

# Update to Engineers Canada Board, February 2017

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# Discussion topics:

**WHY** accreditation matters

**WHO** is involved

**WHAT** accreditation volunteers do

**OVERVIEW** of accreditation criteria

**UPDATE** on last accreditation decisions

**UPDATE** on recent accreditation activities

# Why engineering education accreditation matters

- Regulators need to know which Canadian-educated applicants have the right education to begin the journey towards licensure
- The public needs to know which Canadian engineering education programs meet the regulators' high education standards
- Graduates need to be able to show they have met internationally recognized standards

# Who's involved in accreditation?

## Engineers Canada

- Engineers Canada and its 12 provincial and territorial engineering regulator members work together to advance the public interest and the profession
- Engineers Canada recognizes that specialized knowledge is required to perform engineering education accreditation. It established the Accreditation Board in 1965 to do this important work. The Accreditation Board's main job is to accredit undergraduate engineering educational programs

# About the Accreditation Board

15+ P.Eng./ing. make up the Accreditation Board:

- All are volunteers. They are drawn from the private, public and academic sectors
- Many members are former deans (4), senior faculty members (6). Others are from industry (6) (vice-president, CEO, senior executive).
- Most members from academia have also worked in industry
- They represent a wide range of disciplines
- Most members serve for the maximum 9 years

# About the Accreditation Board

An Accreditation Board member is expected to:

- Be the Chair of the visiting team for one or more accreditation visits every year
- Work on task group assignments and/or on the Policies & Procedures Committee
- Review reports from engineering programs throughout the year. Provide an opinion regarding compliance with criteria based on report information
- Meet face-to-face with other Accreditation Board members at least three times a year
- Speak to engineering program officials or other interested groups about accreditation
- Volunteer an estimated 30-40 days per year, twice this amount for executive committee members

# About the Accreditation Board

These are volunteers! Why do they do all this?

- They are passionate about engineering education!
- Many of the academics have been on the receiving end of an accreditation visit!
- Those members who are primarily from industry are interested in making sure the next generation of engineers/employees remain the best in the world.

# Goals of the Accreditation Board

- Engineering programs offered by Canadian institutions will meet or exceed minimum educational standards acceptable for professional engineering licensure in Canada
- The quality and relevance of engineering education will continuously improve
- The Engineers Canada Board of Directors will be provided with advice and recommendations on international matters relating to engineering accreditation and education

# Who's involved in accreditation?

## Relevant relationships

- Regulators routinely send staff members to observe accreditation board meetings
- Regulators are represented on accreditation visiting teams by the General Visitor(s) or come as observers
- The Accreditation Board and the Deans regularly discuss improvements to the accreditation process
- Representatives from the Canadian Federation of Engineering Students (CFES) are invited to Accreditation Board meetings and to Engineers Canada Board meetings. Other student associations are also involved
- Deans and/or other HEI officials often observe accreditation board meetings or attend accreditation workshops
- Visiting teams are comprised primarily of HEI professors. New programs require both industry and academic visitors

# Linkages to Engineers Canada

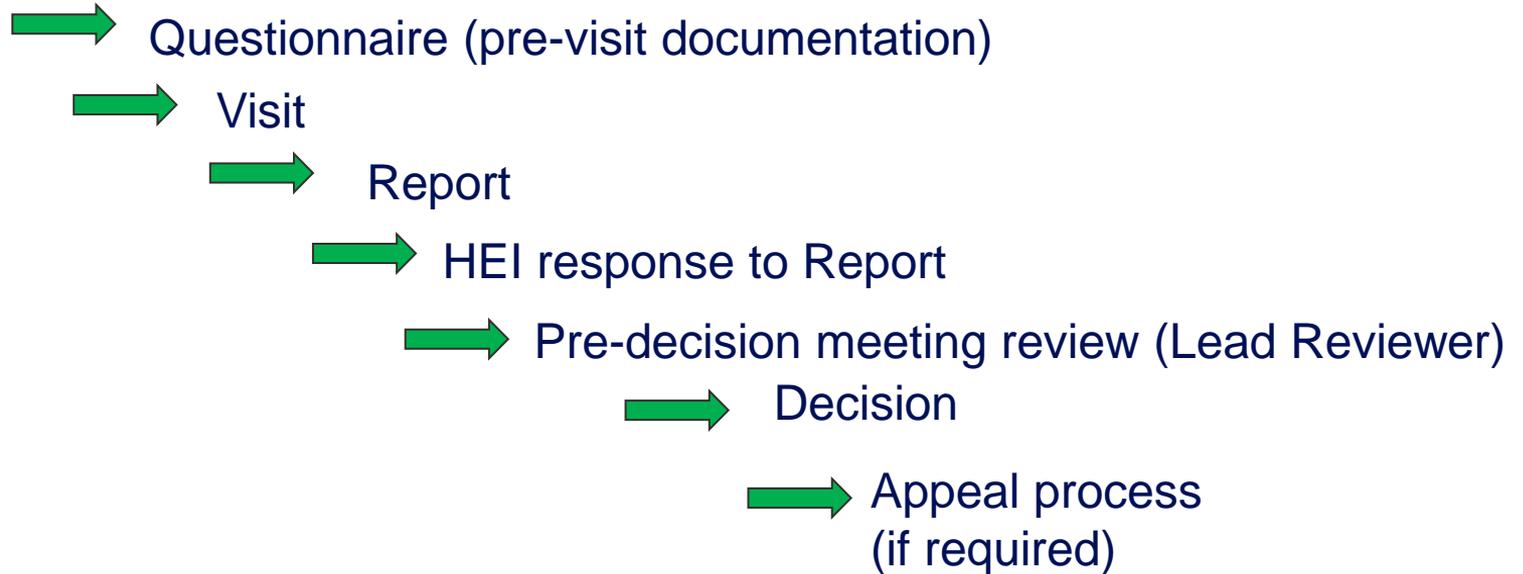
- While the Accreditation Board has the delegated authority to make accreditation decisions and develop criteria interpretive statements, changes to the accreditation criteria or the Accreditation Board terms of reference must be approved by the Engineers Canada Board
- The Accreditation Board chair is an advisor to the Engineers Canada board
- Two Engineers Canada directors are appointed to the Accreditation Board

# WHAT does the Accreditation Board Do?

- The Accreditation Board's major deliverables are accreditation decisions
- Some have compared the process as an “audit”:
  - Teams of experts review program information, both on paper and on-site
  - They gather information about the programs in a visit report
  - The visit report, plus any additional relevant information received from the dean after the visit, as well as the Board's collective experience is used to produce accreditation decisions
- The Accreditation Board (not accreditation visiting teams) produce accreditation decisions

# HOW do they do it? Accreditation visits

Invitation (by institution)



# Accreditation Criteria

Accreditation criteria place emphasis on the quality of the:

- curriculum
- students
- academic and support staff
- facilities and resources

# Accreditation Criteria

The accreditation criteria reflect the need for:

- Graduates to possess the minimum academic requirements for licensure. Additional technical exams not required for licensure
- Engineers to be adaptive, creative, resourceful, and responsive
- Graduates to understand the role and responsibilities of professional engineers to society
- The professional engineer to function as an effective member of a team and to communicate effectively

# Major accreditation criteria components

- Curriculum content and quality\* .  
Measured by “Accreditation Units” (AU).  
This measure is applied to students.
- All students must meet the minimum(s)

\*P&P is looking at current use of the term “quality” in the criteria  
(more on this later...)

# What's an AU?

- Accreditation Units (AU) 1 AU = 50 minutes of actual contact time between the student and the faculty members
- When there are activities for which contact hours do not properly describe the extent of the work involved, programs are able to use another equivalent measure
- The K-factor is one method for determining an equivalent measure. It is a formula for calculation of AU on a proportionality basis

# More about AU...

- In Canada, engineering programs must have at least 1950 AU of contact time including 1545 AU of required instruction in Math, Natural Science, Engineering Science, Engineering Design, and Complementary Studies plus 405 AU of additional instruction.
- In other countries, measurements of the time commitment to various elements of the curriculum include
  - ✓ Credit hours
  - ✓ Credit Accumulation and Transfer Scheme (CATS) points system
  - ✓ European Credit Transfer and Accumulation System.....different places, different currencies
- CEAB is reviewing them all

# Other “currencies”

- **US-ABET system:** an engineering program has between 120 and 130 credit hours. (credit hour and semester lengths (8) defined by the US Department of Education). For 15 week semesters this is equivalent to between 1920-2080 hours of scheduled learning time plus twice that amount of student preparation. Professional registration requirements vary from State to State
- **UK CATs system:** Equates 1 CAT point for every 10 hours of learning effort or ‘notional learning time’. A 4 year baccalaureate honours program or integrated Masters requires 480 CAT points or 4,800 hours of learning effort / ‘notional learning time’. 10 hours of learning activity is approximately 2 hours formal plus 8 hours of private study

## Other “currencies” (continued)

- **Engineering Council** Institutions require a bachelors plus a masters ( or an integrated Masters) for CEng academic eligibility, so the minimum learning effort is 4,800 hours but could be higher
- In EU system the 3 cycle '**Bologna Process**' – bachelors-masters-doctorate - requires 180 ECTS (The European Credit Transfer and Accumulation System) credits for a 3 year degree (60 credits per year) and between a further 60 to 120 ECTS credits for a masters degree. 1 ECTS credit equates to 25 hours (e.g., Italy ) to 30 hours (e.g., Germany) of 'notional' learning activity

# Other “currencies” (continued)

- The ECTS is a student-centred credit process which defines a ‘notional’ student workload required to achieve defined learning outcomes. Based on the typical European academic year (36 to 40 weeks) requires 1,500 to 1,800 hours of student workload per year
- European countries have a variety of different professional ‘licensing’ schemes
- 1 ETCS = 2 CATS
- Engineers New Zealand (a Washington Accord signatory) require a 4 year bachelors degree of 120 credits per year. Each credit equating to 10 hours of learning activity or 1,200 hours per year for a total of 4,800 hours

# Other “currencies” (continued)

- Apart from ABET, at the moment, the other currencies, CATS, ETCS and New Zealand credits require that the credit hours are directly related to the student outcomes/graduate attributes. The rationale behind all these and similar systems is what is called ‘credit mobility within countries and across borders’
- Many of the systems have been developed under the auspices of UNESCO, the EU, various national (federal) governments and three conventions for the mutual recognition of international academic qualifications; the Lisbon Convention 1999, the Tokyo Convention 2011 and the Addis Ababa Convention 2014. Canada and the USA are signatories to the Lisbon convention but have not ratified it

# Comparison of 'other currencies' with our system.

- The 2014 NSEE survey of Canadian Universities shows that the average engineering student (at least in Ontario) spends 20.7 hours per week in learning activities/preparation other than scheduled time (AUs). For 8 semesters at 12.4 weeks per semester this represents at least 2,053 hours of additional learning activity over 4 years. Combined with 1,950+ hours of contact time equates to 4,003 hours of learning activity for Canadian students
- If labs/seminars/tutorials were counted as whole, rather than half-hours, in the AU system and tests, quizzes, exam and exam revision activities were included in the measurement of student workloads – as they are in most other jurisdictions – then it is highly likely that the Canadian student workload would be in close harmony with other systems

# In summary, for “other currencies”:

- Engineering Student workloads are very similar across the many global accredited systems
- In our system however, learning activities outside the classroom/laboratory are not assessed, despite many Canadian universities' claims to be student-focused
- In our system a direct link between learning activities (formal or informal) and learning outcomes/graduate attributes is not mandated in the same manner as most of the other 'currencies'
- The lack of an agreed correlation between our AUs and the learning activity transfer credits of other countries presents challenges for formal exchange programs and for students wishing to study out of country for part of their accredited program

# Major accreditation criteria components

- “Graduate Attributes”: Statements that describe what program graduates are expected to know and be able to do by the time of graduation. Also known as “outcomes assessment”. This measure is applied to programs
- Not all students must meet all graduate attributes

# Criteria allow innovative engineering education/practices

In the visiting team report, there is an opportunity to provide feedback to programs on “effective/efficient practices noted by the team”. In addition, the Accreditation Board looks out for “promising/innovative practices”. Some examples:

**International Exchange:** École Polytechnique provides an option for students to do an international exchange with universities in France and the UK (e.g., Chemical engineering at the University of Bath) as part of their accredited programs. The University of Waterloo lists over 80 exchange programs. Of the 43 Canadian institutions that offer accredited engineering programs, 32 provide international exchange opportunities to engineering students

## ...innovative engineering education/practices

**Associated Universities:** Dalhousie University includes in its accreditation the five associated universities where students can complete the first two years of a four year program in their community

**Bridging Programs:** in at least three provinces (Ontario, Alberta, BC): students graduating from technology programs can obtain their engineering degree within 2.5 to 3 years after transferring to accredited programs

**Carleton University Intranet System:** all materials available electronically to accreditation Visiting Teams

# ...innovative engineering education/practices

**Leadership:** University of Toronto provides leadership training, where leadership is a process and not a position, as part of its 405 AU additional relevant learning through its Institute for Leadership Education in Engineering

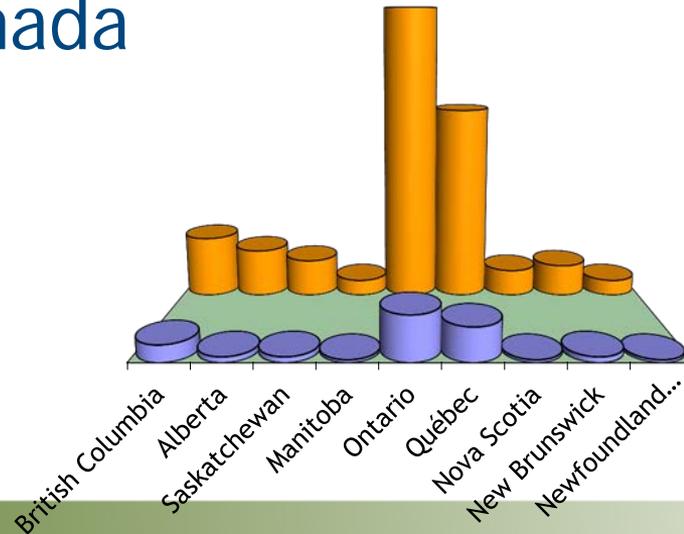
## **Problem-Based Learning:**

- Université de Sherbrooke adopted a 100% problem-based curriculum in 2005
- UPEI has developed a program with a strong emphasis on problem based learning and a reduced reliance on classroom instruction. This is a new program, therefore not yet accredited

**Just-In-Time Learning:** Other program are delivering content on a “just in time” basis where math instruction takes place within engineering science courses instead of within dedicated math courses

# Engineering education in Canada

There are currently 283 accredited programs at 43 Higher Education Institutions in Canada

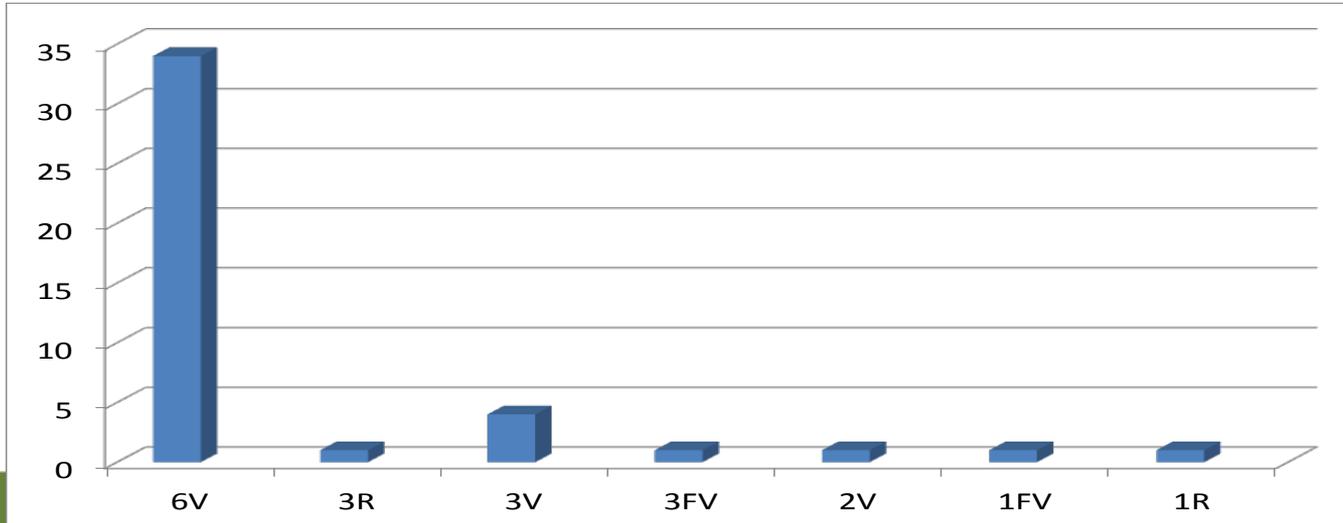


# Update on Accreditation Board decision meeting (June 2016)

- The Accreditation Board met on June 10-12, 2016 to make accreditation decisions and to provide constructive feedback to programs
- Decisions made on 43 programs at 10 institutions
- Close to 100 volunteers provided feedback and suggestions for improvement to the programs receiving visits, as part of the visit process

# 2016 Accreditation Results

- 43 program decisions at 10 HEIs
- 81% of decisions were either 6V or 3R
- other decisions can be made for a variety of reasons (new program, to coincide with other programs, etc.)



# 2016 Accreditation Results

- 179 issues (concern, weakness, deficiency) identified
  - 23% issues resolved as a result of the deans' response
  - 55% issues pertaining to GA/CI criteria
    - 32% Insufficient results, Indicators not appropriate or too few (GA)
    - 23% issues (primarily formative feedback) narrow stakeholder groups, continual improvement process not yet in use (CI)
  - 22% others (curriculum, program environment)
    - Design content, # of staff or faculty, classrooms/laboratories (space, culture of safety)

# GA/CI Observations

- Majority of HEIs have implemented adequate GA/CI processes – some HEIs have struggled
- CEAB recognizes that at least 2 cycles of assessment will be required to better define assessment procedures and to implement improvement measures
- CEAB expectations have been tempered in its GA/CI assessments to date

# Outcomes/Attributes

Jurisdiction/Agency	Outcome Criteria Measure	# of Criteria
EU (EUR-ACE/ETCS/ENAE)	Programme Outcomes	6
Engineering Council (UK)	Collated Learning Outcomes	6
ABET (USA)*	Student Outcomes	11
EC (CANADA)	Graduate Attributes	12
Washington Accord**	Graduate Attributes	12

\*Considering reducing # to 7 after 2017-2018 cycle.

\*\*EU and Washington Accord in discussions on Outcomes/Attributes.

Many of ABET/EC/Accord attributes are covered by others under criteria such as 'Transferrable Skills', 'Additional General Skills' and 'Making Judgements'.

# September 2016 Accreditation Board meeting and workshop

- Workshop topic: “*Workload Reduction for Accreditation Visits*” included discussion on:
  - ✓ Pre-visit documentation
  - ✓ Accreditation documentation needs
  - ✓ Challenges programs face in preparing for a visit
- Feedback and suggestions provided by participants are being reviewed and will be implemented as soon as feasible

# P&P Committee Activities

“Routine” activities include

- Developing strategies to address visiting team and HEI workload issues
- The annual review of visit documentation requirements resulting from HEI and visiting team feedback
- Training for board members (workshops, upgrades to online training, training manual)
- Formalizing and refining the Accreditation Board communication strategy
- Reviewing program feedback to identify possible improvements to the accreditation process

# P&P Committee Activities

P&P is also working on initiatives to address issues raised in the accreditation forum including;

- Developing an interpretive statement that provides feedback on significant changes being considered by programs
- Establishing a schedule for regular meeting with regulators
- Revising the meaning of “quality” as it is currently used in the accreditation criteria
- Exploring various data submission options for programs receiving visits
- Approving an interpretive statement to give effect to the Board’s Sept. decision to retain 1950 AU program requirement (work complete, statement in effect)

# P&P Committee Activities

P&P is also working with the NCDEAS and their Dean's Liaison Committee (subcommittee of the NCDEAS) to get a better understanding of the current criteria issues that are preventing innovation, and to encourage ongoing dialogue:

- Re-establishing a regular schedule for meetings with the Deans Liaison Committee (next meeting scheduled for April 27)
- Attendance at NCDEAS meetings (November and April), both to share information and obtain feedback
- Task groups recently established include NCDEAS participation

# February 2017 CEAB meeting

Accomplished:

Decisions on reports from programs

Discussion on:

- √ Voting results on the Interpretive Statement giving effect to the 1950 accreditation unit categories
- √ New interpretive statement on significant program changes - being developed by the P&P Committee for approval at the next AB meeting
- √ Accreditation Board communications plan- AB feedback received, to be approved at the June AB meeting
- √ HEI Survey to help identify where criteria are perceived as restricting innovation – to be sent to deans within the next few weeks for reply by late March/early April

# February 2017 CEAB meeting (continued)

## Accomplished (continued):

- √ Established a task group to examine the definition of an AU, use of AU, etc.. This task group includes a NCDEAS representative (Chair of the DLC, Tom Tiedje). The group will report progress at each Accreditation Board meeting
- √ Washington Accord member survey – staff to follow-up with WA signatories
- √ Volunteer training, one module developed – further developments to be reported at the next AB meeting
- √ The Qualifications Board's draft discussion paper on developing an assessment process for applicants for licensure who are graduates of a non-accredited program – sent to AB members for feedback
- √ Update (presentation) from NCDEAS
- √ Feedback from meeting participants

# February 2017 CEAB meeting

Also accomplished, on February 12:

- ✓ First ever half-day information session for programs receiving visits in 2017-2018. Deans/designated officials and others involved in accreditation were invited to meet the visiting team chair for a high level discussion regarding their upcoming visit
- ✓ Secretariat staff were available to help with technical questions
- ✓ Session was well attended. 10 of 13 institutions represented. Individual sessions planned for institutions not in attendance on February 12
- ✓ Plans for next year's session already underway

# Questions?

# Thank you

For more information:

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