

Moving Towards an Online Degree in Surveying/Geomatics in Canada & Foreign Trained Professionals

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SUMMARY

This paper explains the process that Canada is undergoing in attempting to move towards an online degree to serve foreign trained professionals wishing to become land surveyors in Canada as well as its own domestic candidates.

The project has numerous partners and stakeholders. It includes all self-regulated land surveying associations, 6 degree granting (geomatics engineering) Canadian universities, and colleges.

The three main steps are detailed here with expectations of desired results. The three components of the project are to modernize the current syllabus of the Canadian Board of Examiners for Professional Surveyors; to modernize the accreditation and exemption process for academic institutions; and lastly to develop a way forward with all stakeholders towards an online degree.

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ABSTRACT

Moving towards an online degree in surveying/geomatics in Canada

The Canadian Board of Examiners for Professional Surveyors is engaged with its members – 10 Canadian self-regulating land surveying associations excepting the province of Quebec – in moving its examinations towards an online degree in surveying/geomatics. This will be a first for Canada.

Canada is a large country where universities granting surveying or geomatics engineering degrees are few and located far apart: there are 2 in Western Canada, 2 in Central Canada, and one in the Maritime provinces. They are all in large centres. Anyone wishing to do such a degree must live in those centres.

This situation does a disservice to the student population which in large part lives outside those centres.

This project intends to prepare future generations of surveying and geomatics professionals where they live building upon technologies to assist society needs and educating this future workforce and hereby strengthening and developing our profession.

It is not only a requirement born out of geography and a somewhat sparse population, but also a demographic requirement. Canada experience a very large “baby boom” after the second world war until the early 1960’s. Now all these surveying and geomatics professionals are retiring in droves. Replacement is imperative to maintain a healthy industry.

The fact that Canada has a very large land mass, a smallish population and huge natural resources demands that the surveying/geomatics industry utilizes not only innovative surveying approaches and technologies but also develop and build its own.

Therefore, the CBEPS National Syllabus is being modernized to account for these new approaches and technologies. This will go hand in hand with a Canadian online surveying/geomatics degree.

CBEPS has also set a formal process for foreign trained land surveyors (FTLS) to get their competency recognized. A landing page leads candidates to either the CBEPS website or the FTLS website depending on where training was acquired.

The website provides a clear process that recognizes academic achievements in the technical areas of surveying/geomatics. An interview is also conducted with a panel made of 2 surveyors and one academic to investigate gaps that may show up in the educational assessment. There is always a learning plan developed for an FTLS candidate to cover the specific areas related to Canadian law.

This process leads the FTLS candidate directly to obtaining CBEPS certificate of completion and once received it is of same value as for a regular Canadian candidate therefore permitting the FTLS candidate to enter the path of professional designation.

Because of the online degree in surveying/geomatics project, any foreign trained candidate will be able to fill the gaps in their education such as Canadian survey law from anywhere in the world reducing greatly any delays in any immigration process.

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1. Introduction

The Canadian Board of Examiners for Professional Surveyorsⁱ (CBEPS) is engaged with its members – 10 Canadian self-regulating land surveying associations excepting the province of Quebec – in moving its examinations towards an online degree in surveying/geomatics. This will be a first for Canada.

This project is funded by the Government of Canada's Foreign Credential Recognition Program and the Association of Canada Lands Surveyors is providing CBEPS with administrative support during the project.

Canada is a large country where universities granting surveying or geomatics engineering degrees are few and located far apart: there are 2 in Western Canada, 2 in Central Canada, and one in the Maritime provinces. They are all in large centres and anyone wishing to do such a degree must live in those centres.

This situation does a disservice to the surveying/geomatics student population, which in large part lives outside those centres.

The project intends to prepare future generations of surveying and geomatics professionals where they live, building upon technologies to assist Canadian society strengthening and developing our future workforce.

It is not only a requirement born out of geography and a somewhat sparse population, but also a demographic requirement. Canada experienced a very large "baby boom" after the second world war until the early 1960's. Now surveying and geomatics professionals born in that time are retiring. Their replacement is imperative to maintain a healthy industry.

The fact that Canada has a very large land mass, a smallish population and huge natural resources demands that the surveying/geomatics industry utilizes not only innovative surveying approaches and technologies but also develop and build its own.

A large portion of its population is also concentrated in its larger centres. Each province has, in general, only one or two large centres with few exceptions. All natural resources are concentrated in rural or remote areas while commercial and residential development mostly occurs in large towns and cities.

2. Canadian Legal System

The Canadian legal system is based on a combination of common law and civil law. Common law is law that is not written down as legislation.

Common law evolved into a system of rules based on precedent. This is a rule that guides judges in making later decisions in similar cases. The common law cannot be found in any code or body of legislation, but only in past decisions.

Civil codes contain a comprehensive statement of rules. Many are framed as broad, general principles that can deal with any dispute that may arise. Courts in a civil-law system first look to a civil code for the rules, then refer to previous decisions to see if they're consistent. The term civil law here is used in contrast to "common law" to refer to the legal system that is based on a civil code, such as the Justinian Code or the Civil Code of Quebec.

All provinces and Territories in Canada with the exception of the province of Quebec use the common law system while Quebec has a civil code.

For all common law provincial land surveying associations and the association regulating Canada Lands (lands under federal jurisdiction), a candidate for the professional designation must first obtain a Canadian Board of Examiners for Professional Surveyors' Certificate of Completion. This is the entry path to professional exams and a practical training period with the land surveying association of his/her choice.

Canada's property rights are under provincial jurisdiction while Canada Landsⁱⁱ across the country are under federal jurisdiction.

2.1 Self-Governing Land Surveyors Associations

In Canada all land surveying associations are self-governed. There are two essential aspects granted to self-governing organizations: the authority to license and the ability to discipline licensees.

The self-governing profession is responsible for deciding who is qualified to practise and in what areas. The profession also sets the standards of technical competence and ethical and professional conduct to be followed by members.

A self-governed land surveying association is established by legislation and is required to:

- act in the public interest
- exercise delegated law-making powers
- exercise powers of enforcement over its members

And includes:

- determining entrance requirements
- providing a system of registration to determine required applicant qualifications
- licensing professional practitioners
- establishing and maintaining levels of competency
- establishing and maintaining codes of conduct (ethics and standards)
- receiving, investigating, and adjudicating complaints
- administering a disciplinary process to sanction members who fail to maintain established standards and practices.

2.3 Land Surveying in Canada

Land Surveying is a critical foundational activity that supports all economic sectors and is essential to achieving Canada's economic and social policy goals.

The Land Surveying profession is a primary partner in the delivery of Canada's secure system of land tenure, which underpins the fair and equitable ownership of property rights.

Land Surveying is a highly complex field requiring a mastery of advanced measurement and spatial data management technologies and a comprehensive knowledge of the legal principals governing boundary law, property rights, and land use regulation.

Land Surveying is essential to the effective regulation, management, stewardship, development, and use of land and natural resources.

2.4 Canadian Board of Examiners for Professional Surveyors (CBEPS)

CBEPS is an organization created by the Canadian land surveying associations to harmonize the technical components required to become a Canadian licensed land surveyor across the country.

All land surveying associations under the common law system are members of CBEPS and have total control on the Canadian technical requirements for land surveyors/geomatics professionals. CBEPS establishes, assesses and certifies the academic qualifications of individuals who apply to become land surveyors and/or geomatics professionals in Canada, except for Quebec.

It created a National Syllabus complete with study guides and learning outcomes to assist candidates in preparing for the examinations. These occur twice yearly in a number of locations in Canada and in person.

The National Syllabus had an upgrade about ten years ago but its main components are anywhere from 10 to 20 years old.

Therefore, the CBEPS National Syllabus is being modernized to account for these new approaches and technologies. This will go hand in hand with a Canadian online surveying/geomatics degree.

At the same time, if the National Syllabus is modernized, the current accreditation of academic institutions and of course' exemptions must also be modernized to reflect the new National Syllabus.

3. Project definition

The project "Towards an Online Degree in Surveying/Geomatics" is divided in 3 phases:

1. Modernize the CBEPS National Syllabus to meet changing societal needs and priorities, and adapting to a future driven by technological change;
2. Update CBEPS Accreditation and Exemptions Process;
3. Develop a clear path to an online Canadian surveying/geomatics engineering degree.

This project exists to support Foreign Trained professionals wanting to work in Canada and to increase not only their numbers but also the number of Canadian candidates. The potential to fulfill the Canadian requirements, from wherever a candidate is, is an advantage that cannot be overlooked.

The COVID19 pandemic accelerated the vision for something more flexible and approachable to replace the current twice-yearly in-person sitting of the CBEPS exams.

Immediately as the pandemic spreads worldwide, many Canadian educational institutions at the university level moved their courses to an online learning model. This model is still used, and some institutions have decided to move entirely to a blended model of course delivery when the pandemic is over where students are both in class and online during lectures.

3.1 Modernize the CBEPS National Syllabus to meet changing societal needs and priorities, and adapting to a future driven by technological change

The National Syllabus Team is composed of representatives from educational institutions, both universities and colleges, from all land surveyors' associations, and a representative from an industry association.

More than ever, the intersection between subjects is causing duplication of learning outcomes between not necessarily similar subjects. The modernizing effort will also examine the redundancy in subjects caused by their intersection.

The current syllabus is out of synch with the surveying profession with regards to the technologies used in daily activities. It does not address either the expanded role of the profession in areas such as land management, project management, new technologies and new uses of new and old technologies.

Currently the National Syllabus is composed of 12 compulsory core subjects and 5 elective subjects.

These are:

Core Requirements

- C1 Mathematics
- C2 Least Squares Estimation & Data Analysis
- C3 Advanced Surveying
- C4 Coordinate Systems & Map Projections
- C5 Geospatial Information Systems
- C6 Geodetic Positioning
- C7 Remote Sensing & Photogrammetry
- C8 Cadastral Studies
- C9 Survey Law
- C10 Land Use Planning & Economics of Land Development
- C11 Business Practices & the Profession
- C12 Hydrography

Elective Requirements

- E1 Spatial Databases & Land Information Systems
- E2 Advanced Hydrography
- E3 Environmental Management
- E4 Advanced Remote Sensing
- E5 Advanced Photogrammetry

Currently the core and elective requirements are supported by detailed learning outcomes and study guidesⁱⁱⁱ.

All institutions that are accredited cover all the CBEPS subjects' learning outcomes through one or more courses. A candidate graduating from an accredited program, upon presentation of his/her transcripts, automatically qualify for the certificate of completion.

For institutions that do not have full accreditation but have course exemptions, a candidate must submit a transcript identifying the subject they wish to be exempted from to be granted the exemption.

Educational institutions in Canada have been moving towards “attributes” and “competencies” for some years as they follow educational requirements in their province as well as for engineering program certification.

3.1.2 Proposed Syllabus

The new proposed syllabus will take a different format that will emphasize and group items under a larger umbrella.

For example, one of the syllabus subjects may be called “Estimation and Data Analysis” and may include items such as statistics, programming, least squares, networks, estimation applied to surveying, photogrammetry, GNSS and others. This would be a departure from having this subject focusing only on only least squares estimation and data analysis without being attached to how and where it can be used.

The proposed syllabus may also be divided in two separate streams: one for technologists and one for professionals. Each would lead to a certificate of completion guaranteeing a level of competence in the areas identified in the syllabus.

There may also be two different tracks in each level that would include essential learning outcomes and “nice to have” learning outcomes.

These and other ideas such as grouping per levels instead or using attributes to develop competencies required for each subject.

As we have just entered this phase of the project, time will tell which idea will prevail. However, it is clear that competencies will be an important part of the new syllabus.

4. Update CBEPS Accreditation and Exemptions Process

The current process is also out of date, and academic institutions have been requesting a modernization of the process that can provide institutions with more flexibility than what is currently available.

In 2019, the exemption process received an update in that institutions requesting accreditation of a syllabus subject. Besides the course(s) contents the institution is also required to list the graduate attributes that are addressed in the courses that cover this syllabus item. Then describe where and how they are covered in each course.

The attributes are:

- Investigation and critical thinking
- Problem solving, creative thinking and design
- Communication (ability to communicate complex land surveying and survey engineering concepts)
- Individual and teamwork skills
- Project management

- Professionalism, ethics and equity
- Awareness of the impact of surveying and associated development on society and on the environment
- Commitment to lifelong learning

This has also been implemented for the accreditation process. However, we did not have any opportunity to test it yet.

4.1 Proposed Process

The new process will require providing flexibility to educational institutions while not compromising the new syllabus currently in development.

The current process is heavily tilted towards meeting the learning outcomes in each syllabus subjects whereas the proposed process will rely more on competencies, expectations and learning outcomes.

Not only is the current process only concerned with learning outcomes and attributes, it is lengthy and expensive and provides very little flexibility to the institutions to shape their courses towards their specific expertise be it positioning and navigation or hydrography or drones.

The expectation that the new process will enable educational institutions to provide all the essential learning required by the syllabus as identified by competencies, attributes or other mechanism and to then focus their program on their specific expertise or the “nice to have” areas where they shine. Each institution in Canada generally has a different focus for their “nice to have” or specialized areas.

Such an environment would also allow the institutions to put their funding to work in a better balanced way instead of just trying to match course contents to a syllabus.

This phase will be undertaken only when the new CBEPS syllabus has reached the necessary level for adoption by all stakeholders.

5. Develop a clear path to an online Canadian surveying/geomatics engineering degree

The last phase is concerned with developing a clear path to a Canadian online degree in surveying/geomatics engineering.

The end result is not to end up with an online degree ready to do but to pave the way for such a degree. Working with educational institutions, land surveying associations and industry, it is hoped that we will achieve this.

Once the ground work of a modern syllabus and a flexible accreditation and course exemption processes are finalized and have received approval from the stakeholders, the work will turn its attention to the question “how can we make this online degree happen?”

There are already numerous ideas to bring us there including each institution providing different modules which could be based on their specific expertise. Other ideas consider each institution providing their own degree as long as a candidate has not taken more than a certain percentage of courses at another or other universities which is the current process.

The main difficulty with this phase of the project is centered around what the institution will find palatable. It is well known that university funding for programs depends heavily on the number of students enrolled in any particular program. We must also be cognizant of what the various provincial government may think of such a degree and how this may impact their funding of universities and of specific programs.

This is also why the ultimate goal of this project is not to end up with an online degree but with a reasonable and achievable map of the process.

6. Foreign Trained Land Surveyors

Before this particular project came about, there was the Foreign Trained Land Surveyors (FTLS)^{iv} project where CBEPS established a specific process for FTLS to be able to have their credentials assessed.

The process provides for a Canada wide (except for the province of Quebec) even and impartial review of credentials which includes a language requirement of working level English or French, Canada's official languages.

This provides the FTLS with a clear path to access a professional land surveying designation in all common law jurisdiction.

The certificate of completion is equivalent to the certificate provided by CBEPS to Canadian trained candidates and is the entry to the professional designations.

The main differences are the language requirement and the eventual learning plan that covers all Canadian centric subjects such as survey law for example. The process also opens the door to FTLS to showcase learning they may have obtained outside of official institutions. This is verified through a self-assessment tool and an interview where identified gaps are questioned with pointed technical questions of scenario based interview questions.

This new process attempts to prepare FTLS candidate to the surveying environment in Canada and its particular differences from other countries.

The learning plan for a candidate identifies all the online courses that can satisfy the areas where educational gaps have been identified in their training.

The main advantage of this process is a one point of contact for the country where all requirements are laid out in a clear path. This is very important as Canada has 11 different self-regulated land surveying association and all are different in terms of the legislation governing surveys.

The second important advantage is the opportunity to complete online courses from a candidate's country of origin.

The third advantage is the recognition/acceptance of the process by the various immigration departments across the country therefore facilitating skilled worker immigration. As well we hope to have this information available to all Canadian embassies and consul offices in the near future.

7. Conclusion

CBEPS anticipate that the whole processes renewals and a detailed, clear map towards an online degree in surveying/geomatics engineering will be a game changer for Canada. It will open the profession to foreign trained professionals like never before and at the same time

make it possible for numerous Canadians to enter the industry while learning from their home location.

The hope is that many more candidates will join the ranks of the many Canadian surveying firms and assure the industry's future.

BIOGRAPHICAL NOTES

Marie C. Robidoux first graduated from Université Laval in law. After moving to Alberta, she received her Canada Lands Surveyor (CLS) commission in 1993 and is a member of the Association of Canada Lands Surveyors (ACLS) where she has been involved as a member of the Board of Examiners (15+years) and member of numerous committees until 2018. She has worked extensively on Canada Lands in Saskatchewan, Alberta, Yukon, Northwest Territories and Nunavut. She has also worked in the oil and gas industry in Alberta for several years. She was the first woman president of the Association of Canada Lands Surveyor (2007-2008), on the ACLS Board of Examiners (2001-2018), and Chair of the Board of Directors of CBEPS (Mar 2013 – Oct 2018). She is currently Registrar for the ACLS and the Canadian Board of Examiners for Professional Surveyors (CBEPS)

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ⁱ <https://cbeps-cceag.ca/>

ⁱⁱ Canada Lands are First Nations Reserves, National Parks, the 3 Territories (Yukon, Northwest Territories and Nunavut), and the offshore.

iii <https://cbeps-cceag.ca/resources/learning-outcomes-and-study-guides/>
iv <https://ftls.cbeps-cceag.ca/>

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