

**Academic Requirements Committee (ARC)
Report # 4 from the Distance Education (DE) Sub-Committee
15 February 2019 ARC Meeting**

BACKGROUND

Until recently, the ARC position was (“8.6 Graduates from Distance Education Programs): “Applicants who acquired their bachelor of engineering degrees or other academic credentials by correspondence, through distance education, or from online learning, do not meet the recognized academic requirements to apply for the P. Eng. Licence”.

In view of the evolution of Distance education and the increasing number of engineering programs, worldwide and in Canada that offer at least some of the curriculum via online methods, ARC decided to review the existing policies, and for that purpose, formed a Distance Education (DE) Sub-committee (ARC Meeting, 8 December 2017).

The Distance Education Subcommittee has submitted three interim reports to date and regularly held extended discussions with the ARC and received valuable feedback, particularly per the ARC minutes of: 18 January, 16 February, 16 March, 24 August, 28 September, 19 October 19, 2018, 23 November, and 7 December 7, 2018, and also on 17 January 2019.

On 24 August 2018 ARC passed the following motion: “*The ARC rescind the previous motion regarding Distance Education and assess the applicants that have Distance Education noted on their transcripts or diploma on a case-by-case basis*”, and indicated that the DE work needed to continue in order to guide the ARC decisions w.r.t. to all non-CEAB applicants, and in particular those that gained their academic degrees by distance education.

It would be desirable, in the long run, to: 1) align the ARC process closer to the CEAB input measures and graduate outcomes and attributes; 2) to deal with the increasing trend for distance education in graduate programs leading to Masters and PhD. Degrees; and 3) to switch to an on-line application process as digitalization is growing in all domains. This also is a long term goal, which is not practicable currently within the PEO organization.

In the meantime, in order to address the current situation, the Distance Education Subcommittee is making certain suggestions and recommendations detailed in this report. These recommendations are presented here in the form of revisions to the ARC “Red Book”.

For clarity, suggestions, additions and revisions are shown in bold characters and underlined (and red colour).

Glossary of Terms

Term	Acronym	Definition
<u>Authentic Assessment</u>		<u>Authentic assessment is the measurement of "intellectual accomplishments that are worthwhile, significant, and meaningful." as contrasted to multiple choice standardized tests.</u>
<u>Blended Education</u>		<u>Education which includes both traditional as well Distance Education courses and learning resources and methods.</u>
<u>Distance Education</u>	<u>DE</u>	<u>Distance Education (DE) is the education of students who may not always be physically present at a school. A number of other terms are also used (distributed learning, e-learning, online learning, virtual classroom etc.). DE includes online courses and massive open online courses (MOOCs).</u>
<u>Formal (structured) Distance Education</u>		<u>Is a well-structured distance education and learning program with clear curriculum content and objectives in a well-resourced robust learning environment and active 2-way communication between the student and the instructor. Student evaluations are done with the same scrutiny as CEAB programs.</u>
<u>Massive open online courses</u>	<u>MOOCs</u>	<u>Massive Open Online Courses (MOOCs) are free online courses available for anyone to enroll, thus providing an affordable and flexible way to learn new skills..</u>
<u>On-line Delivery</u>		<u>This is a “one-way streaming” procedure for the electronic distribution of course material (notes; references; assignments; laboratory notes; submission of assignments; answers to assignments...)</u>
<u>Virtual (Online) Laboratories</u>		<u>Are facilities that can be accessed through the Internet, allowing students and educators to carry out experiments from anywhere at any time.</u>

8.6 Graduates from Distance Education Programs

Based on the information available from Engineers Canada on distance education up until 2014, the ARC passed a motion in January 17, 2014, that “Applicants who acquired their bachelor of engineering degrees or other academic credentials by correspondence, through distance education, or from online learning, do not meet the recognized academic requirements to apply for the P. Eng. Licence” , citing not meeting the accreditation criteria as the main reason. ...

In view of the evolution of Distance education and the increasing number of engineering programs, worldwide and in Canada that offer at least some of the curriculum via online methods, ARC passed the following motion (On 24 August 2018): “The ARC rescind the previous motion regarding Distance Education and assess the applicants that have Distance Education noted on their transcripts or diploma on a case-by-case basis”.

The assessment guidelines for applications from applicants that received their academic degrees from a Distance education or a “blended” engineering program are detailed in sections: A.4.3 Assessment Guidelines, A.4.5 and Assigning Examination Programs.

A.1 Terms of Reference of the Academic Requirements Committee

A.4.3 Assessment Guidelines:

The ARC’s peer review assessment tries to establish if an applicant has the knowledge base similar to a Canadian engineering graduate from a CEAB accredited program. The CEAB accreditation guarantees that EVERY graduate has met the "minimum path"(i.e. minimum requirements for a program with electives) of the program upon graduation (Reg. 941, s. 33.(1) 1.ii).

The metrics attached to a review are based on two major criteria:

Breadth: is the overall body of knowledge, skills and methodology needed to have sufficient competence to perform engineering work in a particular recognized discipline. It includes the required technical, economic, social and communication content. Breadth is generally defined as the sufficiency of the fundamental engineering principles and professional engineering subjects covered. The breadth of the covered topics is evaluated against the PEO Syllabi.

Depth: Engineering has its roots in mathematics and basic sciences, but carries knowledge further toward creative applications needing derivation and application of theory. The depth of the academic requirement must be seen as the integration of mathematics, basic sciences, engineering sciences and complementary studies in developing elements, systems and processes to meet specific needs. It must include creative, iterative and often open-ended processes subject to constraints. These constraints may relate to economic, health, safety, environmental, social or other pertinent interdisciplinary factors. The depth is evaluated against the CEAB criteria for program evaluation.

The guidelines of the ARC process for assessing a program as being equivalent to a Bachelor of Engineering degree program from a transcript point of view are as follows:

- We expect to find university level courses covering mathematics adequately (calculus, differential equations and probabilities and statistics) for all programs (from Basics Studies list).
- We expect to find an adequate coverage of basic physics phenomena such as statics and dynamics, properties of materials and general thermal principles (from Basic Studies list).

- We also expect to find discipline specific fundamental knowledge courses such as electromagnetic for Electrical Engineering, thermodynamics for Mechanical Engineering etc... (from Basics Studies list)
- We expect to find at least 7 topics from the PEO board sheets (may be combined from multidiscipline areas) from the Professionals A list covered at university level in depth.
- We expect to find adequate optional topics (Professionals B list from the board sheets) to be covered in advanced courses.
- We expect to find coverage of at least basic engineering economics in Complementary Studies (CS) list.
- We expect to find a formal capstone project with a formal individual engineering report (in CS list).
- We expect to find a comprehensive engineering program containing also a reasonable coverage and authentic assessment of the professional engineering subjects: Use of Engineering Tools, Equipment and Laboratory experience; Professional skills, e.g.: Individual and Collaborative Problem Solving (CPS), Project Management, Communication Skills, Capstone Project; Engineering Economics and risk analysis (Statistics / Probability); and Impact on Society & the Environment, Health & Safety (CS)

A.4.5 Assigning Examination Programs

1. If the program looks like to be equivalent to a Bachelor of Engineering degree program
 - NO gaps identified: The applicant is assigned a CONFIRMATORY Examination Program.
 - No more than 3 gaps identified (or courses with very low grades): The applicant is assigned a DIRECTED CONFIRMATORY Examination Program.
 - The program may direct the applicant to write no **more than two specific technical examinations** from the Professional Groups A and/or B as well as prescribe to write **one of the CS examinations** (or to exclude the selection of examinations to address specific deficiencies).
2. If the program looks like to be a Bachelor of Engineering degree program, but there is doubt as to the depth being at the University degree level:
 - NO gaps identified: The applicant is assigned a SPECIAL CONFIRMATORY Examination Program:
 - No more than 3 gaps identified (or courses with very low grades): The applicant is assigned a SPECIAL DIRECTED CONFIRMATORY Examination Program:
 - The program may direct the applicant to write no **more than three specific technical examinations** from the Professional Groups A and/or B as well as prescribe to write **one of the CS examinations** (or to exclude the selection of examinations to address specific deficiencies).

3. If the program does not look like to be equivalent to a Bachelor of Engineering degree program:

A SPECIFIC Examination Program is assigned. It may contain Basic Studies examinations (to be written first) and usually several Professional A examinations, usually some Professional B level options from a limited list, and one or more Complementary Studies examinations from the CS list. If the degree is listed in the database the program assigned should be commensurate with the database reporting unless specifically justified.

Note that usually the program is reassessed after the successful passing of the Basic Studies examinations.

Note: Professional B level examinations, being options, should not be assigned where the transcripts show that those options were not taken, unless the specified Professional B level examination is to address a gap in Professional A level or Basic Studies subject .

For Distance Education:

In determining the type of the distance education program: 1) Traditional and equivalent to CEAB; 2) “Blended” Education or 3) One hundred percent on-line, the ARC will be guided primarily by the information submitted by the applicant. In addition, the ARC and/or PEO staff may verify the information from reputable Distance Education Portals, and other available on-line information about the program. The ARC may also request additional information or even interview the applicant in case of ambiguity, as necessary.

4. If the program is substantially (more than 80%) distance education with no evidence of a robust learning environment, or authentic assessments, a SPECIFIC Examination Program is assigned. It may contain Basic Studies examinations (to be written first) and usually several Professional A examinations, usually some Professional B level options from a limited list, and as many Complementary Studies examinations from the CS list as necessary, as well as an Engineering Report.

5. If the program is “Blended” (40% < DE < 80%) with little evidence of a structured learning environment, or authentic assessments, all examination options should be considered including a SPECIFIC Examination Program. It may contain Basic Studies examinations (to be written first) and usually several Professional A examinations, usually some Professional B level options from a limited list, and more than one Complementary Studies examinations from the CS list, as well as an Engineering Report.

6. If the program is “Blended” (40% < DE < 80%) with a robust learning environment and adequate authentic assessments

- **With identified gaps: The applicant is assigned a DIRECTED CONFIRMATORY Examination Program.**
- **NO gaps identified: The applicant is evaluated as per first article of items 1 above.**