Becoming a Canadian Professional Geoscientist After Studying at Acadia as a Geology or Environmental Geoscience Major

by: Dr. Clifford R. Stanley, P.Geo.(N.S.)

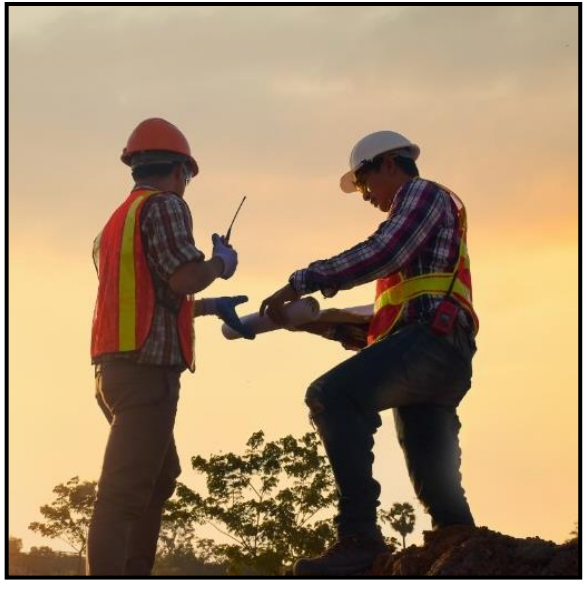
January, 2022

GEOSCIENTISTS NOVA SCOTIA

GEOSCIENTISTS GÉOSCIENTIFIQUES CANADA

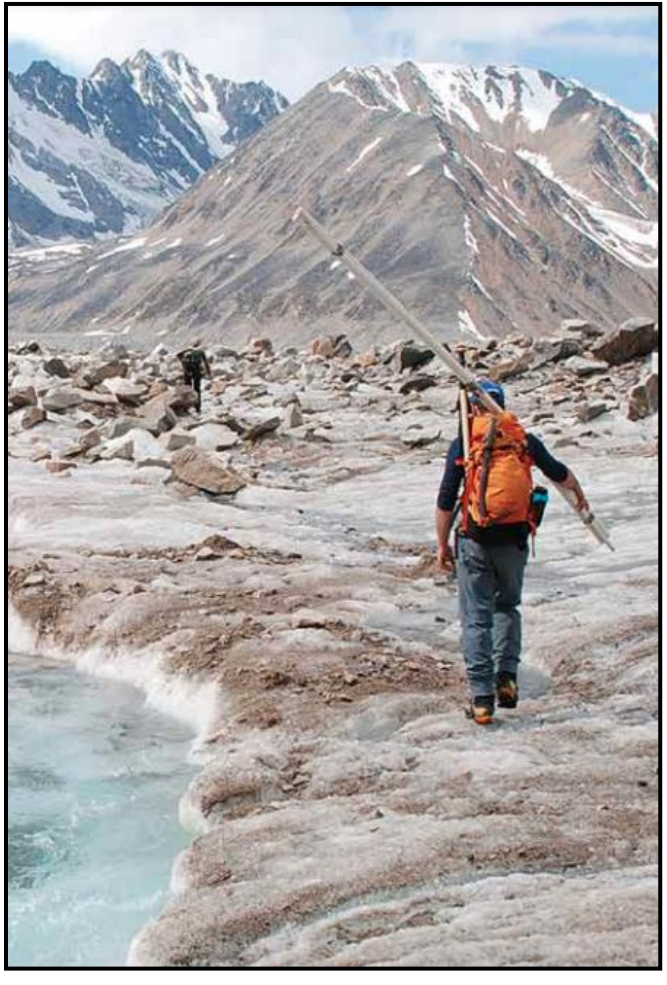
Outline

- **Introduction**
- **Professional Geoscientists in Nova Scotia**
  - The Canadian Constitution
  - The Nova Scotia Professional Geoscientist Act
  - Definition of Geoscience / Geoscientist
- **P.Geo. (N.S.) Admission Requirements**
  - Knowledge Requirements
  - Acadia Major/Honours Geology Degree
  - Acadia Major/Honours Environmental Geoscience Degree
  - Experience Requirements
- **Questions?**



Introduction

- where do Acadia GEOL & ENGO students work after they graduate?
  - Exploration & Mining
  - Exploration & Petroleum
  - Environmental
  - Government
  - Academic
- if you intend to work independently in these fields, regulations require that you become a '***Professional Geoscientist***'
- this allows you to:
  - practice independently
  - undertake certain, special geoscience tasks (*see below*)



Introduction

- If you aren't a professional geoscientist, there will be restrictions to practice in your field of expertise
- Your field of expertise is determined by the university courses you have passed, and the type of geoscience experience you have
- thus, at Acadia, you must take the 'right courses' to allow you to work in your desired field
- obviously, you need to make the proper course selections early in your academic career, so you have the pre-requisites that you need to take the courses you want to take
- Drs. Raeside, O'Driscoll, and I are aware of this, and will help to guide you though this process when we advise you on course selections each year

Professional Geoscientists in Nova Scotia

- You must be a ***Professional Geoscientist (P.Geo.)*** in order to ***"practice geoscience"*** (as defined) in:
  - *Nova Scotia*
  - *all other provinces and territories in Canada*
  - *most of the United States (~35 states)*
  - *other countries (e.g., UK, Australia, NZ, South Africa, Namibia, Ireland, EU)*

Professional Geoscientists in Nova Scotia

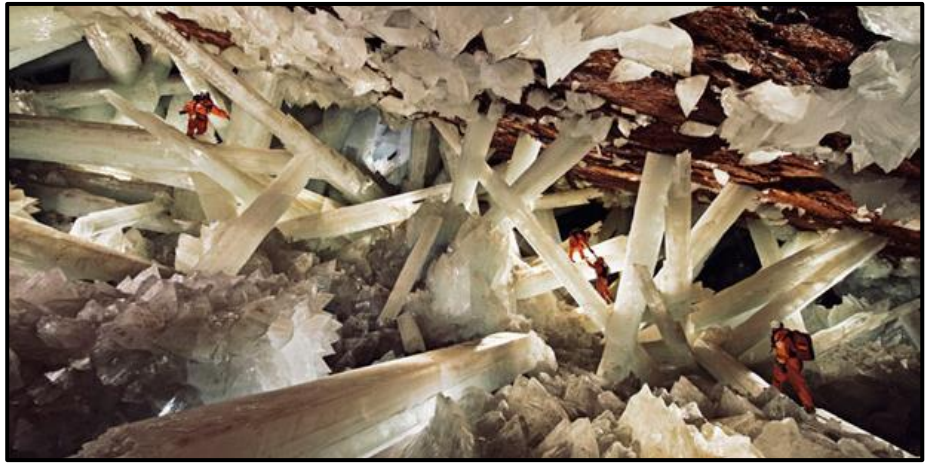
- you must also be a P.Geo. to become a '***qualified person***' and a '***site professional***' (*terms defined in a variety of NS legislative acts involving petroleum and mineral exploration, and the environment*)
- these titles allow you to undertake a variety of specific tasks

In the petroleum and mining fields, as a qualified person you can:

- plan and manage exploration programs
- write provincial assessment reports, stock exchange feasibility studies, stock exchange technical exploration & mining reports and announcements

In the geo-environmental field, as a site professional you can:

- perform environmental monitoring & remediation activities
- plan, design (*with an engineer*), and supervise environmental monitoring and remediation activities



Professional Geoscientists in Nova Scotia

- so who needs to be a ***P.Geo.?***
  - ***Geologists*** – ***we have this degree at Acadia***
  - ***Environmental Geoscientists*** – ***we have this degree at Acadia***
  - ***Geophysicists*** – ***we do not have degree at Acadia***

    Geochemistry is not a recognized stream, except in BC; elsewhere, geochemists register as geologists or environmental geoscientists, depending on their orientation
- these are the three streams recognized nationally by the ***Canadian Geoscience Standards Council*** (*the group that sets the national geoscience standards*)

Definition

- ***What is 'the Practice of Geoscience'?***

"the performing of any activity that requires application of the principles of the geological sciences, and that concerns the safeguarding of public welfare, life, health, property, or economic interests, including, but not limited to:

Geological Exploration

investigations, interpretations, evaluations, consultations or management aimed at discovery or development of metallic or non-metallic minerals, rocks, nuclear or fossil fuels, precious stones and water resources; and (***note that this does not include rock quarries***)

Public Well-Being & Environment

investigations, interpretations, evaluations, consultations, or management relating to geoscientific properties, conditions or processes that may affect the well-being of the general public, including those pertaining to preservation of the natural environment."

Professional Geoscientist Act

- to be a ***Professional Geoscientist*** in Nova Scotia, you must join/be a member of the ***Association of Professional Geoscientists of Nova Scotia*** ***(APGNS; AKA Geoscientists NS)***
- the ***APGNS*** admits ***P.Geo.***s using the guidelines and procedures established by the ***Canadian Geoscience Standards Council*** for professional registration
- other provinces have similar professional geoscience associations, in some cases joined with the engineers, that have a similar purpose and operate in a similar manner (*note that in our federal constitution, regulation of the professions is a provincial responsibility; also note that Quebec's system is a bit different from this, for various legal and historical reasons*)
- The ***Canadian Geoscience Standards Council*** attempts to standardize professional geoscience registration across the country by bringing all provincial associations together, and thereby allow easy qualification transfer

Professional Geoscientist Act

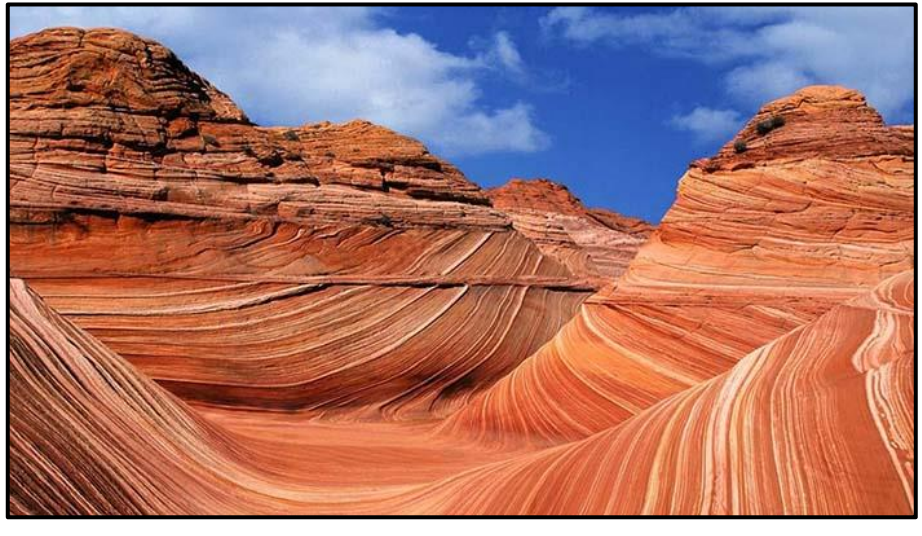
- The ***Nova Scotia Professional Geoscientist Act*** gives the ***APGNS***, the authority to:
  - *admit members with suitable credentials*
  - *investigate, judge and discipline members for malpractice*
  - *requires the APGNS to keep a **public record** of disciplinary actions (unlike doctors, lawyers, etc. - which don't make their disciplinary hearings or records public)*
- The ***NS Professional Geoscientist Act*** allows Nova Scotia P.Geo.s to:
  - *automatically be able to **'practice geoscience'** in Nova Scotia*
  - *allows them to become members of another professional geoscientist association in another province (and some other states/countries) merely by paying their registration fees; you **HAVE TO** register though; in Canada, it's a simple form, with email confirmation => quick)*
  - *note that there is no such thing as **'incidental practice'**, meaning you officially can't undertake geoscience work in another province for a 'couple of days'; you **HAVE TO** register there too!*

Professional Geoscientist Act

- The ***Nova Scotia Professional Geoscientist Act*** does not allow an un-registered geoscientist to:
  - advertise themselves as a ‘geoscientist’, ’geologist’, ‘geophysicist’, ‘geochemist’, ‘mineralogist’, paleontologist’, ‘stratigrapher’, ‘structural geologist’, or any other sub-discipline practitioner or professional
  - work independently in the field of geoscience *(i.e. without a boss who is a professional geoscientist)*
  - submit assessment reports, other government prospecting documents, stock market exploration/mining announcements, or feasibility studies *(including preliminary economic assessments and pre-feasibility studies)*

Professional Geoscientist Act

- The ***Nova Scotia Professional Geoscientist Act*** also requires Nova Scotia P.Geo.s to:
  - participate in a professional development program to continue to enhance their abilities and knowledge while on the job
  - practice geoscience in an ethical manner that will maintain public safety and protect the environment



P.Geo. Admission Requirements

- to join the ***APGNS***, you are required to satisfy five requirements
  - **achieve knowledge** (*pass the necessary curriculum approximately equivalent to a 4-year Canadian honours geology program*)
  - **achieve experience – 2 formats (transition phase); done while an MIT**
    - *48 months of experience with diaries describing work undertaken and things learned (old system)*
    - *New competency-based system involves completing specific achievements related to 29 different competencies (48 months is likely necessary to complete these)*
  - **have four references** (*4 must be geoscientists/engineers; 2 for MITs*)
  - **adequately speak an official language of the province**
  - **pass a professional practice/ethics exam** (*ensuring you have local knowledge of relevant laws, ethical issues; the curriculum and text is provided in advance by the* ***APGNS***)
- obviously, Acadia students need to know what these knowledge requirements are!

Knowledge Requirements

common to all streams

(Geologist, Geophysicist, Environmental Geoscientist)

(Gp 1A) 3 Compulsory Foundation Science Educational Units (EUs)

- Mathematics (*1st year calculus, statistics, matrix algebra, number theory*)
- Physics (*intro, 1st year, w/lab*)
- Chemistry (*intro, 1st year, w/lab*)

(Gp 1B) 6 Additional Foundation Science EUs – *up to 2 from each subject*

- Mathematics (*1st year calculus, statistics, matrix algebra, number theory*)
- Physics (*intro, 1st year, w/lab*)
- Chemistry (*intro, 1st year, w/lab*)
- Biology (*intro, 1st year, w/lab*)
- Statistics (*see above*)
- Computer Programming (*coding in relevant, modern computer language*)

- ***Note:*** *EU = 'educational unit' is basically a one-semester/one-term course at Acadia*
- ***Note:*** *except for Mathematics and Statistics, these courses must have lab and must be >= 1st year university level AND acceptable for credit in a degree in science or applied science/engineering*

Knowledge Requirements

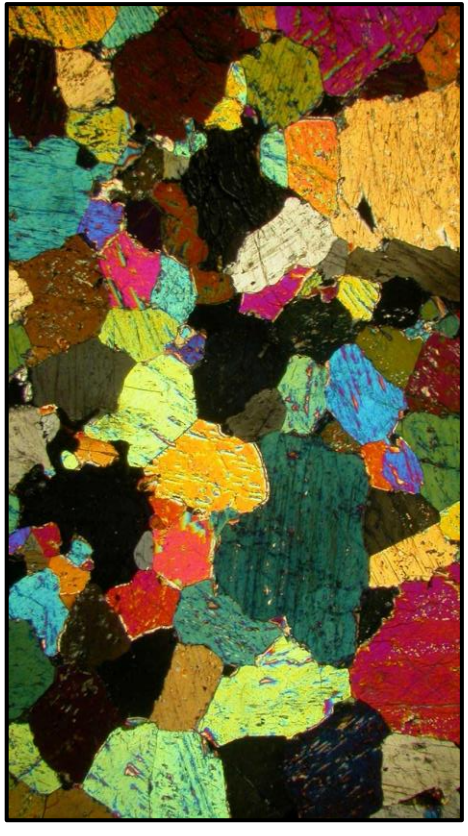
common to all streams

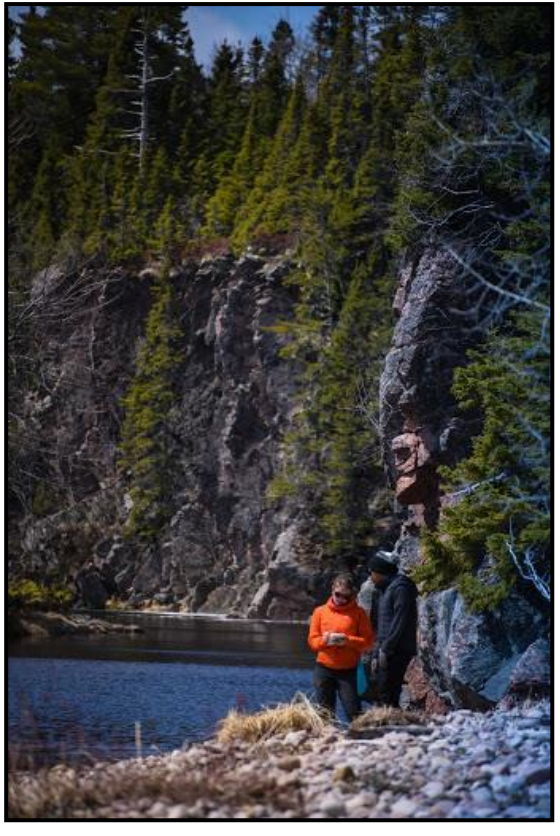
(Geologist, Geophysicist, Environmental Geoscientist)

(Gp 2A) 4 Compulsory Foundation Geoscience EUs

- Field Techniques
- Mineralogy and Petrology
- Sedimentation and Stratigraphy
- Structural Geology

Note: *the material in these educational units may be equivalently studied as material in several courses; regardless, these courses must be acceptable for credit toward a degree in geoscience*





Knowledge Requirements

different for each stream

(Gp 2B) 5 Additional Foundation Geoscience EUs

GEOLOGY

Geochemistry
Geophysics

Igneous Petrology
Metamorphic Petrology
Sedimentary Petrology

Sedimentology
Glacial Geology/Geomorphology
Remote Sensing

ENV GEOSCIENCE

Geochemistry
Geophysics

Hydrology/Hydrogeology
Engineering Geology

Geomorphology/Soil Science
Glacial Geology
Remote Sensing

GEOPHYSICS

Digital Signal Processing

Global Geophysics

Seismology & Seismic Methods

Exploration Geophysics

Potential Fields & Radiometrics

Electrical/Electromagnetic Methods

Note: *Geology and Environmental Science require 1 or 2 EUs from each sub-group, but only one from each subject*

Note: *Geophysics requires 1 EU from 5 of the 6 sub-groups*

Knowledge Requirements

common to all streams

(Geologist, Geophysicist, Environmental Geoscientist)

(Gp 2C) 9 Other Geoscience/Science EUs

An extensive list is available on pages 7-9 and 12-21 in the Canadian Geoscience Standards Council's ***General Knowledge and Experience*** (***GKE***) document:

https://geoscientistscanada.ca/source/GC-Knowledge-Requ-BKLT--REV--EN--web--final-.pdf

Basically, any geoscience or environmental science course offered at Acadia, and many other science courses that relate to geoscience, will qualify

(e.g., CHEM 2853 - Environmental Analytical Chemistry; ENVS 3423 – Environmental Impact Assessment; BIOL 2033 - Ecology; APSC 3413 - Environmental Engineering)

Note: *these courses must be 2nd year or higher* ***and*** *acceptable as a science credit toward a degree in science or applied science/engineering* ***and must be relevant to geoscience***

Note: *GEOL 1033 (Oceanography), GEOL 1073 (Natural Disasters), CHEM 1053 (Chemistry in the Modern World), PHYS 1513/1523 (Astronomy), PHYS 1543 (Energy), and PHYS 1553 (Physics of Music)* ***do not satisfy these requirements***

Note: *PHYS 1563 (Physics and the Environment) does qualify as a group 1A course*

Knowledge Requirements - Summary

common to all streams

(Geologist, Geophysicist, Environmental Geoscientist)

Geoscience Courses = 18

(*note that the APGNS does not stipulate you need to take introductory geology courses; i.e., GEOL 1013 & GEOL 1023; however, you will need to have taken them as pre-requisites for the 18 advanced Geoscience courses you do need to take at Acadia*)

Introductory (First Year) Geoscience Courses = 2

Total Geoscience Courses = 20

+ Other Science Courses = 9

(29 science courses in all)

How do these EUs match up with Acadia ***Geology & Env. Geoscience Major & Honours Degree*** *programs?*

Acadia Major Geology Degree

CORE

- Physical Geology (1013)
- Historical Geology (1023)
- **Mineralogy (2133)**
- History of Life (2213)
- **Petrology & Stratigraphy (2043)**
- **Geomorphology (2703)**
- **Field Methods (2083)**
- **Sedimentary Geology (3303)**
- **Igneous Petrology (3403)**
- **Metamorphic Geology (3503)**
- **Structural Geology (3603)**
- Global & North American Geology (4103)

PRE-REQUISITES

- Chemistry (1013 & 1023)
- Physics (1053 & 1063)
- Math (1013 & 1023 - *calculus*, 2233 & 2243 – *statistics*, or 1333 & 2313 – *matrix algebra*)
- 4 Other Science Courses (from MATH, PHYS, CHEM, BIOL, COMP, APSC; *must have 4 for minor*)

5 ELECTIVES (possible list, plus others)

- Atmosphere, Weather & Climate (2753)
- Hydrogeology (3723)
- **Geochemistry (3103; *alternate years, opposite 3823*)**
- **Geophysics (3823; *alternate years, opposite 3103*)**
- Energy Sources (4843; *alternate years, opposite 4713*)
- **Quaternary Geology (4713; *alternate years, opposite 4843*)**
- Mineral Deposits (4803)
- Advanced Field School (4083)
- Geochemical Material Transfer (4823)
- Mineral Exploration (4813)
- Applied Geochemistry (4833)
- Soil Science (4913)

< blue courses only taught with parallel grad course >
< maroon course only taught with sufficient interest >

Acadia Honours Geology Degree

CORE

- Physical Geology (1013)
- Historical Geology (1023)
- **Mineralogy (2133)**
- History of Life (2213)
- **Petrology & Stratigraphy (2043)**
- **Geomorphology (2703)**
- **Field Methods (2083)**
- **Sedimentary Geology (3303)**
- **Igneous Petrology (3403)**
- **Metamorphic Geology (3503)**
- **Structural Geology (3603)**
- Global & North American Geology (4103)
- **Honours Thesis (4996; counts as 2 EUs)**

PRE-REQUISITES

- Chemistry (1013 & 1023)
- Physics (1053 & 1063)
- Math (1013 & 1023 - *calculus*, 2233 & 2243 *statistics*, or 1333 & 2313 – *matrix algebra*)
- 4 Other Science Courses (from MATH, PHYS, CHEM, BIOL, COMP, APSC; *must have 4 for minor*)

5 ELECTIVES (possible list, plus others)

- Atmosphere, Weather & Climate (2753)
- Hydrogeology (3723)
- **Geochemistry (3103; *alternate years, opposite 3823*)**
- **Geophysics (3823; *alternate years, opposite 3103*)**
- Energy Sources (4843; *alternate years, opposite 4713*)
- **Quaternary Geology (4713; *alternate years, opposite 4843*)**
- Mineral Deposits (4803)
- Advanced Field School (4083)
- Geochemical Material Transfer (4823)
- Mineral Exploration (4813)
- Applied Geochemistry (4833)
- Soil Science (4913)

< blue courses only taught with parallel grad course >
< maroon course only taught with sufficient interest >

Course Totals

Geology Major

- *17 Geology Courses **(20)***
- *10 Other Sciences **(9)***
- *27 Science Courses Total **(29)***

Need to:

Take three Geology or relevant courses as university (*free*) electives

Also take either Geochemistry or Geophysics as one of your geology electives

Geology Honours

- *19 Geology Courses **(20)***
- *10 Other Sciences **(9)***
- *29 Science Courses Total **(29)***

Need to:

Take one Geology or relevant course as a university (*free*) elective

Also take either Geochemistry or Geophysics as one of your geology electives

***Note:** you can reduce (by one) the # of Geology courses you must take as free electives by ensuring that the extra (10th) science course required for your degree is relevant to geoscience, satisfying the Other Geoscience/Science requirement*

***Note:** Co-Op credits do not count toward educational requirements, but time/competencies mastered can be credited as experience requirements*

Acadia Major Environmental Geoscience Degree

CORE

- Physical Geology (1013)
- Historical Geology (1023)
- Environmental Science I (1013)
- Environmental Science II (1023)
- **Mineralogy (2133)**
- History of Life (2213)
- **Petrology & Stratigraphy (2043)**
- **Field Methods (2083)**
- **Geomorphology (2703)**
- **Geochemistry (3103; *alternating yearly with 3823*)**
- **Geophysics (3823; *alternating yearly with 3103*)**
- **Hydrogeology (3723)**
- **Sedimentary Geology (3303)**
- **Structural Geology (3603)**
- Legal Issues (3113)
- Environmental Impact Assessment (3423)

PRE-REQUISITES

- Chemistry (1013 & 1023)
- Physics (1053 & 1063)
- Math (1013 & 1023 - *calculus*, 2233 & 2243 - *statistics*, or 1333 & 2313 – *matrix algebra*)
- Biology (1113 & 1123)
- 4 Other Science Courses (from MATH, PHYS, CHEM, BIOL, COMP, APSC; *must have 4 for minor*)

3 ELECTIVES (possible list, plus others)

- Atmosphere, Weather & Climate (2753)
- Contaminants in the Environment (3613)
- Energy Sources (4843; *alternating yearly with 4713*)
- **Quaternary Geology (4713; *alternating yearly with 4843*)**
- Global & North American Geology (4103)
- Mineral Deposits (4803)
- Advanced Field School (4083)
- Geochemical Material Transfer (4823)
- Mineral Exploration (4813)
- Applied Geochemistry (4833)
- **Soil Science (4913)**

< blue courses only taught with parallel grad course >

< Soil Science only taught with sufficient interest >

Acadia Honours Environmental Geoscience Degree

CORE

- Physical Geology (1013)
- Historical Geology (1023)
- Environmental Science I (1013)
- Environmental Science II (1023)
- **Mineralogy (2133)**
- History of Life (2213)
- **Petrology & Stratigraphy (2043)**
- **Field Methods (2083)**
- **Geomorphology (2703)**
- **Geochemistry (3103; *alternating yearly with 3823*)**
- **Geophysics (3823; *alternating yearly with 3103*)**
- **Hydrogeology (3723)**
- **Sedimentary Geology (3303)**
- **Structural Geology (3603)**
- Legal Issues (3113)
- Environmental Impact Assessment (3423)
- **Honours Thesis (4993A and B; counts as 2 EUs)**

PRE-REQUISITES

- Chemistry (1013 & 1023)
- Physics (1053 & 1063)
- Math (1013 & 1023 - *calculus*, 2233 & 2243 - *statistics*, or 1333 & 2313 – *matrix algebra*)
- Biology (1113 & 1123)
- 4 Other Science Courses (from MATH, PHYS, CHEM, BIOL, COMP, APSC; *must have 4 for minor*)

3 ELECTIVES (possible list, plus others)

- Atmosphere, Weather & Climate (2753)
- Contaminants in the Environment (3613)
- Energy Sources (4843; *alternating yearly with 4713*)
- **Quaternary Geology (4713; *alternating yearly with 4843*)**
- Global & North American Geology (4103)
- Mineral Deposits (4803)
- Advanced Field School (4083)
- Geochemical Material Transfer (4823)
- Mineral Exploration (4813)
- Applied Geochemistry (4833)
- Soil Science (4913)

< blue courses only taught with parallel grad course >
< maroon course only taught with sufficient interest >

Course Totals

Environmental Geoscience Major

- *16 Geology/ENVS Courses past 1st year (20)*
- *10 Other Sciences (9)*
- *26-28 Science Courses Total (29)*

Need to:

May need three or four Geology, Environmental Science, or relevant courses as university (*free*) electives

Environmental Geoscience Honors

- *18 Geology/ENVS Courses past 1st year (20)*
- *10 Other Sciences (9)*
- *28 Science Courses Total (29)*

Need to:

May need one or two Geology, Environmental Science, or relevant courses as university (*free*) electives

Note: *you can reduce (by one) the # of Geoscience courses you must take as free electives by ensuring that the extra (10th) science course required for your degree is relevant to geoscience, making it satisfy the Other Geoscience/Science requirement*

Note: *Co-Op credits do not count toward educational requirements, but time/competencies mastered can be credited as experience requirements*

P.Geo. Admission Requirements

- **During your time at Acadia:**
  - *make sure (w/Drs. Raeside, O'Driscoll, or myself) you take the right courses to satisfy the appropriate knowledge requirements*
  - *we advise you in your course selection based on the local (NS) general knowledge and experience requirements*
  - ***CAVEAT:** if you register in another province, you should be aware that their educational requirements may not be identical to Nova Scotia's, **and this may cause your application to be rejected***

P.Geo. Admission Requirements

- **Then, after completing your degree:**
  - *apply for status as an MIT in Nova Scotia with the APGNS (**preferred for Acadia BSc & MSc students, including Fleming transfers**) or other provincial equivalents (**resume booster!**); **apply in your graduation year & avoid the $100 application fee***
  - *get a job in the geology/geo-environmental field **(this can be anywhere – it doesn't have to be in Nova Scotia; however, your experience won't count unless you are supervised by a professional geologist)***
  - *be 'mentored' by a professional geoscientist (your boss of supervisor) and keep a log of the work & responsibilities you undertake, or describe the competencies you have achieved*
  - *after ~48 months of geoscience experience that is cumulative and progressive in responsibility and technical achievement, you will likely be ready to apply for full membership to the APGNS and become a **professional geoscientist***
  - *if you are a NS MIT and working in another province at that time, you should become a P.Geo. in NS first, and then transfer your membership to the professional geoscience association in that province **(MITs can't transfer)***

Questions ?

- **for more information regarding the Canadian P.Geo admissions requirements, see the Geoscientists Canada website containing the CGSC recommendations:**

https://geoscientistscanada.ca/source/GC-Knowledge-Requ-BKLT--REV--EN--web--final-.pdf

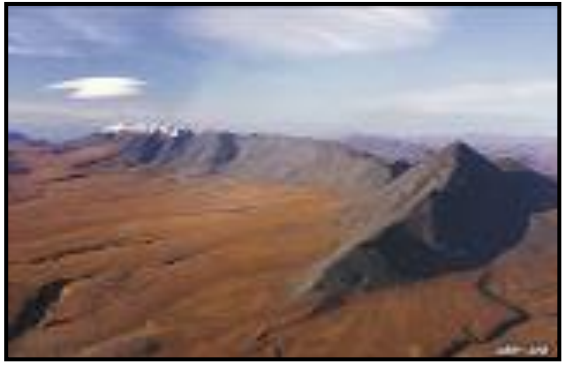
or the APGNS website containing province-specific information:

http://www.geoscientistsns.ca/

- **for more information about the Nova Scotia Geoscience Act, see the NS government website at:**

https://nslegislature.ca/sites/default/files/legc/statutes/geosprof.htm





Questions ?

- **if you have any additional questions about this presentation, please contact:**

  Dr. Cliff Stanley, P.Geo. – *NS CGSC member, member of the APGNS Admissions Board*
  - *HSH 335, 585-1344, cliff.stanley@acadiau.ca*

  Dr. Rob Raeside – GEOL, ENGO Advisor
  - *HSH 329.1, 585-1323, rob.raeside@acadiau.ca*

  Dr. Nelson O'Driscoll – ENVS Advisor
  - *KCIC LL 55, 585-1679, nelson.odriscoll@acadiau.ca*

- **if you have any questions about registration, the registration process, eligibility, *etc*. please contact:**

  David Carter – APGNS Registrar
  - *902-229-1315, registrar@geoscientistsns.ca*

Thank You !