted (i) to (iv), for meeting the educational requirement applicable in the category prior to applying for candidate or professional registration. In the first two, an applicant satisfies the educational requirement if he/she:

- (i) holds an accredited qualification or acceptable combination of accredited qualifications prescribed for the category; or
- (ii) holds a qualification or combination of qualifications recognised under an international academic agreement relevant to the category.

2.4 The third and fourth methods provide means for an applicant to demonstrate educational standing that is substantially equivalent to an accredited qualification for the category of candidate or professional registration by one or more of the following. The applicant:

- (iii) holds a qualification or combination of qualifications that have been determined by case-by-case evaluation to satisfy criteria for substantial equivalence to an accredited qualification for the category by virtue of:
 - (a) the qualification(s) being awarded in a jurisdiction or by a provider that has a record of quality or a quality assurance system known to ECSA; or
 - (b) examination of detailed documentation on the qualification(s) reflecting substantial equivalence; or
- (iv) presents a combination of evidence determined by Council for the category that indicates an *individual level of educational* achievement against criteria that is substantially equivalent to an accredited qualification; evidence may include:
 - (a) qualification(s) or credits towards qualifications not presented under (iii);
 - (b) completion of examinations or other forms of assessment set or prescribed by Council; or
 - (c) portfolio(s) of evidence of work and other outputs presented for assessment; or
 - (d) other evidence of prior learning presented for assessment.

2.7 Detailed requirements for the various methods of satisfying the educational requirements are laid out in subsequent sections.

3. Implementation of policy for methods (i) and (ii)

Method (i) Accredited Programme(s)

3.1 To satisfy the educational requirement by method (i), the applicant must hold an accredited qualification or acceptable combination of accredited qualifications prescribed for the category. Qualifications accredited by ECSA as meeting the education requirement for a category are listed in the documents referred to below. A graduate is recognised as meeting the education requirements for the category if he/she completed the programme in a year within the period of validity of the accreditation indicated on the list. This provision applies to:

- 3.1.1 All BEng-type programmes in Lists A and B of document E-20-PE for Candidate or Professional Engineer Applicants;

- 3.1.2 All National Diploma programmes listed in E-20-PN, subject to satisfying subject combinations specified in 3.2.1 for Candidate or Professional Engineering Technician applicants; and
 - 3.1.3 All BTech programmes listed in E-20-PT subject to satisfying subject combinations specified in 3.2.2 for Candidate or Professional Engineering Technologist applicants.
- 3.2 Recognition of an accredited National Diploma as meeting the education requirements toward technician registration or BTech qualification as meeting the education requirements toward technologist registration is contingent on the subjects contained in the curriculum. The criteria for an acceptable curriculum are as follows:
- 3.2.1 **National Diploma:** As required under NATED 151, subject to variations permitted by the TPAC from time to time.
 - 3.2.2 **BTech:** As required under NATED 151, with at least 0.625 NATED credits in engineering subjects relevant to the designation of the degree, subject to variations permitted by the TPAC from time to time.

Method (ii) Recognised Programme(s)

- 3.3 To satisfy the educational requirement, the applicant must hold a qualification or combination of qualifications recognised under:
- 3.3.1 the Washington Accord, the international academic agreement relevant to the categories of Candidate and Professional Engineer;
 - 3.3.2 the Sydney Accord, the international academic agreement relevant to the categories of Candidate and Professional Engineering Technologist;
 - 3.3.3 the Dublin Accord, the international academic agreement relevant to the categories of Candidate and Professional Engineering Technician.
- 3.4 The signatories to the various accords are identified on the International Engineering Alliance website (www.ieagrements.org). Each signatory maintains its list of accredited programmes. A graduate is recognised as meeting the education requirements if he/she completed the programme in a year within the period of validity of the accreditation after the admission date of the signatory to the relevant accord.
- 3.5 Programmes accredited by organisations holding provisional status in an Accord are not recognised by ECSA. Applicants holding such qualifications must follow the qualification or individual evaluation methods (iii) or (iv).
- 3.6 Where a qualification or combination of qualifications accredited by an accord signatory prior to the entry of the signatory to the accord is considered to be substantially equivalent to an accredited qualification, such qualifications must be listed as qualifications for accelerated processing provided for in section 4.9.1.

4. Process and Criteria for Applicants under Methods (iii) (Qualification Evaluation) and (iv) (Individual Assessment)

- 4.1 An applicant for candidate or professional registration in a category who does not hold an accredited qualification or a recognized qualification must apply for educational evaluation before applying for registration.

- 4.2 The criteria for substantial equivalence to an accredited qualification for the category are defined in:
- 4.2.1 Table 1 for the categories of Candidate and Professional Engineer;
 - 4.2.2 Table 2 for the categories of Candidate and Professional Engineering Technologist;
 - 4.2.3 Table 3 for the categories of Candidate and Professional Engineering Technician.
- 4.3 Recognition of educational achievement is granted for individual criteria for stated categories. Criteria may be satisfied either:
- 4.3.1 by demonstrating compliance of qualifications with qualifications evaluation (QE) criteria stated in Table 1, 2 or 3, column 2; or
 - 4.3.2 assessment of the applicant against the individual assessment (IA) criteria stated in Table 1, 2 or 3, column 3.
- 4.4 After evaluation, a statement of full or partial recognition of educational achievement will be issued to the applicant stating the criteria satisfied and the category for which each criterion is satisfied.
- 4.5 An applicant who seeks to meet the educational requirement by method (i), (ii) or (iii) above and who provides evidence that he or she has been continuously in training and practice for ten years since graduation must be evaluated in terms of section 4.6 of R-01-P.
- 4.6 An applicant for educational evaluation who satisfies all criteria for candidate or professional registration in a category may apply for registration in that category, provided that assessment against the following criteria may be deferred to the assessment of professional competence when applying for professional registration in the relevant category;
- 4.6.1 In the case of an applicant for Candidate and Professional Engineering Technologist criteria 7 and 8 in Table 2;
 - 4.6.2 In the case of an applicant for Candidate and Professional Engineering Technician criteria 7 and 8 in Table 3;
- 4.7 An applicant retains credit for those criteria that have been satisfied in particular categories for three years after the last day on which recognition of one or more credit is notified to the applicant.
- 4.8 An applicant for educational evaluation may undertake further learning and assessment to satisfy the outstanding criteria to obtain recognition in a category. Such an applicant must submit a proposal for the form of learning and assessment to be undertaken for approval.
- 4.9 The following mechanisms may be applied for qualifications evaluation as appropriate to individual cases:
- 4.9.1 An accelerated procedure is available for evaluating a fully documented qualification whose quality is known to ECSA and listed for accelerated processing. Here the applicant is required to supply only certified copies of the qualification certificate(s) and academic transcript(s). The evaluation process verifies that the qualification is of the listed type and that the subjects completed are consistent with being an engineering qualification. Such qualifications would normally be accredited by a

body which is not a signatory to one of the above Accords or come from an education system or institution known to ECSA to have substantially equivalent standards.

- 4.9.2 A fully documented qualification that does not conform to a listed known type may also be considered for substantial equivalence according to the criteria in the applicable Table 1, 2 or 3. In this case, the applicant must provide full information listed in Annexure 1.
- 4.10 The following mechanisms may be applied for individual assessment as appropriate to individual cases:
- 4.10.1 Written examination(s), set or prescribed by ECSA, in the fundamentals of the discipline relevant to the category, with embedded assessment of mathematics and underpinning natural sciences;
 - 4.10.2 Written essay-type examination, set or prescribed by ECSA, on social, environmental, professional and ethical issues, with integral assessment of written communication ability relevant to the category;
 - 4.10.3 Examinations at the exit level of accredited qualifications set by higher education providers or professional examining bodies in engineering specialist areas;
 - 4.10.4 Oral examinations, provided that this is not the sole mechanism used;
 - 4.10.5 Assessment of evidence presented by the applicant of prior learning against criteria in Tables 1, 2 or 3 as appropriate.
 - 4.10.6 Evidence of work experience against criteria in Tables 1, 2 or 3 as appropriate.
- 4.11 Qualifications evaluation mechanisms 4.9.1 and 4.9.2 are normally applied first before invoking individual assessment mechanisms 4.10.1 to 4.10.6.
- 4.12 Applicants proceeding under Methods (iii) or (iv) may be interviewed to establish more information about the qualification. This form of interview is not an examination.
- 4.13 Evaluation of an applicant's qualification and individual evaluation of an applicant's educational standing by ECSA is an advisory service.
- 4.14 Applications must be prepared in the English language and all interviews and assessments will be conducted in English.
- 4.15 An applicant whose educational achievement is found to be deficient against particular criteria may within thirty days of notification submit further evidence for a review of the evaluation.

Table 1: Criteria for substantial equivalence of a qualification and individual performance to a qualification accredited as meeting the educational requirements for Candidate and Professional Engineer.

| | Qualifications Evaluation Criteria | Individual Assessment Criteria ¹ |
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| 1.1 | The programme covers fundamentals of mathematics and natural science appropriate to the discipline. The programme contains the equivalent of at least one semester of mathematical sciences and one semester of natural sciences; and | The applicant displays understanding of and the ability to apply the fundamentals of engineering in a selected discipline together with the underpinning fundamentals of mathematics and natural science. |
| 1.2 | The programme adequately covers the engineering fundamentals appropriate to the discipline; | |
| 1.3 | The programme contains engineering studies related to current practice in the selected field. | The applicant displays proficiency in engineering specialist fields at the exit level |
| 2 | The level of problem solving demanded at the exit level corresponds to <i>complex engineering problems defined</i> in ECSA document E-02-PE. | |
| 3 | The programme contains a selection of engineering tools and IT support appropriate to the discipline | The applicant displays proficiency in the use of engineering tools and IT support appropriate to the discipline. |
| 4 | The curriculum has the requirement for a major design exercise. The design problem meets the requirements of a <i>complex engineering problems</i> and the design approach is properly structured | The applicant demonstrates design proficiency is demonstrated through substantial project work. The design problem meets the requirements of a <i>complex engineering problems</i> and the design approach is properly structured |
| 5 | The curriculum requires experimental work and research methodology | The applicant demonstrates proficiency in experimental and research methodology |
| 6 | The curriculum requires oral and written communication at the level expected of a graduate | The applicant communicates in writing at the exit level of a BEng programme |
| 7 | The curriculum contains elements that give an understanding of the impact of engineering activity | The applicant explains and analyses impacts of engineering activity |
| 8 | The curriculum contains elements that give an understanding of ethics and engineering professionalism | The applicant explains ethical principles and analyses ethical issues |

Table 2: Criteria for substantial equivalence of a qualification and individual performance to a qualification accredited as meeting the educational requirements for Candidate and Professional Engineering technologist.

| | Qualifications Evaluation Criteria | Individual Assessment Criteria ² |
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¹ These criteria will be elaborated in the detailed specification for each form of assessment.

² These criteria will be elaborated in the detailed specification for each form of assessment.

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| 1.1 | The programme has a fundamental treatment of mathematics and natural science appropriate to an engineering sub-discipline with at the equivalent of at least three quarters of a semester of mathematical sciences and one half of a semester of natural sciences | The applicant displays understanding of and the ability to apply the fundamentals of engineering in a selected sub-discipline together with the underpinning fundamentals of mathematics and natural science. |
| 1.2 | The programme adequately covers the engineering fundamentals appropriate to the sub-discipline | |
| 1.3 | The programme contains studies of the engineering technologies relevant to the sub-discipline | The applicant displays proficiency in engineering specialist fields of a selected engineering sub-discipline at the exit level |
| 2 | The level of problem solving demanded at the exit level corresponds to <i>broadly-defined engineering problems defined</i> in ECSA document E-02-PT | |
| 3 | The programme contains a selection of engineering tools and IT support appropriate to the sub-discipline | The applicant displays proficiency in the use of engineering tools and IT support appropriate to the sub-discipline. |
| 4 | Design proficiency is demonstrated through substantial project work. The design problem meets the requirements of a <i>broadly-defined engineering problems</i> and the design approach is properly structured | The applicant demonstrates design proficiency through substantial project work. The design problem meets the requirements of a <i>broadly-defined engineering problems</i> and the design approach is properly structured |
| 5 | The programme contains experimental or investigative work and information-handling methodology | The applicant demonstrates proficiency in experimental or investigative and information-handling methodology |
| 6 | The curriculum requires oral and written communication at the level expected of a technology graduate | The applicant communicates in writing at the exit level of a BTech programme |
| 7 | The curriculum contains elements that give an understanding of the impact of the engineering technologies of the sub-discipline | The applicant explains and analyses impacts of engineering technologies of the sub-discipline |
| 8 | The curriculum contains elements that give an understanding of ethics and engineering professionalism | The applicant explains ethical principles and analyses ethical issues |

Table 3: Criteria for substantial equivalence of a qualification and individual performance to a qualification accredited as meeting the educational requirements for candidate and professional engineering technician.

| | Qualifications Evaluation Criteria | Individual Assessment Criteria ³ |
|-----|--|---|
| 1.1 | The programme covers fundamentals of mathematics and natural science appropriate to a sub-discipline with at least the equivalent of one half of a semester of mathematical sciences and one third of a semester of natural sciences | The applicant displays understanding of and the ability to apply a coherent range of discipline specific fundamental principles in engineering science and technology supported by established mathematical formulas to solve <i>well-defined</i> engineering problems. |
| 1.2 | The programme adequately covers the engineering fundamentals appropriate to the sub-discipline | |
| 1.3 | The programme contains studies of the engineering technologies relevant to the sub-discipline | The applicant displays proficiency in discipline specific engineering techniques at exit level. |
| 2 | The level of problem solving demand at the exit level corresponds to <i>well-defined engineering problems defined</i> in ECSA document E-02-PN | |
| 3 | The programme contains a selection of engineering tools and IT support appropriate to the sub-discipline | The applicant displays proficiency in the use of engineering tools and IT support appropriate to the discipline for the solution of <i>well-defined</i> engineering problems. |
| 4 | Design proficiency is demonstrated through project work. The design problem meets the requirements of a <i>well-defined engineering problems</i> and the design approach is properly structured | The applicant demonstrates procedural design proficiency through project work. The design problem meets the requirements of a <i>well defined</i> engineering problem and the design approach is properly structured |
| 5 | Proficiency in experimental procedures and data-handling methodology is demonstrated | The applicant demonstrates proficiency in standardised experimental and research methodology |
| 6 | The curriculum requires oral and written communication using prescribed formats | The applicant communicates in writing at the exit level of a NDip programme |
| 7 | The curriculum contains elements that give an understanding of the impact of the engineering procedures of the sub-discipline | The applicant explains and analyses impacts of engineering activity addressing issues by defined procedures. |
| 8 | The curriculum contains elements that give an understanding of ethics and engineering professionalism | The applicant understands and commits to professional ethical principles in engineering. |

³ These criteria will be elaborated in the detailed specification for each form of assessment.

5. Case of Applicants who do not meet requirements

- 5.1 The general practice will be to inform the applicant that he/she has not met the educational requirements and list the criteria that were not satisfied. The applicant is then free to take remedial action and return for evaluation. In general, applications will not be refused outright; only in rare cases will a decision of no recognition possible be returned. Refusals therefore need not be referred to the Central Registration Committee for a final decision.

6. Composition of Interview and Oral Examination Panel

- 6.1 An interview in terms of section 4.12 or an oral examination in terms of section 4.10.4 must be conducted by at least two academics who are currently active in conducting accredited programmes in or related to the discipline of the applicant and one practitioner registered in a relevant category.

7. Definitions

Engineering Discipline: a generally-recognised, major subdivision of engineering such as the traditional *disciplines* of Chemical, Civil, or Electrical Engineering, or a cross-disciplinary field of comparable breadth including combinations of engineering fields, for example Mechatronics, and the application of engineering in other fields, for example Bio-Medical Engineering.

Subdiscipline: a generally-recognised practice area or major subdivision within an engineering discipline, for example Structural and Geotechnical Engineering within Civil Engineering.

Substantial Equivalence: applied to educational programmes means that two programmes, while not meeting a single set of criteria in detail, provide their respective graduates with knowledge and abilities to enable the graduates to undertake the same work and professional development.

Annexure 1: Information for applicants for evaluation of qualifications, individual evaluation or proceeding by methods (iii) or (iv)

A person proceeding via the qualification evaluation route method (iii) or (iv) must provide at least the following evidence of educational achievement:

- Certified copies of all qualifications
- Full academic transcripts
- If the type of programme does not appear on the list of programmes whose graduates are eligible for consideration under case (iii), the following material must be supplied:
 - A curriculum analysis using the worksheet provided with as much details as possible
 - Syllabi of the subjects studied
 - Project report(s)

Revision History

| Version | Date | Status/Authorised by | Nature of Revision |
|----------------|-------------|-----------------------------|-------------------------------|
| Rev 1.0 | 25 Nov 2010 | Approved by Council | Implementation Plan to follow |
| Rev 1.1 | 17 Mar 2011 | Approved by Council | Minor editorial changes |