Surveying Programs at COGS

Changes Over the Years and Challenges Moving Ahead

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COGS – Centre of Geographic Sciences

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Overview

- Changes
  - College
    - Approach to teaching
    - What we teach
  - Technology
  - Students
    - Supply
    - Expectations
  - Partnership with industry
- Challenges
  - Demands from industry
  - Education and training options
  - Technology
  - Partnership with industry
  - Industry

COGS – Centre of Geographic Sciences

- Founded in 1945 by Major James A. H. Church
  - Lawrencetown, Nova Scotia
- Nova Scotia Land Survey School
- Nova Scotia Land Survey Institute
- College of Geographic Sciences
- **NSCC Centre of Geographic Sciences**
  - 250 Acres to practise surveying

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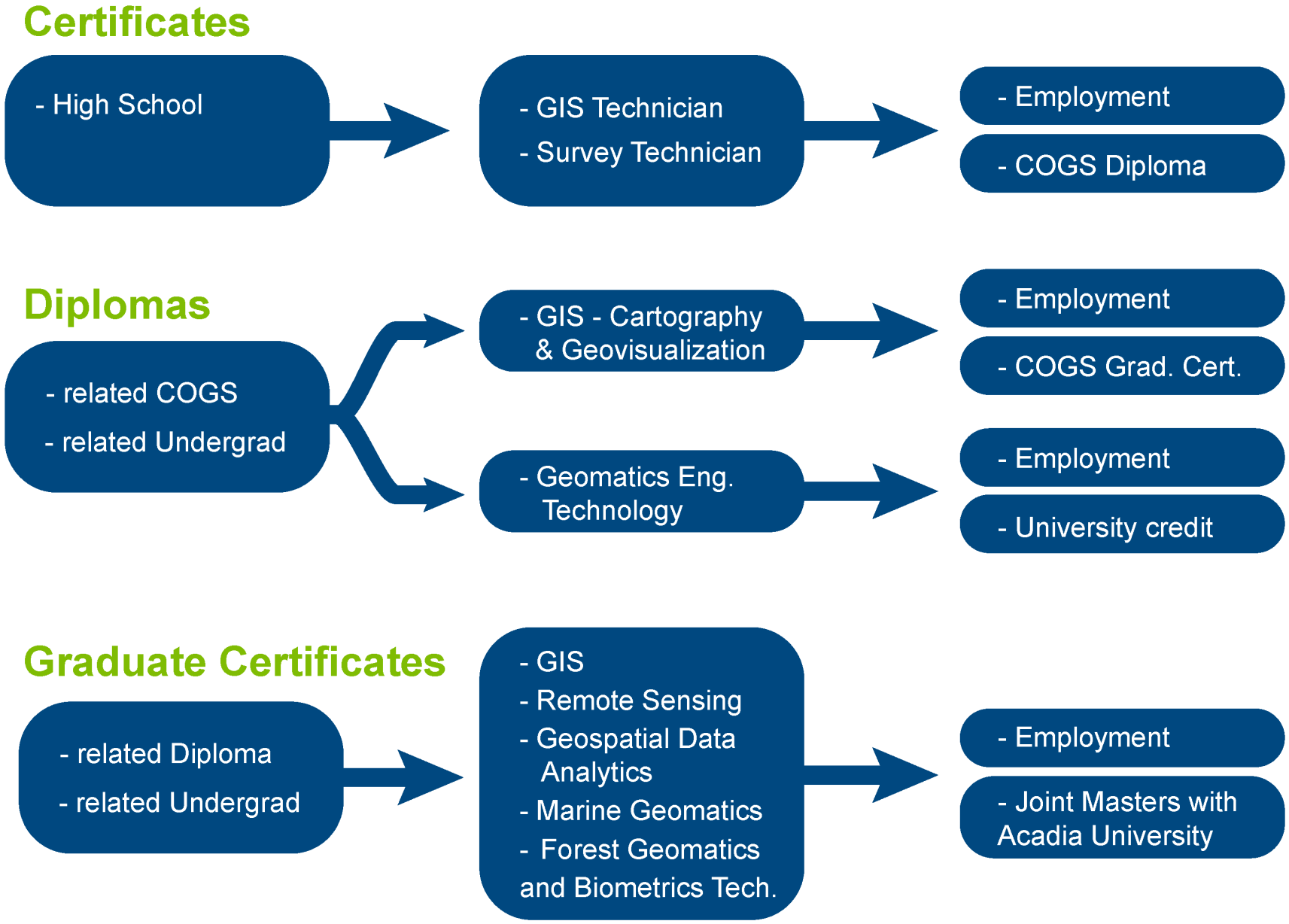
Geomatics Programs



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Survey Technician

Fall Semester

- Survey Theory I
- Survey Mathematics
- Computer Applications
- Communication Fundamentals
- Introduction to AutoCad
- Fieldwork I

Spring Semester

- Work Integrated Learning or
- Fieldcamp

Winter Semester

- Survey Theory II
- Introduction to Geodesy and Map Projections
- Global Navigation Satellite Systems
- Survey Law
- Digital Mapping Applications
- Technical Writing
- Automated Drafting and Coordinate Geometry
- Fieldwork II

Strength of Programs

Fieldwork - Two days per week (= 12 hours) for term (≈160 hours)

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Geomatics Engineering Technology

Fall Semester

- Geodesy and Map Projections
- Precise Positioning with GNSS
- Terrestrial Laser Scanning and Airborne Lidar
- Geomatics Applications with Remotely Piloted Aircraft Systems
- Applied Technology Project I
- Automated Drafting I
- Fieldwork I

Winter Semester

- Construction Surveying
- Statistics and Adjustments
- Geographic Information System
- Cadastral Studies and the Survey Profession
- Applied Technology Project II
- Automated Drafting II
- Fieldwork II

Spring Semester

- Work Integrated Learning or
- Fieldcamp

Strength of Programs

Fieldwork - Two days per week (= 12 hours) for term (≈160 hours)

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Change: Teaching Pedagogy

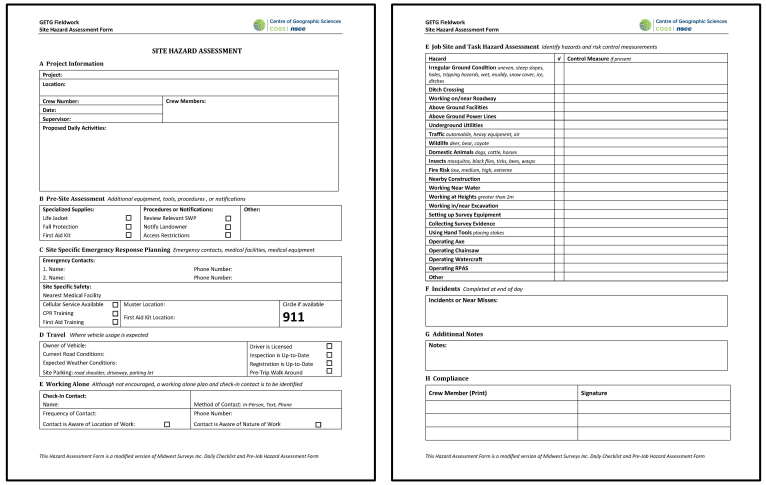
- Move towards less formalized testing (and memorization)
  - Theory based materials
  - Students provided where to find tools and resources
    - A number of great resources that are free
      - Less cost to students for textbooks
    - Getting them to used them appropriately
- To more “hands-on learning”
  - Strong Technical Skills
- Changes in Approach
  - Teach Basics “WELL”
    - Fieldwork
      - Not about marks
      - About methods and standards
- Geared towards success
  - Not so rigid
  - More compassionate
  - Aware

Change: Institutional

- Supports
  - Advisement
  - Accessibility Services
  - Cultural
  - Personal Wellbeing
  - Counselling
  - Learning
- Online Learning Management System
  - Brightspace
  - Students have access to materials
    - From anywhere
    - At anytime
  - More immediate feedback
    - Self grading

Change: Program Content

- No longer the sell is ‘good at **math** and likes being **outdoors**’
  - Also need to include
    - **Adventurous,** likes ‘**technology**’, **work ethic, organized**
- Safety
  - Incorporated into daily practice
    - Job Safety Analysis
    - Site Hazard Assessment
- Field-to-Finish
  - Mapping in the field
- Changes in Survey Programs
  - Embracing Technology
    - GNSS, Terrestrial and Airborne Lidar, Underground Utility Location,
  - Autonomy
    - Robots, Lidar, GNSS
- Curriculum
  - Dictated by industry
    - Wants and needs
  - Our job
    - Essentials



GETG Fieldwork
Site Hazard Assessment Form

SITE HAZARD ASSESSMENT

A Project Information

Project:
Location:
Crew Number:
Crew Members:
Date:
Supervisor:
Proposed Daily Activities:

B Pre-Site Assessment *Additional equipment, tools, procedures , or notifications*

Specialized Supplies:	Procedures or Notifications:	Other:
Life Jacket ☐	Review Relevant SWP ☐	
Fall Protection ☐	Notify Landowner ☐	
First Aid Kit ☐	Access Restrictions ☐	

C Site Specific Emergency Response Planning *Emergency contacts, medical facilities, medical equipment*

Emergency Contacts:
1. Name: Phone Number:
2. Name: Phone Number:

Site Specific Safety:
Nearest Medical Facility:

Cellular Service Available ☐	Muster Location :	Circle if available
CPR Training ☐	First Aid Kit Location:	911
First Aid Training ☐		

D Travel *Where vehicle usage is expected*

Owner of Vehicle:	Driver is Licensed ☐
Current Road Conditions:	Inspection is Up-to-Date ☐
Expected Weather Conditions:	Registration is Up-to-Date ☐
Site Parking *road shoulder, driveway, parking lot*	Pre-Trip Walk Around ☐

E Working Alone *Although not encouraged, a working alone plan and check-in contact is to be identified*

Check-in Contact:	
Name:	Method of Contact: *In-Person, Text, Phone*
Frequency of Contact:	Phone Number:
Contact is Aware of Location of Work: ☐	Contact is Aware of Nature of Work ☐

This Hazard Assessment Form is a modified version of Midwest Surveys Inc. Daily Checklist and Pre-Job Hazard Assessment Form

GETG Fieldwork
Site Hazard Assessment Form

E Job Site and Task Hazard Assessment *Identify hazards and risk control measurements*

Hazard	√	Control Measure *if present*
Irregular Ground Condition *uneven, steep slopes, holes, tripping hazards, wet, muddy, snow cover, ice, ditches*		
Ditch Crossing		
Working on/near Roadway		
Above Ground Facilities		
Above Ground Power Lines		
Underground Utilities		
Traffic *Automobile, heavy equipment, atv*		
Wildlife *deer, bear, coyote*		
Domestic Animals *dogs, cattle, horses*		
Insects *mosquitos, black flies, ticks, bees, wasps*		
Fire Risk *low, medium, high, extreme*		
Nearby Construction		
Working Near Water		
Working at Heights *greater than 2m*		
Working in/near Excavation		
Setting up Survey Equipment		
Collecting Survey Evidence		
Using Hand Tools *placing stakes*		
Operating Axe		
Operating Chainsaw		
Operating Watercraft		
Operating RPAS		
Other		

F Incidents *Completed at end of day*

Incidents or Near Misses:

G Additional Notes

Notes:

H Compliance

Crew Member (Print)	Signature

This Hazard Assessment Form is a modified version of Midwest Surveys Inc. Daily Checklist and Pre-Job Hazard Assessment Form

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Change: Student Body

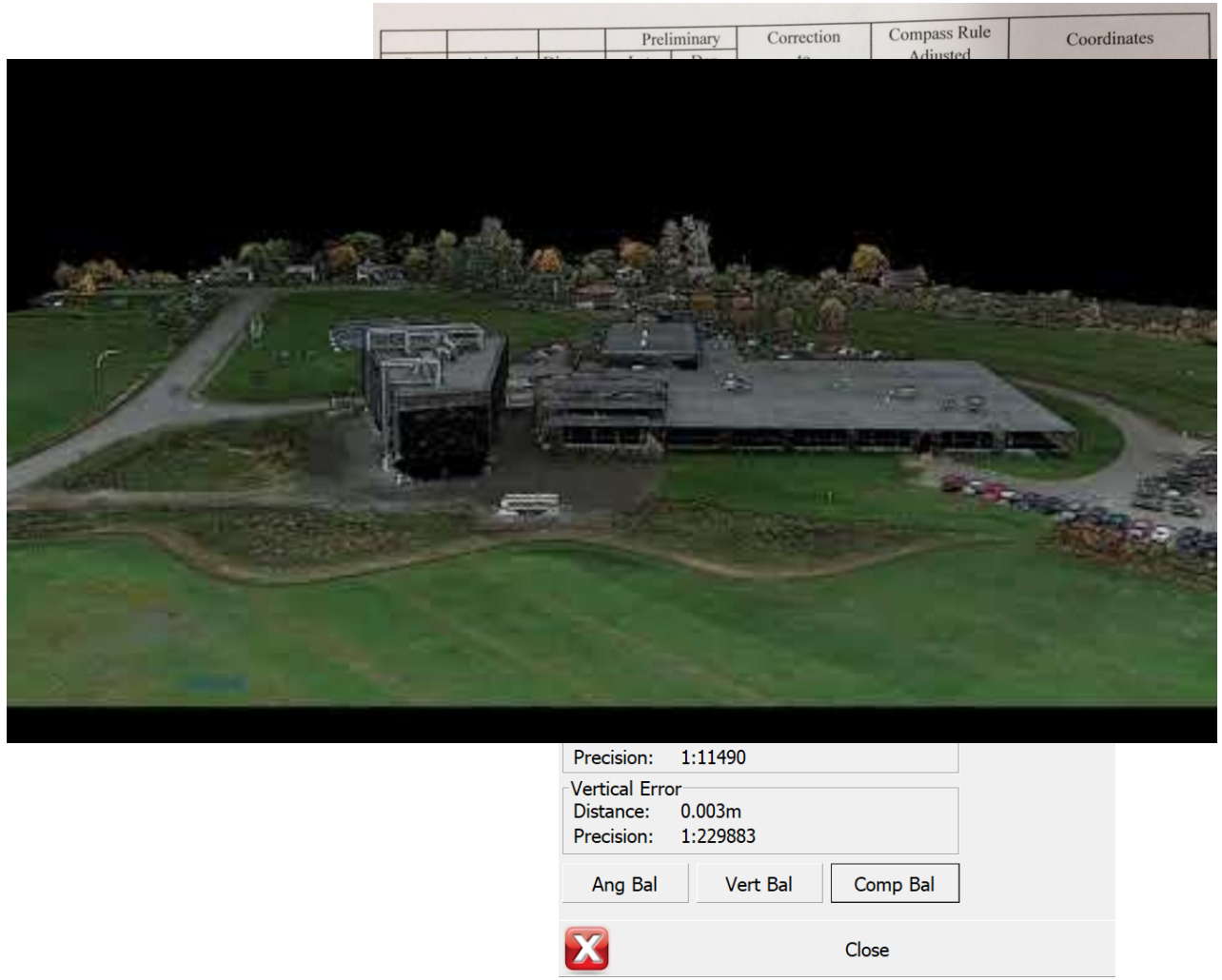
- Larger influx of students not from Canada
  - Reason
    - COGS reputation (We would like to think)
    - Want to live and stay in Canada (Reality)
      - Opportunity for good life
  - Possible Impact
    - Numbers decreased by 35%
      - 7000 less non-Canadian students in Nova Scotia
- Female students
  - No appreciable change
    - 1 to 4 per year
- Need for part time job due to economic times
  - Not a place to have a part time job

Change: Type of Student

- Different
  - More work-life balance
  - Enjoying life
  - Home body
    - Want to stay close to homo, family and friend
    - May be due to cost of living
  - Deadlines
    - Inconsequential
  - Stress is more noticeable and frequent
- Digital natives - more attached to technology
  - Phones (Yes)
  - Computers (Not necessarily)
    - Chrome book (free)
    - Lack file management
- More informed
  - Online content
- Mathematic skills not strong
  - Need for remedial work
  - Issue with education system?
    - NS math scores (PISA)
      - Decreased 24 points between 2018-2022

Change: Technology

- A move from calculations to modelling, analysis, and assessment
  - Less manual calculations
    - Still practiced (minimally)
      - Necessary to understand the concepts
  - More automation
    - Software and Hardware
- More complex intelligent software
  - Processing and visualization easier
  - More modelling
  - More analysis
  - Use available tools
- Quality control
  - Assess accuracy
  - Remediate
    - When necessary



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Change: Student Capability and Expectations

- Expectations to know more (technology)
  - Multidisciplinary
  - Geomatics Engineering Technologists
    - No longer just use total station or GNSS
    - Need to know how to use the drone (photogrammetry and lidar), lidar scanning, GNSS(and all of its variations)
    - Need to know how to use airborne lidar, lidar scanners
    - But understand where to use each
- Survey Technician
  - No longer just an assistant
  - They are running survey crews
  - Is this driven by demand or capability?

Change: Relationship with Industry

- Increased interaction between COGS and industry
  - Information sessions
  - Recruiting
  - Industry Expo
    - Industry panel
  - Meet and Greet Socials
  - Program Advisory Committees
  - Student Participation in Association meetings
    - GETG class of 2024 attended ANSLS Annual General Meeting
      - Employers in direct contact with students
      - Students interact with vendors
      - Students interact with NSLS candidates
      - Students exposed to professionals

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Change: Supply and Demand

- High Demand from Industry
- Supply is limited
  - Need MORE supply
- Call for trained technicians/technologists is high
  - Across Canada
- Can't provide supply to Nova Scotia
- Limited supply and high demand
  - Higher wages and better benefits
    - Allowing graduates to stay in Nova Scotia
- Why aren't there more signing up?
  - Especially when
    - Guaranteed a Job
    - Earn a good living
  - Knowledge of profession and opportunities lacking

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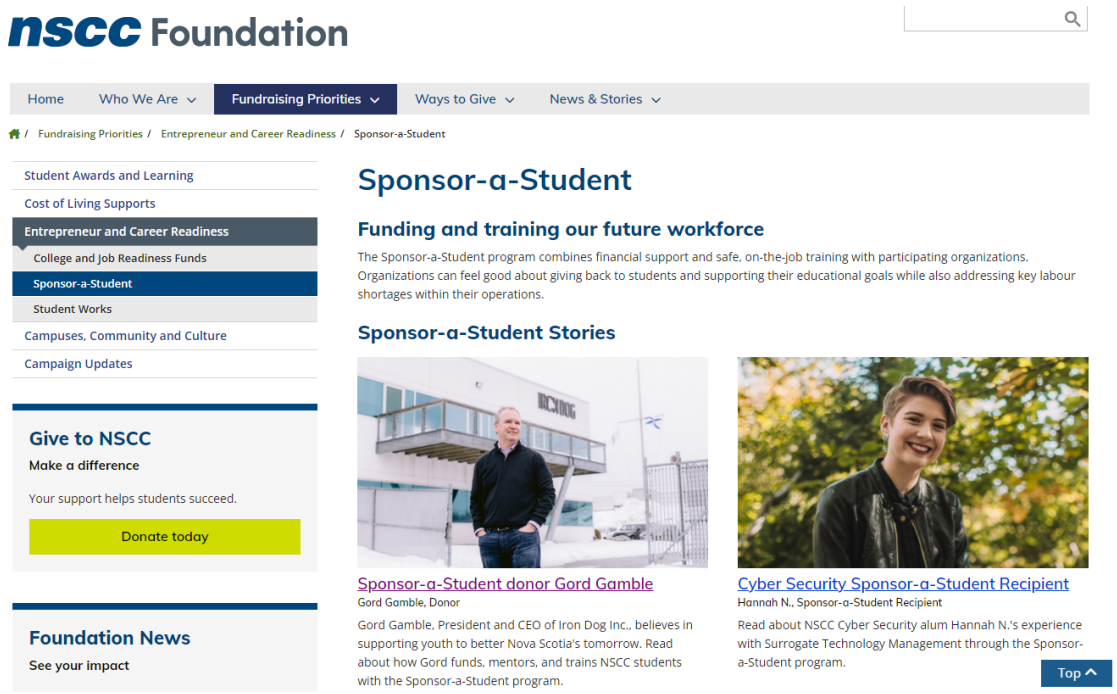
Challenge: Meet Demand

- Need for more partnership between COGS and Industry
  - To promote geomatics
  - Promote education
  - Jobs and opportunities
    - Surveying is critical construction
- Incentives to boost student enrolment?
  - Funding
  - Break on income tax
    - ‘Skilled’ trade
  - Sponsorship
    - Pool of Industry Members
    - Job placements
    - Tuition\Housing paid for
      - Financial forgiveness
        - Work for company for set number of years
        - Else, pay back
    - **Free education is a great option!**



https://www.nscc.ca/foundation/fundraising-priorities/entrepreneur-and-career-readiness/sponsor-a-student.asp

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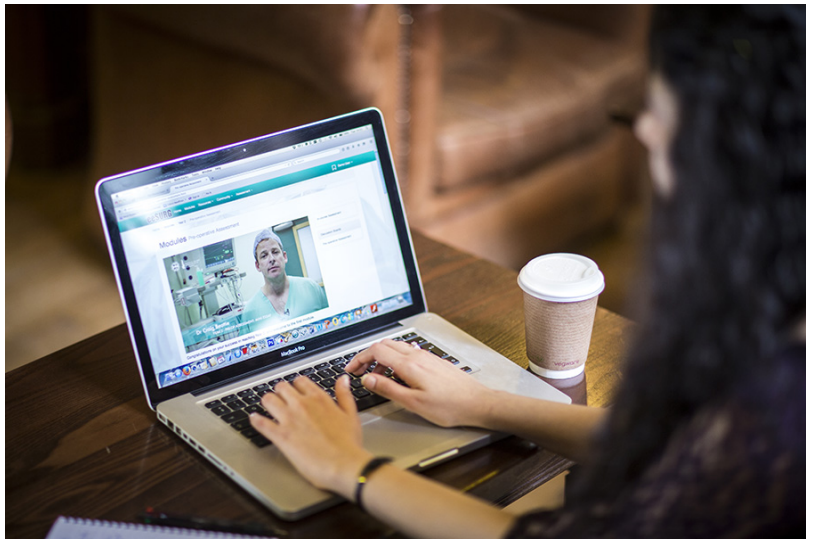
Challenge: (Online) Learning

- Opportunity
  - Increase enrollment
- Challenge
  - Can technical training be offered online?
  - Can we guarantee that students receive technical aspects
    - **OUR STRENGTH**
  - Easily applied in non-technical and software driven courses
    - Legal, Drafting, Geodesy, Digital Mapping, GIS, Survey Theory, etc.
- Benefits
  - Flexible
    - Meet people where they are at
  - Reduced costs to students
    - Stay at home – avoid need for accommodations in Lawrencetown
- Issues
  - Cost to institute
    - Cloud based software solutions (Azure and Citrix)
      - PRICY



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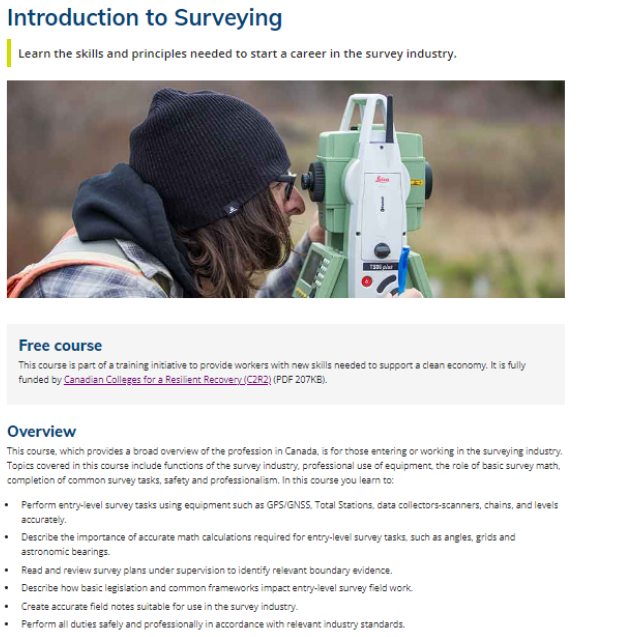
Challenge: Learning

- Technical Training (Options)
  - For online
    - On campus for a limited number of weeks
      - For hands-on
  - Require partnership from industry partners for hands-on
    - Like “Introduction to Surveying” (45 hours)
      - COGS online instruction on theory and equipment use
      - Some support from industry partner
        - Provide access to equipment
  - Video games or emulators
    - Emulating data collection



Introduction to Surveying

Learn the skills and principles needed to start a career in the survey industry.

Free course

This course is part of a training initiative to provide workers with new skills needed to support a clean economy. It is fully funded by Canadian Colleges for a Resilient Recovery (C2R2) (PDF 207KB).

Overview

This course, which provides a broad overview of the profession in Canada, is for those entering or working in the surveying industry. Topics covered in this course include functions of the survey industry, professional use of equipment, the role of basic survey math, completion of common survey tasks, safety and professionalism. In this course you learn to:

- Perform entry-level survey tasks using equipment such as GPS/GNSS, Total Stations, data collectors-scanners, chains, and levels accurately.
- Describe the importance of accurate math calculations required for entry-level survey tasks, such as angles, grids and astronomic bearings.
- Read and review survey plans under supervision to identify relevant boundary evidence.
- Describe how basic legislation and common frameworks impact entry-level survey field work.
- Create accurate field notes suitable for use in the survey industry.
- Perform all duties safely and professionally in accordance with relevant industry standards.

https://geospatial.trimble.com/en/resources/blog/trimble-virtual-world-ready-surveyor-one

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Challenge: Alternate Methods

- Co-op
  - 4 months - classroom
  - 1 year – workplace
  - 4 months – classroom
- Customized Training
  - Need from industry
    - Survey Assistant
- Micro Credentials
  - Introduction to Surveying
    - January 2025

Challenge: Institutional

- Staying current
  - Technology changes
  - Advancements of technology
- Required resources
  - Hardware, software, data storage (data volume), capable computers
  - Obtaining a ‘class set’ is very cost prohibitive
  - Cloud computing
    - Access is expensive
- Cost of hardware and software
  - Limited funding available
  - Need more affordable solutions
    - Share resource with campuses
    - Share with industry
    - Alternative purchasing – renting solutions
      - Technology Agreement, Lease-to-buy
    - Donations from industry and vendor

Challenge: Programming

- Who do we serve?
  - CBEPS articulation
    - Who hires with articling as a requirement?
  - TAC
    - Who hires with CET as a requirement?
  - UNB
  - **INDUSTRY**

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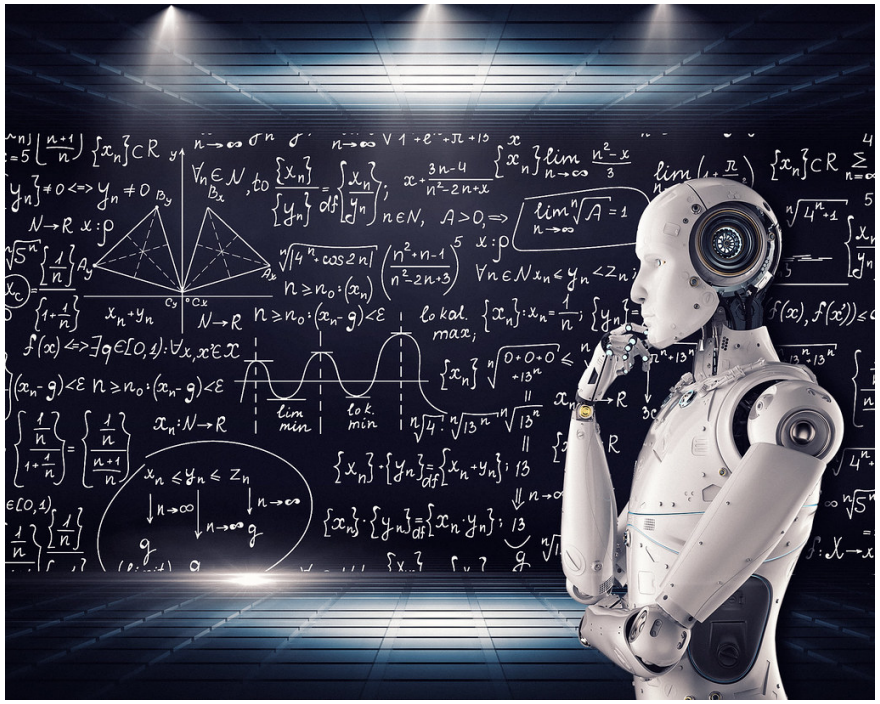
Challenge: Education

- Artificial Intelligence
  - Need to assure quality of programming
    - Internet is full of great information
      - Validity and accuracy?
  - Embrace it
    - Use it cautiously



In Summary

- We are continually searching for ways to improve programming
  - Student success
  - Expand the industry
- Technology will continue to be a challenge
  - Expose students to the latest
  - Fit within a shrinking budget
- Need to expand recruiting beyond NSCC recruitment
  - Can Industry help??
- Healthy relationship with industry
  - Benefits with further collaboration

Thank You!

Open to Suggestions or Opportunities?