Benchmarking the Canadian Engineering Accreditation System

Consultant Report

Prepared for: Benchmarking Task Force of Engineers Canada
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Executive Summary

In support of Engineers Canada's strategic priority to *Investigate and Validate the Purpose and Scope of Accreditation*, this report provides a benchmarking of the accreditation systems of comparator jurisdictions (Australia, France, Malaysia, and Poland,) and comparator regulated professions within Canada (Information Technology and Processing Professionals, Nursing, and Social Work).

Through an iterative process, 41 metrics were identified by the Benchmarking Task Force. The metrics encompass accreditation systems processes, measures, impact on graduate's licensure pathway, international agreements, roles and responsibilities, strategies for consistency, and quality consistency and evaluation.

To identify and learn from a range of accreditation approaches relevant to engineering education accreditation in Canada, the selection process sought variation within the bounds of minimum requirements to allow for appropriate comparisons. For minimum requirements, all jurisdictions selected had:

- a comparable educational system;
- a comparable degree length; and
- a quality assurance system.

All regulated professions selected had:

- accreditation at a comparable bachelor's level;
- students typically entering directly from high school (or Quebec equivalent); and
- a national accrediting framework.

Variation in accreditation criteria, processes, and implications for licensure requirements was sought. All selected jurisdictions and professions, including engineering education accreditation in Canada, were benchmarked according to the 41 metrics.

All eight accreditation systems, including the 5 engineering jurisdictions and 3 other professions, are outcome-based accreditation systems. Outcome-based accreditation systems include an outcomes-based assessment alongside input-based evaluations of learning environment. Some include input-based evaluation of activities, such as experiential learning, context, or number of hours on specific topic areas. The process of outcome-based accreditation systems, typically and in these comparator contexts, rely on self-evaluations of learning environments and the process and results of measures of student outcomes. The self-evaluations are reviewed by a national body through a process that includes a visit by a team external to the education institution, a report and a decision-making body (e.g., a board or commission) that reviews the report and makes recommendations on accreditation. Regarding process, there was variation in the membership of review teams, and the approval or review function of department or committee within the national body (e.g., Canadian accreditation board). There was also variation in most criteria, though facilities requirements were similar.

Exclusive rights - Only Canada and Malaysia have country-wide exclusive right to practice and reserved title for professional engineers. Australia has growing statutory registration at the state/territory level,

but it is not yet nationally consistent. Among the comparator professions, nursing has both exclusive right to practice and reserved title in all provinces and one territory. Social work has exclusive right to practice in Ontario and reserved title for all provinces and one territory but not Nunavut and Yukon where there is no social work academic program. Information technology and processing professionals have neither right to practice nor right to title.

Distinctions- Across benchmarked jurisdictions and professions, Canadian engineering education accreditation is the sole system that utilizes a minimum path requirement and includes detailed time-based input counts beyond the requirement of overall degree length. Canadian engineering education accreditation is also the only system without some form of experiential learning requirement; IT has a lighter requirement while most have a substantial requirement for experiential learning. Malaysia and IT alone have discipline-specific content criteria. Canada also has less required industry involvement.

Variations within criteria present - Although many of the metrics were present across comparators, the level of detail and the specific criteria varied across accreditation systems, particularly for curriculum content requirements, faculty qualifications, industry involvement, and learning environment criteria other than facilities. For some comparators, accreditation lightened the requirements on graduates who pursue licensure. The purpose of accreditation spanned from advocacy to assessment of quality with a frequent focus on reassuring the public. Subject matter experts on visiting teams could be educators, representatives from industry, or regulators. Several accreditation systems seek to enhance consistency through having individuals who attend multiple visits a year (paid or commissionaires) as well as training.

Additional highlights - Three highlights were noted: (1) Poland (KAUT's Standards) specifies two levels of criteria and to receive full-term accreditation a program must demonstrate all of the "basic" criteria plus 60% of the "additional" criteria, where "meeting of any of these attributes is a testament to the higher quality of education". (2) Regarding Indigenization, and EDI (equity, diversity, and inclusion) criteria, the only engineering education accreditation system to mention either was Australia's standards for faculty numbers (gender parity) and qualifications (Staff awareness of gender and cross-cultural issues, inclusive teaching approach). In Canada, social work and nursing included criteria with a focus on Indigenization and EDI. (3) Descriptions of what qualifies as experiential learning in engineering were notably provided in Australia and Malaysia.

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Introduction

Purpose

In support of Engineers Canada's strategic priority to *Investigate and Validate the Purpose and Scope of Accreditation*, this research report provides the Benchmarking Task Force (Task Force) and Engineers Canada with a benchmarking analysis of the engineering education accreditation systems of four comparator countries (jurisdictions) and the accreditation systems of three other regulated professions within Canada. The development of metrics and benchmarking aims to deepen understanding of patterns, possibilities, and the range of accreditation criteria, processes, purpose, and the relationship between accreditation and regulation. This understanding contributes to the desired outcome that all stakeholders of the accreditation system have visibility of the modes of accreditation in use nationally and internationally.

The Benchmarking Task Force

The Task Force consisted of engineering educators and regulators, who all have had experience with the Canadian accreditation system. Starting in November 2021, the Task Force provided guidance to Engineers Canada staff and project consultants on the scope of the benchmarking report, reviewed and provided feedback on the final draft report. Following this research report, they will co-write the Task Force report, review the final presentation, and provide a report to the steering committee regarding the key considerations from the research. Members of the Task Force include:

- Wayne MacQuarrie (Chair of Task Force)
- Jane Goodyer
- Rosamund Hyde
- Russ Kinghorn
- Chris Roney

Through four Task Force meetings, the benchmarking comparator criteria and metrics were developed, refined and approved based on the range of perspectives and insights of this Task Force. The consultants then completed the benchmarking comparisons, and draft research report that the Task Force then reviewed and provided feedback on, prior to drafting the Task force report.

Acronyms

- BEM - Board of Engineers Malaysia
- CASN - Canadian Association of Schools of Nursing
- CAWSE - Canadian Association for Social Work Education
- CCRNR - Canadian Council of Registered Nurse Regulators

- CIPS - Canadian Information Processing Society
- CTI - Commission des Titres d'Ingénieur (France)
- EAC - Engineering Accreditation Council (Malaysia)
- ECTS - European Credit Transfer and Accumulation System
- EDI - Equity Diversity and Inclusion
- ENAEE - European Network for Accreditation of Engineering Education
- ENQA - European Association for Quality Assurance in Higher Education
- IHL - Institutions of Higher Learning (Malaysia)
- IT - Informational Technology and Processing Professionals
- JD - Juris Doctor
- KAUT - Komisja Akredytacyjna Uczelni Technicznych (Accreditation Commission of Universities of Technology, Poland)
- OIQ - l'Ordre des Ingénieurs du Quebec
- PharmD - Doctor of Pharmacy
- SLT - Student Learning Time (Malaysia)
- Task Force - Benchmarking Task Force

In addition, Washington Accord refers to "a multi-lateral agreement between bodies responsible for accreditation or recognition of tertiary-level engineering qualifications within their jurisdictions who have chosen to work collectively to assist the mobility of professional engineer" (IE Alliance).

Selection of Comparators

To identify and learn from existing practices that both represent a range of accreditation approaches and that are relevant to engineering education accreditation in Canada, the selection process sought maximum variation within the bounds of minimum requirements that allow for appropriate comparisons. Specific minimum requirements and expectations for variation were identified through discussions with the Benchmarking Task Force (Task Force).

Selection Criteria

The selection criteria included both minimum requirements and dimensions for seeking maximum variation.

Minimum Requirements for Comparability

To be selected, a jurisdiction must have:

- a comparable educational system;
- a comparable degree length; and
- a quality assurance system.

All selected regulated professions must have:

- accreditation at a comparable bachelor's level;
- students typically entering directly from high school (or Quebec equivalent); and
- a national accrediting framework.

With the rise in doctoral programs replacing undergraduate degree programs (e.g. law's JD, and pharmacy's PharmD), admission requiring undergraduate credits (e.g. medicine and veterinary), and the absence of national standards (e.g. teachers only have province-specific standards), several well-known Canadian professions were excluded. A final consideration was for at least some comparator profession to be regulated with exclusive right to practice or reserved title or both.

With these minimum requirements, an initial environmental scan was conducted with the assistance of Engineers Canada to identify 36 potential jurisdictions with engineering education accreditation systems and 10 potential professions regulated in Canada.

Maximum Variation for Insight

Within the bounds of the minimum requirements, maximum variation (heterogeneity) was sought in accreditation criteria, processes, and implications for licensure requirements across both sets of comparators. This sampling approach involves "purposefully picking a wide range of cases to get variation on dimensions of interest; two purposes: (1) to document diversity and (2) to identify important common patterns that are common across the diversity (cut through the noise of variation) on dimensions of interest" (Patton, 2015, p. 267).

For jurisdictions, the dimensions of interest included the selection of both Washington Accord signatory and non-Washington Accord signatory jurisdictions, and the inclusion of at least one jurisdiction from the southern hemisphere.

For professions, the dimensions of interest included seeking variation on the impact of being a graduate of an accredited program on the licensure process (e.g., technical or ethical/professional exam exemptions), and the selection of at least one accreditation system that has been created recently.

Selection of Specific Comparators

For comparator jurisdictions, Australia was selected based on its divergence as an accreditation system focused on outcome assessment while still being a full match to Canada across the selection criteria. The southern selections were Australia and Malaysia. Non-Washington Accord signatory selection of France was selected based on the existence of agreements with *l'Ordre des Ingénieurs du Quebec* (OIQ). Poland was the additional non-Washington Accord signatory selection, based on public availability of information about their system. The full set of potential and selected jurisdiction comparators are in Appendix 1.

In professions, nursing and social work met the minimum criteria including having both exclusive right to practice or reserved title. Nursing and social work were selected as comparators; social work is also a newer accreditation system. Informational Technology and Processing Professionals (IT) was also selected based on the graduated licensure approach (although the profession does not have an exclusive right to practice in Canada) and the fact that it is a new accreditation system. The full set of potential and selected jurisdiction comparators are in Appendix 2.

Table 1. Selected Engineering Jurisdiction Comparators

	Canada	Australia	France	Malaysia	Poland
Relevant Accreditation International Agreements	Washington Accord	Washington accord	European Association for Quality Assurance in Higher Education (ENQA), European Network for Accreditation of Engineering Education (ENAEE)	Washington Accord	ENAEE
Population (estimates)	38 million	26 million	67 million	33 million	38 million
Hemisphere	Northern	Southern	Northern	Southern	Northern
Registration	Required	Required in some states	None	Required.	Required for civil engineering only
Licensure	Required	Required in some states	Required for more demanding projects	None	None
Right to Title	Yes, legislation	In 3 states	Legislation for "graduate engineers" title (Master degree level); Engineer not regulated	Yes, legislation	For civil engineering only
Right to Practice	Yes, legislation	In 3 states	Limited in project type. More advanced "State Engineers" can do any project.	Yes, legislation	For civil engineering only

Table 2. Selected Canadian Profession Comparators

	Engineering	IT	Nursing	Social Work
Relevant Accreditation International Agreements	Washington Accord	Seoul Accord - accredited programs covered by the Seoul Accord recognized by CIPS as being equivalent to their accredited programs	Mutual Recognition Agreement (MRA) between CASN and CCNE (US) for degree recognition for entry into graduate-level education only	Memoranda of Understanding (MOUs) with the National Indigenous Accreditation Board (NIAB) and CSWE (US) that agree to the mutual recognition and honouring of accredited degrees
Registration	Required	Voluntary	Required	Required for all except Yukon and Nunavut
Licensure	Required	Voluntary	Required	Only required in Ontario
Right to Title	Yes, legislation	Legislated in British Columbia, Alberta, Saskatchewan, Ontario, New Brunswick and Nova Scotia	Yes, legislation	Yes, legislation. All except Yukon and North West Territories
Right to Practice	Yes, legislation	No	Yes, legislation	Yes, legislation. All except Yukon and North West Territories

Metrics

Through discussions, the Task Force identified 41 key benchmarking metrics related to accreditation criteria, processes, and quality to serve as the basis for comparison between the jurisdictions and professions. The initial set was reviewed and revised for clarity, applied to a sample of two countries, and agreed upon by the Task Force.

The final list of 41 metrics applied in benchmarking and the analysis are listed in Table 3.

Table 3. Benchmarking metrics

Category	Benchmarking Metrics
1. Accreditation process & measures	1.1. Accreditation process components ● 1.1.1. Self-evaluation ● 1.1.2. Visit 1.2. Time-based input ● 1.2.1. Overall degree length (what constitutes a degree) ● 1.2.2. Specific counts of hours for each course based on type of instruction ● 1.2.3. Specific counts of hours for specific content areas 1.3. Delivery and learning spaces input ● 1.3.1. Measures of interpersonal climate ● 1.3.2. Facilities ● 1.3.3. Faculty qualifications (competence requirements) ● 1.3.4. Number of faculty & faculty duties ● 1.3.5. Licensure requirement for faculty ● 1.3.6. Financial ● 1.3.7. Curriculum oversight within institution / school / program ● 1.3.8. List of data tables ● 1.3.9. Leadership & authority ○ 1.3.9.1. Professional/academic qualifications of Dean or unit leadership ○ 1.3.9.2. Formal curriculum committee or equivalent faculty body with responsibility for program decision-making ○ 1.3.9.3. Alignment with institutional strategy and mission ○ 1.3.9.4. Functional effectiveness of committees and leadership 1.4. Outcomes (graduate attributes; entry-level competencies) 1.5. Discipline-specific program quality ● 1.5.1. Discipline-specific content in self-evaluation criteria ● 1.5.2. Discipline-specific perspective on the visiting team 1.6. Involvement of industry in programs ● 1.6.1. Industry as stakeholders of accreditation council/boards ● 1.6.2. Industry as members of accreditation visits ● 1.6.3. Program requirement for industry advisory panel to inform continual improvement ● 1.6.4. Industry completes direct review of programs ● 1.6.5. Stakeholder engagement that can (but is not required to) include industry 1.7. Professional experience (experiential learning) requirements ● 1.7.1. Mandatory co-op, internship, practicum or work-integrated learning experience ○ 1.7.1.1 Mandatory assessment/standards for co-op, internship, practicum or work-integrated learning experience ● 1.7.2. Culminating project or thesis (i.e., capstone) ○ 1.7.2.1. Indicate if required to be related to professional experience or “industry-related”
2. How does accreditation impact graduates’	2.1. Licensure context ● 2.1.1 Exclusive right to practice? 2.2. What is the benefit of accreditation for graduates in the licensure context? ● 2.2.1. Exams, portfolios, other?

pathways to licensure?	• 2.2.2. Are there exemptions for graduates of accredited programs?
3. Roles and Responsibilities	3.1. What are the roles of specific actors within accreditation? (Including who makes the decision, who writes the report) 3.1.1. Who makes the accreditation decision? Who writes the report? 3.2. Who are the stated stakeholders? 3.3. Does the accrediting body accredit other levels (e.g., technicians; technologists)?
4. Quality Consistency and Evaluation	4.1. Is there a public meta-evaluation of the system? What was evaluated? 4.2. Mention of or methods for ensuring consistency in quality assurance across institutions 4.3. Survey or data of public confidence in a jurisdiction / profession
5. Purpose of accreditation	5.1. Stated purpose of accreditation

Criteria metrics were clearly described or clearly absent (e.g., minimum path) in accreditation frameworks and standards. All standards reviewed are included in the folder labeled Appendix 4. In addition, clarification was sought for some regulatory contexts and higher education contexts. Conversations with Australia confirmed higher education context with oversight on the length of a four-year degree programs based on government requirements, and clarified the regulatory contexts are regional and changing since their May 2020 document. The conversation with the nursing accreditation body confirmed regulatory context, with a similar discussion with the undergraduate director of Social Work at the University of Ottawa confirming their regulatory context. Regulatory contexts and higher education contexts were located for other bodies. Where conversations took place, confirmation occurred of the absence of content criteria. In no instances did understanding from the documents differ from the conversations. Terminology, and accrediting and regulatory bodies and jurisdictions were clarified.

Findings

All selected comparator jurisdictions and professions, along with engineering education accreditation in Canada, were benchmarked according to the 41 metrics. Details about the presence, absence, and variation of specific criteria, processes, and context were documented for each accreditation system. The variations for each metric are summarized in the jurisdictions and professions sections, and provided in full cited detail in the Appendix 3 spreadsheets. Table 4 concisely represents the overall benchmarking of engineering education accreditation in Canada to comparator jurisdictions and professions. The table indicates if the specific criteria exist within the accreditation systems (medium shaded and blank; screen readers will read the word present); where it is comparable (cells merged with similar); and where its existence varied within jurisdictions or within professions (notes).

Table 4. Overall Benchmarking Table

Legend:
Yes, similar across all - darker shading and the phrase "similar across all".
Yes, with variation in details across comparators - shaded (details in later tables);
Only present in some comparators - shaded with a note in italics specifying which ones;
No - unshaded with text such as "not a criterion" or a note about difference.

Metric	Engineering in Canada	Jurisdictions	Professions
1.1.1., 1.1.2. Self-evaluation, Visit	similar across all		
1.2.1. Overall degree length (what constitutes a degree)	Present in engineering in Canada	Present in all jurisdictions	Present in all professions
1.2.2. Specific counts of hours for each course based on type of instruction	AU counts; labs and lectures distinct	Not a criterion	Not a criterion
1.2.3. Specific counts of hours for specific content areas	Present in engineering in Canada	*Australia and Poland (Additional Attributes / Higher Quality) only*	*IT & Social Work only*
1.3.1. Measures of interpersonal climate	Present in engineering in Canada	Present in all jurisdictions	Present in all professions
1.3.2. Facilities	similar across all		
1.3.3. Faculty qualifications (competence requirements)	Present in engineering in Canada	Present in all jurisdictions	Present in all professions
1.3.4 Number of faculty & faculty duties	Present in engineering in Canada	Present in all jurisdictions	Present in all professions
1.3.5. Licensure requirement for faculty	Present in engineering in Canada	Present in all jurisdictions	*Nursing academic head and clinical practicum supervisors only*
1.3.6. Financial	Present in engineering in Canada	*All but Poland*	Present in all professions
1.3.7. Curriculum oversight within institution/school/ program	Present in engineering in Canada	Present in all jurisdictions	Present in all professions
1.3.8. List of data tables	Present in engineering in Canada	Present in all jurisdictions	*IT & Nursing only*
1.3.9.1. Professional/academic qualifications of Dean or unit leadership	Present in engineering in Canada	*France only*	*Nursing only*
1.3.9.2. Formal curriculum committee or equivalent faculty body with responsibility for program decision-making	Present in engineering in Canada	Present in all jurisdictions	*Nursing & Social Work only*
1.3.9.3. Alignment with institutional strategy and mission	Not a criterion	*All but France*	Not a criterion
1.3.9.4. Functional effectiveness of committees and leadership	Present in engineering in Canada	*All but France*	Present in all professions
1.4. Outcomes (graduate attributes; entry-level competencies)	Present in engineering in Canada	Present in all jurisdictions	Present in all professions
1.5.1. Discipline-specific content in self-evaluation criteria	Not a criterion	*Malaysia only*	*IT only*
1.5.2. Discipline-specific perspective on the visiting team	Not a criterion	*Australia and Malaysia only*	Not a criterion
1.6.1. Industry as stakeholders of accreditation council/boards	Present in engineering in Canada	Present in all jurisdictions	*IT only*
1.6.2. Industry as members of accreditation visits	Present in engineering in Canada	Present in all jurisdictions	Not a criterion
1.6.3. Program requirement for industry advisory panel to inform continual improvement	Not a criterion	*All but Poland*	Not a criterion
1.6.4. Industry completes direct review of programs	Not a criterion	*France and Poland only*	Not a criterion

Metric	Engineering in Canada	Jurisdictions	Professions
1.6.5. Stakeholder engagement that can (but is not required to) include industry	Present in engineering in Canada	*All but Australia*	*All, varying subgroups: Employers (IT),placement services (Nursing), practitioners and community (Social Work)*
1.7.1. Mandatory co-op, internship, practicum or work-integrated learning experience	Not a criterion	*All but Australia*	*Nursing & Social Work only*
1.7.1.1. Mandatory assessment/standards for co-op, internship, practicum or work-integrated learning experience	Not a criterion	Present in all jurisdictions	*Nursing & Social Work only*
1.7.2. Culminating project or thesis (i.e., capstone)	Present in engineering in Canada: Significant design experience	*All but France*	*IT only (project, can do an internship instead)*
1.7.2.1. Indicate if project or thesis is required to be related to professional experience or "industry-related"	Not a criterion	*France and Malaysia only*	Not a criterion
2.1. Licensure context	Right to practice	*Right to practice in Malaysia. Statutory registration emerging in Australia*	*Right to practice for nursing nation-wide, and for social work in Ontario*
2.1.1 Exclusive right to practice?	Present in engineering in Canada	*Specific states in Australia; civil engineering in Poland*	*Nursing (all provinces and territories), Social Work (Ontario only)*
2.2. What is the benefit of accreditation for graduates in the licensure context?	Exempt from technical exams	*Present in all jurisdictions except France (where it is not applicable)*	*All differ (See Professions section)*
2.2.1. Exams, portfolios, other?	Present in engineering in Canada	*Present in all jurisdictions except France (where it is not applicable) and Poland*	*All differ (See Professions section)*
2.2.2. Are there exemptions for graduates of accredited programs?	Yes, exempt from technical exams	*All but France and Poland (where it is not applicable)*	*All differ (See Professions section)*

Table 4 summarizes general patterns across comparator types for Metrics 1 and 2 across Engineering accreditation in Canada, all engineering jurisdiction comparators, and all Canadian profession comparators. In the next section, tables summarize jurisdiction comparators with paragraphs describing Metric 2. *How does accreditation impact graduates' pathways to licensure?* also described in paragraph form, Metrics 3. *Roles and Responsibilities*, 4. *Quality Consistency and Evaluation*, and 5. *Purpose*, due to high variability across comparators. Professions are similarly reported, with Metrics 1 and 2 in table format and the remainder in paragraphs.

Similar Accreditation Process of Self-Evaluation plus Visits (metrics 1.1.1., 1.1.2.)

All eight accreditation systems, including the five engineering and three other professions, are outcome-based accreditation systems. Outcome-based accreditation systems include an outcome-based assessment alongside input-based evaluations of the learning environment. Some include input-based evaluation of activities, such as experiential learning, context, or number of hours on specific topic

areas. The process of outcome-based accreditation systems, typically and in these comparator contexts, rely on self-evaluations of learning environments and the process and results of measures of student outcomes. The self-evaluations are reviewed by a national body through a process that includes a visit by a team external to the institution, a report and a decision-making body (e.g., a board or commission) that reviews the report and makes recommendations on accreditation status.

In the systems reviewed, variation was noted in specific criteria such as experiential learning, inclusion of time-based inputs criteria, and in the membership of review teams. The visiting team (also called audit or evaluation panel) had variation in team composition and size, specifically:

- Presence of regulators or industry exist in some but not all
- Logistical support noted for some accrediting bodies (Canada, France, Australia)
- Visit managers (paid employee or contract) that go on 2-3 visits a year and are often retired subject matter experts and past evaluation panel members (Australia)
- Discipline/subject matter experts are on all teams, but their role in the profession varied, as social work, nursing had educators but no industry or regulators on teams as subject matter experts.

Jurisdictions

The detailed comparison table of the accreditation systems of engineering jurisdictions with quotes and linked sources is available in Appendix 3 (Excel Sheet 3b).

Variation in Time-based Input Criteria (metrics 1.2.1. - 1.2.3.)

Table 5. Jurisdictional Comparison of Time-based Input Criteria (metrics 1.2.1. - 1.2.3.)

Legend: No - unshaded, not a criterion; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	Canada	Australia	France	Malaysia	Poland
1.2.1. Overall degree length (what constitutes a degree)	The entire program must include a minimum of 1,850 AUs.	Overall length of 4 years (specified by national Department of Education).	5 years total - 2 years prep (120 ECTS credits), 3 years engineering (180 ECTS credits).	4 years (135 SLT Credits).	At least 3 years (180 ECTS credits).
1.2.2. Specific counts of hours for each course based on type of instruction	Detailed counting, separates AU counts for labs and lectures	Not a criterion	Not a criterion	Not a criterion	Not a criterion
1.2.3. Specific counts of hours for specific content areas	Minimum AU counts for each curriculum component (minimum path)	General proportions of the program (10 - 40%) for each of knowledge, design, specialization, management, ethics, electives	Not a criterion	Not a criterion	Additional attributes (Higher Quality) includes minimum credit count for “basic subjects” (mathematics, physics, computer science, chemistry, biology, etc.); and a library course

Variation in Delivery and Learning Spaces Input (metrics 1.3.1. - 1.3.9.)

Table 6. Jurisdictional Comparison of Delivery and Learning Spaces Input Criteria (metrics 1.3.1. - 1.3.8.)

Legend: No - unshaded, not a criterion; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	Canada	Australia	France	Malaysia	Poland
1.3.1. Measures of interpersonal climate	Quality, morale, and commitment of students, faculty, support staff and administration	With a focus on EDI including "Staff awareness of gender and cross-cultural issues, inclusive teaching approach"	Yes, schools are responsible for the social environment for students and staff, as well as supporting student life and activities	Environment conducive to ensure that students are enthusiastic and motivated. Students not overburdened with workload. Co-curricular to develop character.	Conditions for active participation in student cultural life, including for students with disabilities.
1.3.2. Facilities	Quality, suitability, accessibility of labs, library, computing facilities	Appropriate experimental and project-based facilities; meet needs of students (including those with a disability)	Labs (own or partner) Teaching space	Adequate teaching and learning facilities, including classrooms, study areas, computer / IT systems, labs, workshops, and experimental facilities.	Adequate infrastructure, including classrooms, labs, workshops, student housing, internet access, and library access
1.3.3. Faculty qualifications (competence requirements)	High level of expertise and competence with factors including education; teaching, research or engineering practice, communication, participation in engineering societies and positive attitude towards licensure.	"Appropriate depth, mix and distribution of qualifications, experience and engineering practice exposure, scholarship and professional standing"	Teacher-researchers must hold a doctorate, devote at least 30% of time to research and produce on average at least 1 scientific publication every 2 years.	All academic staff teaching engineering subjects must be registered with the regulator (not necessarily as PEng). Competence factors include education, diversity of background, engineering or teaching experience, "enthusiasm for developing more effective programmes", communication, scholarship, participation in professional societies and licensure.	Detailed criteria: "At least 30% of lectures (number of subjects) from core and field-related subject groups are delivered by staff who have the academic title, post-doctoral degree… or experts" with experts defined as those with experience in at least one of the fields of teaching (didactic), professional practice, design (e.g., patents), or branch-related distinctions.
1.3.4. Number of faculty & faculty duties	Sufficient number of full-time faculty, sufficient experience, and balance of duties	Appropriate student/staff ratios. Effective workload policies and practices.	Sufficient number of permanent teachers, teacher-researchers, admin / technical staff.	The full-time equivalent academic staff to student ratio shall ideally be 1:20 or better. Minimum 8 faculty per discipline.	Minimum staff requirement as set by law. Additional (higher quality) criteria met if no more than 15 students per lab)

Metric	Canada	Australia	France	Malaysia	Poland
1.3.5. Licensure requirement for faculty	A portion of engineering science and/or engineering design is expected to be delivered by faculty members holding ,or progressing toward, professional engineering licensure.	Not a criterion for accreditation. Australian government requires teaching staff to have a qualification one level higher than what they are teaching. Licensure not required.	Not a criterion	"minimum of 3 full-time Professional Engineers registered with the BEM [regulator]. Where >160 students, at least 30% of the actively teaching engineering academic staff shall be registered"	Not a criterion
1.3.6. Financial	Sufficient for staff recruitment, retention and training; acquiring and maintaining infrastructure and equipment.	Appropriate resources for program delivery, sound business planning for current and proposed commitments, capacity to deliver	Approval of school budgets, average costs taken into account, financial forecasting for new programs or sites	Adequate to assure overall quality and program continuity: sufficient financial resources to acquire, maintain and operate appropriate facilities.	Not a criterion
1.3.7. Curriculum oversight within institution / school / program	Required continual improvement process & actions. Curriculum changes overseen by a formally structured curriculum committee whose majority is licensed.	Quality systems criteria including engagement with students and external stakeholders, continual improvement and benchmarking	Quality system (policy, management tools); process mapping; monitoring systems and indicators	Continual quality improvement processes involving all academic staff and including review of program outcomes, course outcomes, and performance assessment	Clearly-defined decision-making processes; internal system of quality assurance focusing on assessment of teaching materials, review of student surveys, class inspections, achievement of outcomes
1.3.8. List of data tables	10 auto-filled and 3 manual entry tables	Data checklist and templates, includes forms as well as tables.	5 tables	16 sample tables	Not listed

Table 7. Jurisdictional Comparison of Leadership and Authority (metrics 1.3.9.1 - 1.3.9.4.)

Legend: No - unshaded, not a criterion; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	Canada	Australia	France	Malaysia	Poland
1.3.9.1. Professional / academic qualifications of Dean or unit leadership	Deans and program heads expected to be licensed to practice in Canada.	Not a criterion	Ph.D required.	Not a criterion	Not a criterion
1.3.9.2. Formal curriculum committee or equivalent faculty body with responsibility for program decision-making	Faculty Council has "clear, documented authority and responsibility for the engineering program". Curriculum changes overseen by a formal curriculum committee.	Formally constituted committee structures and mechanisms for program review and approval.	Requirement for Development Councils for each course.	All academic staff involved with regular curriculum and content review.	Clearly defined structure for implementing and documenting education quality assurance.
1.3.9.3. Alignment with institutional strategy and mission	Not a criterion	Alignment of organization to deliver the program through long-term commitment and strategic management.	Not a criterion	Expectation for engineering education to be "reflected in the IHL's vision and mission statements and strategic plans."	Requirement for unit's strategy to be "consistent with the strategy and mission of the parent university."
1.3.9.4. Functional effectiveness of committees and leadership	Expectation for "suitable committee and reporting structures" to be in place.	"Effective program teams, with effective team leadership" as evidence for academic leadership.	Not a criterion	"Constructive leadership" and "adequate policies" expected as a reflection of institutional support.	Expectation for a "smoothly functioning dean's office".

Variation in Outcomes, Discipline-specific, Industry Involvement, and Professional Experience (experiential learning) (metrics 1.4. - 1.7.)

Table 8. Jurisdictional Comparison of Outcomes, Discipline-specific, Industry Involvement, and Experiential Learning Criteria (metrics 1.4. - 1.7.)

Legend: No - unshaded, not a criteria; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	Canada	Australia	France	Malaysia	Poland
1.4. Outcomes (graduate attributes; entry-level competencies)	High level Graduate attributes	Detailed outcomes with example indicators + must reference within program learning outcomes the national Stage 1 Competencies for Professional Engineers	Outcome - focus on the process defining, developing and evaluating competencies.	Outcome-based Education (OBE) implementation based on 12 Program Outcomes	Outcomes with a rubric (single rating per graduate attribute equivalent)
1.5.1. Discipline-specific content in self-evaluation criteria	Not a criterion	Not a criterion	Not a criterion	Requirement to cover broad areas in respective disciplines, ensuring depth and breadth of content.	Not a criterion
1.5.2. Discipline-specific perspective on the visiting team	Not a criterion (though included as "breadth of outlook" expectation for the visiting team)	Evaluation panel (visiting team) includes "Discipline Experts" from Industry.	Not a criterion	All Evaluation Panel members must be chosen from fields related to the program.	Not a criterion
1.6.1. Industry as stakeholders of accreditation council/boards	Appointments from regulators. Ideally, ⅓ of CEAB members must be currently or formerly engaged in practice.	Yes.	The commission is composed of 32 members divided into two colleges. The academic college has 16 members chosen from among higher education personnel, the socio-economic college has 8 members chosen from among the most representative employers' organizations and 8 members chosen from among the associations and trade unions representing engineers.	At least 50% of EAC members must be from industry.	Not a criterion
1.6.2. Industry as members of accreditation visits	General visitor selected by regulators, usually not employed full-time in an academic environment.	Evaluation panels include Discipline Experts selected from Industry.	Yes, but not every time. Depends on the availability of industry members or relevance for a specific visit.	Visiting team has representatives from both industry and academia.	Employer representative.
1.6.3. Program requirement for	Not a criterion	Engagement with external	Yes. They are part of the internal quality	Requirement for industry advisory	Not a criterion

Metric	Canada	Australia	France	Malaysia	Poland
industry advisory panel to inform continual improvement		stakeholders to drive continual improvement	improvement process for each university.	panel for the purpose of planning and continual quality improvement.	
1.6.4. Industry completes direct review of programs	Not a criterion	Not a criterion	No directly but consultations/surveys/meetings with them are required	Not a criterion	"Study programmes are reviewed by employers".
1.6.5. Stakeholder engagement that can (but is not required to) include industry	Internal and external stakeholder engagement in continual improvement process required.	Not a criterion	Surveys sent to companies to have their input on graduates' training	Consultation required by education institutions with industry and other external stakeholders	Requirement for unit's strategy to take stakeholders into account, including employers and industry associations.
1.7.1. Mandatory co-op, internship, practicum or work-integrated learning experience	Not a criterion	Not a criterion	Professional practice is part of the curriculum.	Requirement for minimum 8 weeks of industrial training.	Student internships and apprenticeships required (minimum 4 weeks).
1.7.1.1 Mandatory assessment / standards for co-op, internship, practicum or work-integrated learning experience	Not a criterion	Standards provided for professional practice experiences.	Specific criteria for professional practice.	Assessment processes for industrial training required as part of quality assurance.	Requirement for educational outcomes for internships and apprenticeships to be "closely related" to field of study.
1.7.2. Culminating project or thesis (i.e., capstone)	"A significant design experience conducted under the professional responsibility of faculty licensed to practise engineering in Canada" required.	Final year design projects and theses	Not a criterion	Final year project (minimum 6 credits) and an Integrated Design Project	Thesis or equivalent engineering project
1.7.2.1. Indicate if required to be related to professional experience or "industry-related"	Not a criterion	Not a criterion	Project or thesis not required, but if it is, it must be industry-related	"The final-year project should preferably be industry related"	Not a criterion

Licensure context and the benefit of accreditation for graduates (metrics 2.1. - 2.2.2.)

In Canada, engineering licensure exists nationwide and includes an exclusive right to practice. Graduates of accredited engineering degree programs are exempt from technical exams to become an engineer-in-training and to become a professional engineer. In all provinces and territories, graduates of accredited programs still need to complete a standard national professional practice exam on law, ethics and professionalism. One province, British Columbia, has both professional engineering registration for most disciplines, and an additional specialist designation post licensure for Designated Structural Engineer for those "who meet the requirements to create and manage the design of a building's primary structural system" based on 6 years of experience. In addition, some provinces assess applicants using discipline-specific programs or competencies.

In Australia, statutory registration only existed in one of seven states/territories until recently. Following an Engineers Australia report in 2020, statutory registration has grown to three states/territories out of seven. Registration processes vary from state to state. Graduates from accredited programs are exempt from national competency assessment for engineering stage 1 competencies. For example, the Board of Professional Engineers of Queensland (BPEQ), which has regulated engineering practice in the state since 1930, requires engineers to be registered in an 'area of engineering' and they must only practice engineering in the specific area(s) they are registered in. Being registered requires: (1) Qualification - "Graduating from a recognised tertiary institute with a four-year undergraduate degree in engineering (or equivalent)."; (2) Competency - "Gained through experience working as an engineer and carrying out professional engineering services (four to five years post-graduation)."; and (3) Assessment - Qualification and competency assessed through an approved assessment entity.; and (4) application for registration - Made to BPEQ along with letter of assessment and fitness to practice declaration. Graduates from accredited programs in the appropriate area would qualify for academic qualification. Thus, the registration requirements across Canada and Queensland are similar in the grounds for registration (education and experience); Queensland also has registration for 19 specific disciplines.

In Malaysia, the exclusive right to practice and exclusive right to (reserved) title for professional engineers is legislated under section 7 of Malaysia's Registration of Engineers Act 1967 (revised 2015). Malaysia has three levels of practice, with a similar exemption for the engineer-in-training equivalent level. In Malaysia, graduates of an accredited 4-year programs are exempt from technical exams (have direct entry) into an engineer-in-training ("Graduate Engineer") level, but must write and pass a professional exam in addition to experience to become a Professional Engineer, and then must write and pass an additional exam to reach the higher level of Professional Engineer with Practising Certificate in order to own a practice and submit plans.

France has no engineering licensure process; thus, graduates can practice with no further requirements, however they are limited the types of projects they can do. "Graduate engineers" in France is a protected title and "State Engineers" can do any projects including structural. An thesis, experience and exam equivalent to a PhD is required to become a "State engineers" and is worded as "Valorisation des acquis de l'expérience (VAE)." Poland only has a single registration body for civil engineering only for

which accredited program graduates with appropriate degrees and experience can practice, so graduates can practice with no further requirements in other areas. Both France and Poland have no technical exams required, and thus no need for exemptions for graduates to enter all professional levels.

Roles and Responsibilities (metrics 3.1. - 3.3.)

In Canada, one higher-level oversight body sets the standards for accreditation (the Engineers Canada Board), while a second body implements the accreditation process and makes accreditation decisions (the CEAB); this is similar in Poland and Australia. Malaysia's council is intertwined closely with their regulator who selects their council members and provides staff; though a single body (their council) implements, makes accreditation decisions, and sets criteria. In France, the CTI sets the standards and makes the initial decision, though the final decision is made by a government ministry. All set criteria in accordance with international agreements for program evaluation. The accreditation body is typically supported by staff or a secretariat though it varies if the staff are from the regulator (Malaysia) or a separately defined unit (Australia).

In all jurisdictions, including Canada, academic programs are scheduled or request to be reviewed and their institutions/departments complete a self-evaluation. The site visit takes place, and a report is written by the visiting team or by the visiting team lead with input from the visiting team about the findings; Poland also includes a "statement of the assessment team leader and an opinion of an internal reviewer".

Accreditation site visits are conducted by visiting teams, audit teams, evaluation panels, or similarly-defined groups that are selected by the accreditation organization. Visiting teams (or equivalent) consist of individuals with specific perspectives and backgrounds. In general, there is an expectation to include both academic and non-academic perspectives on the team. France, Australia, Poland, and Malaysia specify a role for industry or employer representatives as visiting team members, while General Visitors in Canada are selected by provincial and territorial regulators and typically do not work full-time in an academic environment. France requires involvement from both academic and "socio-economic" representatives, the latter of which includes both employers and associations and trade organizations representing engineers: additionally, their accreditation body (CTI) defines four categories of experts to participate in the audit process:

- French, European or foreign experts, working in France, participating in audits in their fields of competence,
- French, European or foreign experts working abroad and participating in audits to provide an international perspective and expertise in their own fields of competence,
- French, European or foreign engineering students, to bring their vision as students,
- Occasional experts, French, European or foreign, participating in CTI activities for a short period (for rare profiles: language or country; specialty; field; for replacement needs)

The report is reviewed by a paid visiting team manager in Australia, or by the department overseeing accreditation (who approve or review at this stage) in Canada and Malaysia), while other jurisdictions do not include a review step.

The CTI is responsible for writing the report and providing an initial decision regarding accreditation while the final decision for accreditation approval rests with the Ministère de l'enseignement supérieur, de la recherche et de l'innovation in France. In Canada and all other comparator jurisdictions, the accrediting body then reviews the reports and other inputs and makes the accreditation decisions.

Accreditation bodies in this benchmarking process explicitly identify specific stakeholders, with notable variations across jurisdictions. In addition to academic institutions or bodies (such as engineering deans' councils), which are explicitly mentioned by Canada and all four comparator jurisdictions, industry or employers (or in the case of Australia, an industry-led skills council) are specified as stakeholders by all jurisdictions except Canada. Engineering regulators are identified as key stakeholders by Canada and Malaysia. Other key stakeholders include international engineering bodies such as the International Engineering Alliance by Australia, member organizations focused on promotion and member support such as the Institute of Engineers in Malaysia, and government bodies such as the Public Service Department in Malaysia.

The only accreditation body included in the benchmarking process that accredits other levels, such as technicians or technologists, is Engineers Australia which also accredits 3-year engineering technology programs and 2-year technician programs.

Quality Consistency and Evaluation (metrics 4.1. - 4.3.)

Beyond standards that are present in all jurisdictions, Engineers Australia's visiting teams include a visit manager who is an employee or contract staff person of the accrediting body who each manage 2-3 visits per year; the role is more than logistics as the visiting manager reviews the report prior to submission for approval, and looks for consistency between visits. The visit managers are typically in early retirement and have been involved in visits prior. Quality consistency is additionally ensured through a post-visit survey in Australia of visiting team members.

Canada has developed an Accountability in Accreditation Framework with seven key outcomes defining a well-functioning accreditation system. Each of these outcomes have two to six associated indicators, and each indicator has one or more associated measures.

Training exists in all accreditation systems though with limited details publicly available. At least two jurisdictions are redeveloping training for visiting team members. Engineers Australia is developing hands-on training using real samples, and Engineers Canada has plans for a training program [to] improve consistency across accreditation visits by providing volunteers and educators the information they need in a timely and repeatable way".

Regarding a public meta-evaluation, France's CTI undergoes periodic external evaluations to demonstrate that its procedures comply with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) or with the standards of relevant organizations such as:

- European Association for Quality Assurance in Higher Education (ENQA),
- European Quality Assurance Register for Higher Education (EQAR),
- European Network for the Accreditation of Engineering Education (ENAEE),
- Conseil National de l'Emploi, de la Formation et de l'Orientation Professionnelle (CNEFOP).

Poland is also externally evaluated as part of the European Network for the Accreditation of Engineering Education (ENAEE). Canada, Australia, and Malaysia are externally evaluated as part of the Washington Accord. No mention of consistency strategies was found for Malaysia. No survey or data of public confidence in any jurisdiction's accrediting body was found (4.3.).

Purpose of Accreditation (metric 5.1.)

The purpose for all jurisdictions is for engineering education accreditation to improve or ensure the quality of education, including, for most, preparing quality graduates for the profession (Australia) or ensuring knowledge of graduates for licensure (Canada and Malaysia). Assurance to potential employers (Malaysia) and the public (Malaysia, France) were explicit considerations for some. The primary stakeholder served was noted as the regulator(s) for Canada and Malaysia, and as the "profession" and meeting government requirements for Poland and Australia.

For example, Malaysia's accreditation objective first addresses their regulator's (BEM) need to identify academically qualified graduates, then secondarily to ensure continual quality improvement and also benchmarking of programs for higher education institutions (IHL's in Malaysia): "... to ensure that graduates of the accredited engineering programmes meet the minimum academic requirements for registration as a graduate engineering with BEM. In addition, … is to ensure that the Continual Quality Improvement is being practiced by IHLs. Accreditation may also serve as a tool to benchmark engineering programmes offered by IHLs in Malaysia."

Professions

The detailed comparison table of the accreditation systems of non-engineering regulated professions in Canada with quotes and linked sources is available in Appendix 3 (Excel Sheet 1c).

The international agreements for the professions compared were:

- Washington Accord (engineering)
- Seoul Accord for Informational Technology and Processing Professionals (IT).

Nursing has a reciprocal agreement with the equivalent US body (CCNE) to recognize each others' degrees only for the purposes of graduate program entry requirements. Social work has Memoranda of Understanding (MOUs) with the equivalent US body (CSWE) and the National Indigenous Accreditation Board (NIAB) for the mutual recognition and honouring of accredited degrees.

Variation in Time-based Input Criteria (metrics 1.2.1. - 1.2.3.)

Table 9. Profession Comparison of Time-based Input Criteria (metrics 1.2.1. - 1.2.3.)

Legend: No - unshaded, not a criterion; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	Engineering (repeated)	IT	Nursing	Social Work
1.2.1. Overall degree length (what constitutes a degree)	The entire program must include a minimum of 1,850 AUs.	40 courses of study leading to a Baccalaureate degree. 1 course = 1 semester, roughly 12 weeks, 36 lecture hours.	4-year Baccalaureate generally required, though some jurisdictions allow for completion in 3 years + 1 pre-year in math/sciences.	Baccalaureate degree required.
1.2.2. Specific counts of hours for each course based on type of instruction	Detailed counting, separates AU counts for labs and lectures	Not a criterion.	Not a criterion	Not a criterion
1.2.3. Specific counts of hours for specific content areas	Minima AU counts for each curriculum component (minimum path)	Specified number of courses for computer science / software engineering / computer engineering, math / statistics, and other subjects.	Not a criterion	At least 40% of the program must be general education (courses outside of social work, may be completed prior to admissions) and at least 50% professional social work education.

Variation in Delivery and Learning Spaces Input (metrics 1.3.1. - 1.3.9.)

Table 10. Profession Comparison of Delivery and Learning Spaces Input (metrics 1.3.1. - 1.3.8.)

Legend: No - unshaded, not a criterion; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	Engineering (repeated)	IT	Nursing	Social Work
1.3.1. Measures of interpersonal climate	Quality, morale, and commitment of students, faculty, support staff and administration	Faculty job satisfaction, student satisfaction, faculty and student morale assessed	References to EDI and social-cultural environment of the education units	Support and encouragement for the active engagement of faculty members, instructors, staff, and students in the development and operation of the program.

Metric	Engineering (repeated)	IT	Nursing	Social Work
1.3.2. Facilities	Quality, suitability, accessibility of labs, library, computing facilities	Availability of resources and staff support including computational and network facilities	Standard on Resources & Environment refers to physical spaces	Access to physical space aligns with mission, goals, and curricular content, including offices for faculty, staff, and part-time instructors; classrooms; dedicated spaces for student interaction and community meetings.
1.3.3. Faculty qualifications (competence requirements)	High level of expertise and competence with factors including education; teaching, research or engineering practice, communication, participation in engineering societies and positive attitude towards licensure.	Faculty are competent, qualified, possess relevant knowledge and skills.	Faculty are required to possess academic qualifications and professional experiences in their area of teaching.	Faculty members and field education personnel represent a range of experience and perspectives and have the qualifications, experience, knowledge and skills to effectively fulfill their duties. (15 specific requirements are listed under 2.2. Human resources: faculty members and field education)
1.3.4. Number of faculty & faculty duties	Sufficient number of full-time faculty, sufficient experience, and balance of duties	Sufficient number to provide a range of experience, capability, and meaningful technical interaction among the faculty members. Faculty engage in professional development activities such as research scholarship, industrial interaction, consulting.	Sufficient number to achieve mission, goals, expected outcomes, and to support faculty scholarship	Sufficient number to plan, administer and deliver its programs; faculty expected to engage in teaching, research, and service to the university, profession, and community
1.3.5. Licensure requirement for faculty	A portion of Engineering science and/or engineering design is expected to be delivered by faculty members holding ,or progressing toward, professional engineering licensure.	Not a criterion	Preceptors who teach or supervise in clinical settings required to be licensed/ registered in their practice jurisdiction. The nursing leader / academic head of the education unit is required to be a RN.	Not a criterion
1.3.6. Financial	Sufficient to ensure qualified staff recruitment, retention and training; acquiring and maintaining infrastructure and equipment.	Sufficient based on description, including faculty size and enrolment	Sufficient to achieve mission, goals, outcomes of program	Sufficient to achieve mission, goals, outcomes of program
1.3.7. Curriculum oversight within institution / school / program	Continual improvement process & actions required. Curriculum changes overseen by a formally structured curriculum committee with a majority of members licensed.	Requirement for regular review of graduate attributes and quality indicators and implementation of improvements by departments	Requirement for curriculum evaluation plan and ongoing evaluation, including evaluation / curriculum committee	Academic units engage in regular summative and formative evaluative processes to ensure their programs are of high quality, relevant, and respond to changing needs and new knowledge.
1.3.8. List of data tables	10 auto-filled and 3 manual entry tables	Structured form (manual entry), separate tables required for each course	6-8 forms	Not listed

Table 11. Jurisdictional Comparison of Leadership and Authority (metrics 1.3.9.1 - 1.3.9.4.)

Legend: No - unshaded, not a criterion; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	**Engineering** (repeated)	**IT**	**Nursing**	**Social Work**
1.3.9.1. Professional / academic qualifications of Dean or unit leadership	Deans and program heads expected to be licensed to practice in Canada.	Not a criterion	Nursing leader / academic head is required to be a RN and hold a master's or doctoral degree	Director required to hold a full-time position within the academic unit necessary social work experience and expertise.
1.3.9.2. Formal curriculum committee or equivalent faculty body with responsibility for program decision-making	Faculty Council required to have "clear, documented authority and responsibility for the engineering program". Curriculum changes overseen by a formal curriculum committee.	Not a criterion	Requirement for an evaluation / curriculum committee	Social work academic unit required to have a "decisive voice" (autonomy) in program delivery, design, and administration.
1.3.9.3. Alignment with institutional strategy and mission	Not a criterion	Not a criterion	Not a criterion	Not a criterion
1.3.9.4. Functional effectiveness of committees and leadership	Expectation for "suitable committee and reporting structures" to be in place.	"Control and organization of the institution" assessed through site visit.	"Clearly defined, transparent organizational structures, policies, and processes" for effective program functioning.	Importance of academic unit's leadership in respect to social work education.

Variation in Outcomes, Discipline-specific, Industry Involvement, and Experiential Learning (metrics 1.4 - 1.7)

Table 12. Profession Comparison of Outcomes, Discipline-specific, Industry Involvement, and Experiential Learning (metrics 1.4. - 1.7.)

Legend: No - unshaded, not a criteria; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	Engineers (repeated)	IT	Nursing	Social Work
1.4. Outcomes (graduate attributes; entry-level competencies)	High level Graduate attributes	Outcomes/competencies listed.	Two sets listed: degree-level outcomes and provincial/territorial entry-level competencies.	Competencies listed.
1.5.1. Discipline-specific content in self-evaluation criteria	Not a criterion	Course count breadth requirements for different program types	Not a criterion	Not a criterion
1.5.2. Discipline-specific perspective on the visiting team	Not a criterion	Not a criterion	Not a criterion	Not a criterion
1.6.1. Industry as stakeholders of accreditation council / boards	Appointments from regulators. Ideally, ⅓ of CEAB members must be currently or formerly engaged in practice.	Industry listed as accreditation stakeholder along with government and educators	Not a criterion	Not a criterion
1.6.2. Industry as members of accreditation visits	General visitor selected by regulators, usually not employed full-time in an academic environment.	Not a criterion	Not a criterion	Not a criterion
1.6.3. Program requirement for industry advisory panel to inform continual improvement	Not a criterion	Not a criterion	Not a criterion	Not a criterion
1.6.4. Industry completes direct review of programs	Not a criterion	Not a criterion	Not a criterion	Not a criterion
1.6.5. Stakeholder engagement that can (but is not required to) include industry	Stakeholder engagement listed in accreditation criteria.	"Where possible, the [visiting] team will also speak to employers, such as members of the department's industrial advisory board."	On-site / virtual interviews conducted with employers/representatives of placement services	Engagement with partners including practitioners, regulators, and community.
1.7.1. Mandatory co-op, internship, practicum or work-integrated learning experience	Not a criterion	Not a criterion	Curriculum requirement for practice experiences (clinical placements and simulation). Some jurisdictions require a set # hours of clinical practice for graduates.	A minimum of 700 field education practicum hours.

Metric	**Engineers** (repeated)	**IT**	**Nursing**	**Social Work**
1.7.1.1. Mandatory assessment / standards for co-op, internship, practicum or work-integrated learning experience	"A significant design experience conducted under the professional responsibility of faculty licensed to practise engineering in Canada" required.	N/A	Requirement that placements provide learning opportunities that contribute to learning outcomes.	Defined requirements for Field Education Curriculum, including learning objectives.
1.7.2. Culminating project or thesis (i.e., capstone)	Not a criterion	"Significant Design Experience" - "whether it be in course projects, a final 4th-year project, or an internship or in some other manner".	Not a criterion	Not a criterion
1.7.2.1. Indicate if required to be related to professional experience or "industry-related"	High level Graduate attributes.	Not a criterion	N/A	N/A

Licensure context and the benefit of accreditation for graduates (2.1. - 2.2.)

Table 13. Licensure context and the benefit of accreditation for graduates (2.1. - 2.2.)

Legend: No - unshaded, not a criteria; Yes, comparable - shaded; Yes, with variation across comparators - shaded with notes

Metric	**Engineers** (repeated)	IT	Nursing	Social Work
2.1. Licensure context	Accredited programs meet academic criteria for licensure (1 of 5 categories of criteria) by provincial / territorial regulatory bodies.	Information Systems Professional (ISP) designation is legislated as a self-regulating designation in BC, AB, SK, ON, NB, NS.	Each province and territory's regulators set their own requirements or guidelines, while using a common set of entry-level competencies: accreditation plays different roles for different regulators	Registration for licensure allows access to certain protected practices. Otherwise, licensure is not always required.
2.1.1. Exclusive right to practice?	Yes. Exclusive right to practice and reserved title	No	Yes. Exclusive right to practice and reserved title (as RN)	Exclusive right to practice only in Ontario. Reserved title in all provinces except Nunavut.
2.2. What is the benefit of accreditation for graduates in the licensure context?	Graduates considered academically qualified to begin licensure process	Graduating from an accredited program allows for pre-professional Associate Information Technology Professional (AITP) designation with no exams or sponsorship: fewer years of post-graduate experience required to apply for ISP designation.	Graduates of education programs approved by provincial regulators eligible to write exam without an individual assessment	Graduates from a Canadian accredited social work program are able to apply without additional exams, review of education requirements or qualifications review, except in BC where there is a required exam with no exemption. Post-graduate practicum hours required for Alberta and Nova Scotia. Quebec has its own system for accrediting Quebec institutions and does not rely on the same national system.
2.2.1. Exams, portfolios, other?	Technical exams, national professional practice (ethics) exams.	Competency review, ethics exam and required years of experience.	National exam (NCLEX; separate exam in Quebec called the Professional Examination of the OIIQ).	Exams for all graduates (BC); exams in specific circumstances (MB, NL).
2.2.2 Are there exemptions for graduates of accredited programs?	Graduates are exempt from technical exams but not national professional practice (ethics) exams.	Exemption for graduates of accredited programs for competency review, ethics exams and reduce years of experience required to apply for the regulated Information Systems Professional (I.S.P.) designation.	No	Exam required of all applicants in British Columbia: exempt in MB, NL (if within 3 years of graduation) (Appendix 1d).

Roles and Responsibilities (3.1. - 3.3.)

For the comparator professions, the standards for accreditation are set by a profession's accrediting body, specifically their board or council, in accordance with international agreements and usually with stakeholder representation. Within these structures, there is a separate accreditation board responsible for overseeing the accreditation process and making decisions on accreditation based on self-evaluation and site visits. This accreditation board is typically supported by staff or a secretariat. In short, one body

(accreditation board) implements the standards and makes decisions, and a higher body (the association board) sets the standards.

For site visits, nursing and social work expect team members to be educators; with nursing visiting team members are required to be full-time faculty (or retired from such a position within the past three years) and social work commissioners must either be a faculty member or hold a continuing appointment with an accredited program. In contrast, IT does not provide specific requirements for its review teams, aside from members being "carefully selected" to represent the accreditation council. Training is provided by the accreditation body to reviewers, with nursing and IT team members required to complete a web-based module provided by the Association of Accrediting Agencies of Canada (AAAC). Furthermore, IT requires that new reviewers participate as an observer on their first site visit. There is no reference to team members for these three accreditation bodies receiving compensation for their participation.

The documented processes for the three comparator professions did not include any requirements for a review between the visiting team's final report being completed and the board or commission receiving the report. Similar to Engineers Canada, institutions were offered an opportunity to comment on their accreditation report prior to the board / commission decision.

For each of the three comparator professions, the results of the self-evaluation and site visits are reported to the board or commission responsible for accreditation (CIPS Computer Science Accreditation Council for IT, CASN Accreditation Bureau for nursing, and the Commission on Accreditation for social work), who then decide whether accreditation is granted or if remediation of issues identified in the accreditation process is required first.

In terms of stated stakeholders, all three comparator accreditation bodies refer to engaging with educational institutions or educators, with social work specifically mentioning collaborative relations with the association representing deans and directors of schools of social work, the Quebec association for social work programs, and the Indigenous Social Work Education Network. IT lists both government and industry as additional stakeholders, while nursing mentions regulators, the Canadian Nursing Association, and internal volunteers as stakeholders to consult for periodic revisions to standards.

The accrediting bodies for all three comparator professions also perform accreditation for educational programs at other levels. Nursing accredits the Licensed Practical Nurse, Nurse Practitioner, and Registered Psychiatric Nurse programs along with bridging programs for Internationally-Educated Nurses; social work accredits both masters and bachelors of social work programs; and IT accredits programs that lead to certificates, diplomas, and applied degrees.

Quality Consistency and Evaluation (metrics 4.1. - 4.3.)

Accreditation quality and consistency across the professions' programs rely on accreditation standards themselves (which specify key elements and evaluation guidelines for each standard) and practices such as mentorship and staff support for visiting team members; similar to jurisdictions. Social work has

commissionaires that attend all of the visits, similar to Australia having one person on each team that attends multiple visits. Visiting team members for IT, nursing, and engineering in Canada are required to complete training prior to serving on a team (including the Association for Accrediting Agencies of Canada's online course) and IT requires visiting team members to attend their first accreditation visit as an "Accreditor in Training" (observer status).

Purpose of Accreditation (5.1)

All three comparator professions describe accreditation as fulfilling both an assessment function (i.e., ensuring program quality or rigour) and supporting ongoing program development and improvement. Social Work also describes accreditation as serving "an advocacy function to support academic units in the delivery of quality social work education", while IT notes how accreditation serves as a signal to the general public regarding a graduate's qualifications for entering the industry job market.

Additional Highlights

Two Levels of Standards: Basic and Higher Quality Attributes

Poland's accreditation criteria for engineering programs "have been divided into two sections:

- basic – meeting of all these attributes is a prerequisite for obtaining accreditation,
- additional – meeting of any of these attributes is a testament to the higher quality of education than meeting only the basic attributes implies."

In Poland, accreditation is granted for either two or five years, but "Accreditation for five years may be granted [only] if the organizational unit meets all of the basic attributes and at least 60% of the additional [higher quality] attributes." For most of Poland's Standards they have defined both "basic" and "additional" attributes that indicate higher quality. As an example, Table 14 lists the basic attributes required of all accredited programs, and higher quality "additional" attributes that allow for longer accreditation for Poland's Standard III: *Requirements for Engineering Analysis, Design and Practice*.

Table 14. Poland's Basic and Higher Quality Additional Requirements Sample of the Standard on Requirements for Engineering Analysis, Design and Practice

Basic Attributes	(Higher Quality) Additional Attributes
1. Learning outcomes contained in the content of basic subjects (mathematics, physics, computer science, chemistry, biology, etc.) make it possible to formulate and solve simple tasks in the represented engineering discipline, and allow to understand the broad interdisciplinary nature of technical sciences. 2. Core and specialization subjects that are aimed at acquiring engineering practical skills (analysis, design and engineering practice) have separate design and / or laboratory classes in the number of hours ensuring students achieve these learning outcomes. 3. Engineering practical skills and social competences are achieved as part of projects carried out by students (individually and / or as a team), and their elements are: analysis of facilities, processes and / or systems; selecting and applying appropriate analytical, computational and / or experimental methods. 4. The study program guarantees that the student will achieve learning outcomes in the field of knowledge, skills and social competences necessary for: assessing the suitability of analytical methods, solving simple project tasks, applying standards in engineering practice, understanding non-technical, social, environmental, economic, legal and industrial aspects affecting engineering practice. 5. Learning outcomes achieved in the process of pursuing the degree award (completion of the diploma thesis or engineering project) include, in addition to engineering knowledge and design and analytical skills, also: the ability to obtain and interpret relevant data and results, self-assessment skills, including awareness of responsibility for decisions made, awareness of the necessity of lifelong learning.	6. In the study program, activities related to the content of education in basic subjects (mathematics, physics, computer science, chemistry, biology, etc.) enable to collect a total of at least 18 ECTS credits. 7. Among the design classes in core or specialization subjects, which are aimed at acquiring engineering practical skills (analysis, design and engineering practice), at least one provides for the implementation of a team project whose subject is a complex technical facility. 8. As part of the project work (individual and / or team work), the student is obliged to assess the usefulness of analytical or research methods in solving the given task. 9. The study program includes a compulsory library training course, where the student achieves the ability to obtain and interpret relevant data, including the use of access to electronic databases. 10. The process of pursuing the degree award provides for the possibility of writing diploma theses, the subjects of which arise from the need to solve a specific problem given by an industrial enterprise. Such work has been carried out in an accredited course in the last two years. 11. A student of an accredited course understands organizational and management aspects in an industrial and business context.

EDI (Equity, Diversity and Inclusion) Criteria

Equity, diversity, and inclusion (EDI) was embedded in criteria for Australia's Standards including their faculty requirements, academic leadership and educational culture requirements, and their funding, facilities, and physical resources requirements. France's standards include consideration for diversity and actions against discrimination both within the school and within student activities. EDI is also embedded within nursing and social work criteria for hiring, learning environment and core competencies. Specific example EDI criteria are shown in Table 15.

Table 15. Sample Equity, Diversity, and inclusion (EDI) Criteria

EDI Focus	Sample Criteria
Hiring, retention and equitable assessment	● Faculty requirements include "Gender balance across academic appointment levels" (Australia Standards) ● "The policies and procedures of the academic unit include specific mechanisms to support the recruitment, hiring, retention, and equitable assessment of Indigenous Peoples and members of equity-seeking groups." (Social work; also noted in Table 16)
Academic leadership and educational culture	● Dynamic, cooperative learning community, inclusive of gender, culture, social differences; and engaged with: i. Progressive pedagogical frameworks and adoption of best practice in engineering education; ii. Cooperative industry and community outreach; iii. Encouraging diversity and the development of individual staff as learning facilitators; iv. Interlinked research and teaching programs" (Australia Standards) ● "Staff awareness of gender and cross-cultural issues, inclusive teaching approach" (Australia Standards) ● At the school level "A.2.1 Social and environmental responsibility [of the school towards students and staff]: In terms of social responsibility, the school ensures diversity and balance of profiles within its bodies, management, teaching staff and students, diversity of geographical and social origins among students, inclusion of all publics and in particular people with disabilities, quality of life at work, safety at work, the fight against discrimination and violence of all kinds. The school is involved in national measures to fight against sexist and sexual violence..." (France Standards) ● Within student activities "F.2 Student life: The school encourages responsible community life, which is set out in a specific charter: control of environmental impacts, fight against discrimination, attention to isolated populations, promotion of responsible behavior (fight against addictions, harassment, violence including sexist and sexual violence...). Prevention measures are implemented with student engineers." (France Standards) ● "Resources & Environment" includes Key Element 8: "Equity, inclusion and respect of diversity are reflected in the stated values, policies, and relationships of the educational unit" (Nursing Standards)
Funding and facilities	● "Learning support facilities appropriate to the development of the full range of graduate capabilities and matching the needs of individual students, including those with a disability" (Australia Standards)
Curriculum & Learning Outcomes	● Three out of 13 core competencies focus on EDI: "6. Francophone Peoples and Communities; 7. Equity and social justice; and 8. Anti-racism." (Social Work Standards)

Indigenization Criteria

Indigenization, notably, is absent from the standards of all four engineering education accreditation systems at the time of this review. Indigenization is embedded within comparator professions of social work and nursing within their criteria for hiring and evaluation of faculty, facilities and funding, partnerships and curriculum as shown in Table 16.

Table 16. Sample Indigenization Criteria

Indigenization Focus	Sample Criteria
Hiring, retention and equitable assessment	● "The policies and procedures of the academic unit include specific mechanisms to support the recruitment, hiring, retention, and equitable assessment of Indigenous Peoples and members of equity-seeking groups." (Social work; also noted in Table 15)
Funding and facilities	● "Academic units where decolonization and indigenization are central to the program will have adequate financial, physical, pedagogical, and community resources for the achievement of the mission and delivery of its program" (Social Work Standards).
Curriculum & Learning Outcomes	● "The curriculum addresses Action 24 of the Truth and Reconciliation Commission programs of nursing to integrate the United Nations Declaration on the Rights of Indigenous Peoples, human rights, the history of Indigenous peoples in Canada, Indigenous teachings and practice, intercultural competency, and anti-racism." (Nursing Standards) ● Two of social work's 13 core competencies focus on Indigenization: 4. Colonialism and social work; 5. Indigenous Peoples and Communities" (Social Work Standards)
Partnerships and Collaborations	● "The academic unit reciprocally engages with Indigenous communities on whose historical and contemporary territories it is located and institutes specific mechanisms to incorporate aspects of the cultural and linguistic characteristics of these communities throughout the program. This includes collaborative and relational work with diverse Indigenous nations who are not connected to traditional territories." (Social Work) ● "The academic unit collaborates with multiple partners to develop curricular content relevant to core learning objectives. The academic unit specifically collaborates with multiple Indigenous partners (including, but not limited to, scholars, professors, students, knowledge keepers, and community members) to develop curricular content relevant to core learning objectives # 4 & # 5 and pertinent to the territories in which the program operates. This includes relational work with diverse Indigenous nations who are not connected to traditional territories." (Social Work)

Clear Definitions of Experiential Learning

Out of the comparator engineering education jurisdictions, Australia and Malaysia both provide clear definitions and expectations around the inclusion of experiential learning practices.

Engineers Australia includes in their accreditation criteria the concept of Engagement with Professional Practice (EPP), which aims to support the development of professional work practices and methods. The desired outcome of this approach is to provide the basis for developing professional judgment, with the aim of such practices continuing for students after graduation. Professional practice experiences are expected to be delivered through settings that provide experiential learning, including simulated, virtual, or industrial environments, and are recognized as providing material differences from traditional education environments. Specifically, these experiences provide familiarity with work management systems and professional communication styles, an introduction to constructive role models, and interactions with business functions and unanticipated disturbances that constrain engineers' ability to deliver their outputs.

EPP in the Australian context is expected to be an integral learning activity that is understood by all stakeholders and documented within the curriculum as formal learning activities; furthermore, these experiences must include formal monitoring and assessment of associated learning outcomes. The accreditation criteria provide a non-exhaustive list of EPP elements, as listed under Standard AP4 Engagement with professional practice:

> "1) Systematic contact with practicing professionals, for example, through on-going project reviews, mentoring, or professional society activities
> 2) Engineering information management, especially management of an engineering baseline
> 3) Direct industry input to authentic problem-solving, projects and evaluation tasks
> 4) Industry-based investigations and case studies, including final year projects
> 5) Industrial site visits that contribute to learning outcomes
> 6) Inclusion of staff with industry experience in curriculum delivery
> 7) Guest lectures by industry practitioners
> 8) Application of industry standards, codes, practices and methods
> 9) Structured interviews of engineering professionals"

Malaysia's accreditation standards place a similar emphasis on experiential learning, noting that practical experience with a range of common engineering processes is required to be provided at the appropriate level for students. Exposure to engineering practice is expected to be integrated throughout the curriculum, including through guest lecturers from industry, industry visits, and the preference for the final-year project to be industry-related. Additionally, all accredited programs are required to provide a minimum of eight weeks of continuous industrial training for each student, with the focus on appreciating and improving one's capability of engaging in complex engineering activities. Such industrial training is intended to introduce students to leading technologies and processes, as well as

large-scale operations that would not be possible to demonstrate outside of industrial settings. Industrial training can include observations and demonstrations at industrial sites: the accreditation standards also allow for a Work-Based Learning (WBL) approach, so long as the work experience enables the program's learning outcomes to be met.

Conclusion

Overall, there is notable variation across professions and jurisdictions for the 41 metrics comparing accreditation criteria (content, learning spaces, and outcomes), processes, roles and responsibilities, impact on licensure, strategies for consistency, and purpose. Canadian engineering education accreditation was distinct in its use of minimum path criteria, and as the only accreditation system without an experiential learning requirement. One profession and one jurisdiction had discipline-specific criteria. In addition, there were highlighted and noted variations across accreditation systems that may offer options for Canadian engineering accreditation. These findings do not entail specific implications or benefits / costs of such distinctions. Instead, they simply contribute questions and possibilities to the ongoing investigation into the purpose and scope of accreditation.

All eight accreditation systems, including the five engineering and three other professions, are outcome-based accreditation systems. Outcome-based accreditation systems rely on self-evaluations of learning environments and the process and results of measures of student outcomes. The self-evaluations are reviewed by a national body through a process that includes a visit by a team external to the institution, a report and a decision-making body (e.g., a board or commission) that reviews the report and makes recommendations on accreditation. Regarding process, there was variation in the membership of review teams, and the approval or review function of department or committee within the national body (e.g., Canadian accreditation board). There was also variation in most criteria, though facilities requirements were similar.

Though all are outcome-based accreditation systems, their context of licensure and international agreements also vary. Two distinct international agreements were examined for engineering accreditation across jurisdictions: Washington Accord and ENAEE. Licensure requirements in Poland, one province in Canada, and in Australia was notably higher for structural engineers than other disciplines. Malaysia had three levels with the first equivalent to Canada's engineer-in-training, the highest level is equivalent to Canada's professional engineering allowing for owning a consultancy and approving plans, and the middle level allowing for practice but not owning a consultancy or approving plans. Australia's Queensland mandatory registration is discipline-specific, narrowing practice allowed to the specific discipline area the engineer is registered in; in Poland only civil engineers are registered and in BC structural engineering is the only discipline with a separate registration.

Exclusive rights - Only Malaysia has nationally legislated exclusive right to practice and reserved title for professional engineers, and in a federated model, only Canada has legislation in all provinces and territories. Australia has growing statutory registration at the state/territory level. Among the

comparator professions, nursing had both exclusive right to practice and reserved title for all provinces and one territory; and social work has exclusive right to practice in Ontario and reserved title for all provinces and one territory but not Nunavut and Yukon where there is no social work academic program.

Distinctions (absence or presence of criterion) - Across benchmarked jurisdictions and professions, Canadian engineering education accreditation is the sole system that utilizes a minimum path requirement and includes detailed time-based input counts beyond the requirement of overall degree length. Canadian engineering education accreditation is also the only system without some form of experiential learning requirement; IT has a lighter requirement while most have a substantial requirement for experiential learning. Malaysia and IT alone have discipline-specific content criteria. Canada also has less required industry involvement.

Variations within criteria present - Although many of the metrics were present across comparators, the level of detail and the specific criteria varied across accreditation systems, particularly for curriculum content requirements, faculty qualifications, industry involvement, and learning environment criteria other than facilities. For some comparators, accreditation lightened the requirements on graduates who pursue licensure. The purpose of accreditation spanned from advocacy to assessment of quality of education received by graduates or quality of graduates with a frequent focus on reassuring the public. Subject matter experts on visiting team could be educators, representatives from industry, or regulators. Several accreditation systems seek to enhance consistency through having individuals who attend multiple visits a year (paid or commissionaires) as well as training.

Additional Highlights - Three highlights were noted: (1) Poland (KAUT's Standards) specifies two levels of criteria and to receive full-term accreditation a program must demonstrate all of the "basic" criteria plus 60% of the "additional" criteria, where "meeting of any of these attributes is a testament to the higher quality of education". (2) Regarding Indigenization, and EDI (equity, diversity, and inclusion) criteria, the only engineering education accreditation system to mention either was Australia's standards for faculty numbers (gender parity) and qualifications (Staff awareness of gender and cross-cultural issues, inclusive teaching approach). In Canada, social work and nursing included criteria with a focus on Indigenization and EDI. (3) Descriptions of what qualifies as experiential learning in engineering were notably provided in Australia and Malaysia.

About the Consultants: Higher Education and Beyond

Our experienced and qualified facilitators and researchers offer evidence-informed decision-making, professional development design, evaluation capacity building, and inter-perspective knowledge facilitation for organizational success and stakeholder engagement within and beyond higher education. The consultants on this report have experience with outcome-based accreditation across multiple jurisdictions and professions, and experience with metric development.

Appendix 1. Potential and Selected Jurisdiction Comparators

Possible Jurisdiction Comparators	1. EQUIVALENT EDUCATIONAL SYSTEM: Their primary and secondary education is of a comparable length as Canada's	2. COMPARABLE DEGREE LENGTH: The degree is of a comparable length to Canada's	3. QUALITY ASSURANCE SYSTEM: They have some type of quality control system	4. REGISTRATION: They have a system where individuals are required to be registered in order to practise, but the requirement is a one-time-one step. Once you're on the list, you remain on the list.	5. PROFESSIONAL LICENSURE: have a system where individuals are required to have a license in order to practise engineering, and there are ongoing competency requirements associated with that licensure in order to maintain status.	6. WASHINGTON ACCORD SIGNATORY *(Near Comparator)*
Source	Engineers Canada International Institutions and Degrees Database to get some basic information about other countries that may be promising. The database holds all of our research on countries, institutions and degrees from the last 20+ years.					Dec. 2021 Signatories
Australia	Yes	Yes	Yes	Yes	Yes	**Yes**
Austria*	Yes	Yes	Yes	Yes		
Bangladesh	Yes	Yes	Yes	Yes		
Belgium	Yes	Yes	Yes		Yes	
Canada	Yes	Yes	Yes	Yes	Yes	**Yes**
Cyprus	Yes	Yes	Yes	Yes		
France	Yes	Yes	Yes		Yes	*agreement with OIQ
Hong Kong	Yes	Yes	Yes	Yes	Yes	Yes
India	Yes	Yes	Yes	Yes	Yes	Yes
Indonesia	Yes	Yes	Yes	Yes		Yes
Ireland	Yes	Yes	Yes	Yes	Yes	Yes
Japan	Yes	Yes	Yes	Yes	Yes	Yes
Korea, Republic of	Yes	Yes	Yes	Yes	Yes	Yes
Latvia	Yes	Yes	Yes	Yes		
Malaysia	Yes	Yes	Yes	Yes		**Yes**
Malta	Yes	Yes	Yes	Yes		
Montenegro	Yes	Yes	Yes		Yes	
Netherlands	Yes	Yes	Yes	Yes		
New Zealand	Yes	Yes	Yes	Yes	Yes	Yes
Pakistan	Yes	Yes	Yes	Yes	Yes	Yes
Peru	Yes	Yes	Yes	Yes		Yes
Poland	Yes	Yes	Yes	Yes (Civil Engineering)		
Puerto Rico	Yes	Yes	Yes	Yes	Yes	
Russian Federation*	Yes	Yes	Yes	Yes		Yes
Serbia	Yes	Yes	Yes		Yes	
Singapore	Yes	Yes	Yes	Yes	Yes	Yes
Slovenia	Yes	Yes	Yes		Yes	
South Africa	Yes	Yes	Yes	Yes	Yes	Yes
Spain	Yes	Yes	Yes	Yes		
Sri Lanka	Yes	Yes	Yes	Yes		
Taiwan, Province of China	Yes	Yes	Yes	Yes		
Tanzania, United Republic of	Yes	Yes	Yes		Yes	
Thailand	Yes	Yes	Yes	Yes		Yes
United Arab Emirates	Yes	Yes	Yes		Yes	
United Kingdom	Yes	Yes	Yes	Yes	Yes	Yes

United States	Yes	Yes	Yes	Yes	Yes	Yes

Appendix 2. Potential and Selected Profession Comparators

Professions Considered (organization)	Must be accrediting at a bachelor's or comparable level	Typical students must direct enter from high school/CEGEP	A national accrediting framework	Regulated (CICIC.ca)	Technical post-graduate Exams? Exemption for graduates of accredited programs?
Engineering (Engineers Canada)	**Yes**	**Yes**	**Yes**	Yes. **Reserved title (CICIC)** & **exclusive right to (independent) practice** in all provinces & territories	Exams exist. Exemptions for accredited program graduates.
Nursing (Canadian Association of Schools of Nursing (CASN))	**Yes** at Baccalaureate level (Nursing, B.Sc in Nursing), M.Sc in Nursing. Quebec accepts diploma-level for RN	**Yes**	**Yes**	Yes. **Exclusive right to practice & reserved title** (all provinces & territories)	Exams required; No exemption
Social Work (Canada's Association for Social Work Education (CASWE))	**Yes**	**Yes**	**Yes**	**Ontario - Exclusive right to practice.** Most **- Reserved title (**all except Yukon or Nunavut)	Exams; Exemptions vary by province (e.g., no exemption (in BC) unless registered already in another province.)
IT Professionals	**Yes**	**Yes**	**Yes**	**No.** Voluntary certification, license or registration (Information systems analysts and consultants) Information Systems Professional (I.S.P) is "Canada's only legally recognized designation for IT professionals, ... legislated as a self-regulating designation in six provinces (British Columbia, Alberta, Sask., Ontario, New Brunswick and Nova Scotia)"	Exam exist. Exemption for technical and ethics exam for accredited program graduates. Graduates from accredited programs automatically qualify for lower level AITP designation; and apply reduced years of experience and no ethics exam requirement for the higher level ISP designation. (Note 2)
Accounting (Chartered Professional Accountants Canada; Ordre des comptables en management accrédités du Québec)	**Not equivalent** Recognition at undergraduate level. Accreditation as post-graduation level (Note 1)	**Yes** for recognition; **No** for accredited programs which are graduate-level national curriculum	**Yes**	Yes. **Exclusive right to practice & reserved title** (all provinces & territories)	Exams; No exemption
Architecture (Canadian Architectural	**Yes.** Accredit both a bachelor of architecture	**Yes.**	**Yes**	Yes. **Exclusive right to practice & reserved title (**all except Yukon or	**No exams. Portfolio**. Graduates of accredited programs

Professions Considered (organization)	Must be accrediting at a bachelor's or comparable level	Typical students must direct enter from high school/CEGEP	A national accrediting framework	Regulated (CICIC.ca)	Technical post-graduate Exams? Exemption for graduates of accredited programs?
Certification Board (CACB))	(BArch) or a master of architecture (M. Arch) degree			Nunavut)	exempt.
Pharmacy (Canadian Council for Accreditation of Pharmacy Programs (CCAPP))	**No.** Primarily Doctor of Pharmacy (PharmD) is an undergraduate professional doctorate	**No**. (e.g., UAlberta - "Applicants must complete 60 credit units of University transferable work including the prerequisite courses listed below."	**Yes**	**Yes. Exclusive right to practice & reserved title** (all provinces & territories)	Exams required (except in Quebec). A pharmacy degree require to sit Pharmacy Examining Board of Canada exams, no exemptions outside Quebec. (Note 3: Quebec)
Veterinary (Council on Education (COE) of the American and Canadian Veterinary Medical Associations (AVMA and CVMA, respectively).	**No.** Doctor of Veterinary Medicine (only 5 programs in Canada: UPEI, Guelph, Saskatchewan, Calgary, UMontreal)	**No**. (e.g., UPEI - "You must have at least 20 prerequisite courses completed or in progress at the time of application…at the undergraduate degree level at a post-secondary institution."	**Yes, but not equivalent,** programs in Canada are accredited by a joint Canada & USA accreditation	**Yes. Exclusive right to practice & reserved title** (all except Yukon)	Yes - North American Veterinary Licensing Examination (NAVLE) exam with 360 clinically-relevant multiple-choice questions No Exemption (e.g., since 1986 in Manitoba).
Law (National Committee on Accreditation (NCA) of the Federation of Law Societies of Canada, for common law)	Primarily Juris Doctor (JD)	**No**. (e.g., USaskatchewan - "You cannot begin this program directly from high school")	**Yes**. National requirements	**Yes. Both Exclusive right to practice & reserved title** (all provinces & territories)	Yes - exams by NCA. Requirement varies by Province for graduates of Canadian common law programs (Note 4)
Medicine (Committee on Accreditation of Canadian Medical Schools, Canadian Medical Association and The Association of faculties of medicine of Canada)	Doctorate of Medicine (MD) is a undergraduate professional doctorate	**No**. (e.g., Dalhousie U. - requires undergraduate or graduate credit hours (Note 5)	**Yes**. Committee on Accreditation of Canadian Medical Schools	**Yes. Both Exclusive right to practice & reserved title** (all provinces & territories; both for specialist physicians, and General practitioners and family physicians)	Exams. (exams just for internationally trained). Exemption with no exams for graduates. "Upon earning the M.D. degree, students are then eligible to apply for postgraduate training in the discipline of their choice." (Usask)
Education (e.g., Ontario	Yes	Yes	**No.** National	**Yes. Exclusive right to practice but**	No technical exams

Professions Considered (organization)	Must be accrediting at a bachelor's or comparable level	Typical students must direct enter from high school/CEGEP	A national accrediting framework	Regulated (CICIC.ca)	Technical post-graduate Exams? Exemption for graduates of accredited programs?
College of Teachers)			Standard; Provincially accredited.	**not reserved title** (all provinces & territories; both for secondary and elementary school teachers)	

Note 1. Accounting accreditation occurs at the post-graduate level, with a "Recognition standards" at the undergraduate level. Recognition standard is a review and approval for an undergraduate program's graduates to be eligible to complete CPA post-grad training. Accreditation standards is a review and approval to deliver a post-graduation program that is equivalent to the standard national CPA professional education curriculum as either a graduate diploma or Master's degree. (www.cpacanada.ca/en/become-a-cpa/education-partnership-between-profession-and-psis/cpa-recognition-and-accreditation-standards)

Note 2. There are two levels of licensure: "The pre-professional Associate Information Technology Professional (AITP) designation and Candidate Membership is the first step to obtaining Professional I.S.P. status." I.S.P. designation recognized by law. Graduates of an accredited program are eligible for "AITP Designation and One Year of FREE CIPS Candidate Membership" as they are exempt from the ethics exam, the fee and requirements to become an AITP). Graduates of an accredited program also also exempt from the ethics exam and need to complete two fewer years of IT experience for the I.S.P. designation compare to graduates from non-accredited degrees. CIPS designations also include a specified route for academics.

Note 3. In Quebec, the Ordre des pharmaciens du Québec (OPQ) reviews transcripts, course descriptions, and professional certifications; no exam.

Note 4. Law exam requirements and thus exemptions varies by Province; exams no exemption in some provinces, no exam in some provinces. Bar admission process is set by provincial / territorial law societies. Some provinces (e.g. ON, NB) require completion of licensing examinations (no exemption), while others require only completion of a bar admissions course focused on ethics and practice (e.g. Practice Readiness education Program (PREP) in MB, SK, and AB, Professional Legal Training Course (PLTC) in BC) for graduates of common law programs in Canada.

Note 5. For example, Dalhousie University's admissions Medicine program requires "the 60 most recent credit hours of graded (alpha/numerical) courses from a completed or in-progress to be completed 90-120 credit baccalaureate degree… OR using up to 15 credit hours of graded (alpha/numerical) courses from a completed or in-progress to be completed graduate degree (Masters or PhD) PLUS the 45 most recent credit hours of graded (alpha/numerical courses from a completed 90-120 credit baccalaureate degree"

Appendix 3. Full Benchmarking Metric Comparison Tables including tabs including 1a. Metrics list; 1b. Jurisdictions; 1c. Professions; 1d. Social Work. (Excel)

Appendix 4. The Accreditation Standards or Criteria for Engineers Canada and the four jurisdiction comparators and the three profession comparators. (PDFs in Folder)

Reference

Patton, M. Q. (2015). Qualitative research & evaluation methods: integrating theory and practice. SAGE Publications, Inc.