GEOSCIENTISTS
NOVA SCOTIA

Association of Professional Geoscientists of Nova Scotia

Applicant Assessment – Academic Requirements Guide

THE ASSOCIATION OF PROFESSIONAL GEOSCIENTISTS OF NOVA SCOTIA
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EXECUTIVE SUMMARY

The APGNS “**Applicant Assessment - Academic Requirements Guide**” is a reference document developed by the APGNS Admissions Board (the ‘Board’) for the evaluation of applications for professional geoscience registration. It is also the supporting document for the APGNS “**Applicant Academic Self-Assessment Worksheet”**.

This Guide and the Self Assessment Worksheet Tool are made available to applicants for professional geoscience registration (member and/or member-in-training) for information purposes.

The educational requirements detailed here are based on the ***Geoscience Knowledge and Experience Requirements for Professional Registration in Canada*** (GKE).

The GKE has been approved by APGNS as the fundamental reference in the evaluation of applicants for professional geoscience registration. The GKE sets the minimum academic requirements as equivalent to a typical four (4) year degree in geoscience at a Canadian university. The GKE also defines the minimum geoscience work experience requirement for professional registration as a period of forty-eight (48) months of professionally supervised, practical, cumulative and progressive, geoscience work experience (the GKE document is available on the Association website www.geoscientistsns.ca).

The GKE identifies three ‘streams’ of professional geoscience registration:

- Geology,
- Environmental Geoscience, and
- Geophysics.

Each registration stream has a common set of fundamental science requirements as well as specific geoscience requirements.

The basic academic evaluation unit of the GKE is the ‘educational unit’ (EU). This is defined as the equivalent of a one term course, meeting (lecture time) three hours per week, with or without a laboratory component, for 13 weeks, in a 120 credit-hour, 4-year degree program and which is acceptable for academic credit in a science or engineering curriculum.

The EU, as used here, does not address the manner in which material in each subject area is presented in university or college programs. Its purpose is to provide a qualitative statement about the knowledge expected, when both knowledge and experience qualifications are evaluated for the purpose of professional registration.

The determination of what is acceptable as an academic credit or EU, is at the discretion of the Board and will be determined based on the evaluation of the total of the information presented in the application file.

DISCLAIMER

To the users of this document:

This Applicant Assessment – Academic Requirements Guide has been developed, is published and distributed by the Association of Professional Geoscientists of Nova Scotia (APGNS) as a reference for the APGNS Admissions Board. It is also made available to applicants for professional geoscience registration in the evaluation of their academic training.

Persons relying on this tool should be aware that it is intended as an aid and a reference and that it does not constitute a guarantee of professional registration.

In all cases, the applicant or candidate for professional registration bears the onus and sole responsibility of meeting the requirements for professional registration to the satisfaction of APGNS.

Determination of the acceptability of any EU will be determined individually and based on the information made available for the evaluation and is at the discretion of the Board.

TABLE OF DEFINITIONS AND ACRONYMS

Applicant	A person who has applied for professional registration (membership) in APGNS.
Candidate	A person who is considering applying for professional registration (membership) in APGNS.
APGNS	The official legislated name of the Association, established by the Geoscience Profession Act is “Association of Professional Geoscientists of Nova Scotia”; the Association is also known by the ‘brand’ name “Geoscientists Nova Scotia”.
Geoscientists Canada	A national body comprised of the professional geoscience regulators, the constituent associations of professional geoscientists from most jurisdictions in Canada; formerly known as the “Canadian Council of Professional Geoscientists” (CCPG).
Canadian Geoscience Standards Board	‘CGSB’ - A standing committee of Geoscientists Canada made up of representatives from each constituent association with a mandate to facilitate standardization of admissions requirements and mobility of professional geoscientists across Canada.
Admissions Board	The standing committee or board of APGNS, comprised of members and advisors tasked by APGNS Council with ensuring that those individuals admitted to the Association as professional geoscientists (members and/or members-in-training) have the necessary qualifications, education, and experience.
Council	The management board that establishes the policies and directs the activities of APGNS.
Geoscientists Nova Scotia	The ‘brand’ name of the Association; it may not be abbreviated
GKE	The Geoscience Knowledge and Experience Criteria for Professional Registration in Canada; a guideline document produced by the CGSB, and used by each constituent association to assess registration qualifications of applicants, or to establish their own requirement qualifications for membership.
NPPE	National Professional Practice Exam; successful completion is required by APGNS for professional geoscience registration
EU’s	The basic academic evaluation unit as described by the GKE.

INTRODUCTION

The applicant for professional geoscience registration must first understand and identify the appropriate 'stream' of professional geoscience registration in which they have trained, will practice and, therefore, will be applying under.

Based on the GKE, in Nova Scotia, three streams of geoscience practice are recognized:

- Geology,
- Environmental Geoscience, and
- Geophysics.

It is important to understand that the selection of which 'stream' to apply under can significantly influence the success or failure of the application. The appropriate 'stream' should be determined based on the applicant's academic training, their geoscience work experience, and their planned career path.

If the applicant's academic training and work experience are in the field of geology, environmental geoscience, or geophysics, they should apply under the corresponding 'stream' because it best fits his/her career path. In some cases, the Board may require additional academic training or supplemental courses, or additional work experience to fulfill the requirements of a specific stream. For example, an applicant who has completed the academic requirements under the geology stream, but is working or intends to work in environmental geoscience, may be required to complete additional academic courses or gain additional work experience to demonstrate that they have fulfilled the requirements for professional registration.

If the applicant's academic training is in the field of environmental science, and he/she does not have a substantial 'geoscience component', they may not have the academic training required for registration as a professional geoscientist, and therefore they should consider an alternative designation perhaps as an 'environmental scientist'.

If the applicant is uncertain about the appropriate application 'stream', they should contact the Registrar and request assistance (registrar@geoscientistsns.ca or 902-420-9928).

In addition to the three 'streams' identified above, there are two registration categories which are considered by the Board:

- Member-in-Training (MIT), and
- Member (P.Geo).

Registration as a Member-in-Training (MIT)

Applicants who are recommended for registration as a Member-in-Training (MIT) will have satisfied the academic requirements for professional registration, but will not have gained the required minimum of forty eight (48) months

of acceptable geoscience work experience. (Applicants should refer to the APGNS MIT Program Guide and the Components of Acceptable Geoscience Work Experience for information regarding the work experience.)
MIT's may be eligible for assistance from a mentor in the preparation of their work experience diaries. The diaries must document the professional and personal development of the MIT through their supervised work experience. The diaries and accompanying documentation must be prepared and submitted in the approved form and format.

On completion of twenty four (24) months of geoscience work experience, the MIT may be apply to write the National Professional Practice Exam (NPPE), which is also a requirement for registration as a P.Geo.

Registration as a Member (P.Geo.)

Applicants, who have satisfied the academic training and work experience requirements, as well as the successful completion of the NPPE, may be recommended for registration as a professional geoscientist (P.Geo).

The academic requirements, specific to each registration 'stream' are summarized in Figure 1.

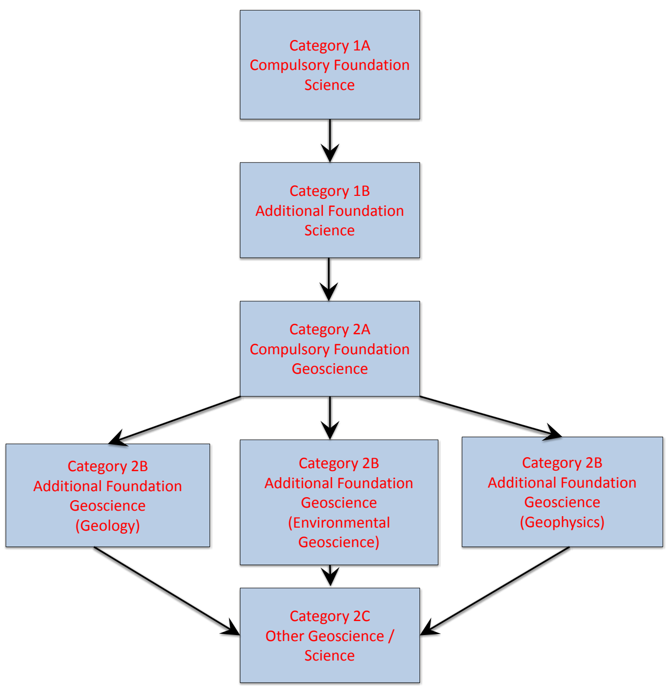

Figure 1. **Summary of the path to professional geoscience registration – academic requirements and the three 'streams' of professional practice.**

EDUCATIONAL REQUIREMENTS

Each registration 'stream' (Geology, Environmental Geoscience, and Geophysics) requires a minimum of twenty-seven (27) educational units (EU's) to satisfy the academic training requirements of the GKE. Collectively, these may or may not constitute the requirements for an undergraduate (bachelors) degree in geoscience.

These EU's are broken down into three (3) categories and five (5) groups. The table below shows the number of EU's required from each. The categories and groups are:

Category 1 - Foundation Science
• 3 EU's are required from Compulsory Foundation Science (Group 1A)
• 6 EU's are required from Additional Foundation Science (Group 1B)
Category 2 - Foundation Geoscience
• 4 EU's are required from Compulsory Foundation Geoscience (Group 2A)
• 5 EU's are required from Additional Foundation Geoscience (Group 2B)
Category 3 - Other Geoscience / Science
• 9 EU's are required from Other Geoscience / Science (Group 2C)

All of the EU's are equivalent in duration to a one-semester course (usually 13 weeks), offered at a university or community college. Collectively, these academic requirements comprise the science courses that are typically required for an undergraduate (bachelors) degree in Geology, Environmental Geoscience, or Geophysics from a Canadian university.

Some of the material identified in the 27 EU's may be obtained via 'non-traditional' courses or training which would be evaluated individually by the Board, based on information and supporting materials provided by the applicant, to determine if they are acceptable as alternatives.

Notes:

- ***In all cases, it is the responsibility of the applicant to demonstrate or provide sufficient background and/or supporting information for the Board to conclude that their academic training is equivalent to the EU's required by the Board.***
- ***In many of the descriptions provided herein, and where appropriate for the purpose of clarity, the term 'course' has been used interchangeably with the term 'EU'.***
- ***In all of the requirements, the preferred courses have a laboratory component to their instruction. For***

Chemistry, Physics, and Biology courses in categories 1A and 1B, these are considered 'traditional' laboratories.

- ***In Mathematics, Statistics, and Computer Science courses to be considered in categories 1A and 1B, the laboratory component is typically offered as a tutorial involving the completion of quantitative exercises under the supervision and assistance of the instructor or teaching assistant***

- ***Laboratory components for Geoscience courses may take many forms, and include the more traditional laboratory components as noted above, as well as microscope laboratories, afternoon or weekend fieldtrips, and multi-week-long field schools.***

- ***Some advanced geoscience courses may not include a laboratory component. This would not necessarily preclude their potential to satisfy an EU as required by the Board, provided that the majority of geoscience courses include laboratory instruction as part of their curriculum.***

- ***Acceptability of any EU will be determined individually and based on the information made available for the evaluation and is at the discretion of the Board.***

CATEGORY 1. FOUNDATION SCIENCE

The subject of geoscience builds on scientific principles that are central to a number of other science subjects, notably chemistry, physics and mathematics. A geoscientist must have basic knowledge in these foundation sciences to practice geoscience. The sections below provide detailed descriptions of the individual course requirements.

Group 1A – Compulsory Foundation Science

Chemistry, physics, and mathematics are fundamental to geoscience, and thus a foundation in these disciplines is considered necessary to be able to understand geoscience principles and practice as a geoscientist.

University curricula typically offer two overall introductory courses in chemistry and physics that provide an appropriate overview of these subjects and serve as pre-requisites both to advanced courses in chemistry and physics, and to other degrees in science and applied science. These introductory courses, typically offered as 1st year, one semester, general overview classes, with a laboratory component, satisfy the EU's in the Group 1A (Compulsory Foundation Science) because they provide the foundation of the chemistry and physics theory that is built on in geoscience curricula, and thus are necessary to understand material in upper level geoscience courses.

In contrast, university mathematics curricula typically have a different format, as no single pair of mathematics courses provides an overall introduction to all parts of the mathematics discipline. Rather, analogous pairs of introductory mathematics courses in the sub-disciplines of calculus, probability and statistics, and linear/matrix algebra (and possibly others) are typically offered. Courses in any of these sub-disciplines may be useful to the geoscientist, providing an appropriate mathematical foundation that can be used in upper-level geoscience courses.

Because no single pair of first year mathematics courses provides an overview of the entire discipline of mathematics, and because most first year mathematics courses offered are relevant to geoscience, any pair of first year mathematics courses (not necessarily calculus) can be used to demonstrate that applicants have sufficient numeracy to be able to understand and use quantitative information in geoscience applications.

Chemistry

An introductory chemistry class, with laboratory, that, together with a second similar subsequent chemistry course, covers all of the basics of chemistry and which, with the second subsequent course, represents a pre-requisite for future chemistry courses and other science degrees.

Physics

An introductory physics class, with laboratory, that, together with a second similar subsequent physics course, covers all of the basics of physics and which, with the second subsequent course, represents a pre-requisite for future physics courses and other science degrees.

Mathematics

A 1st year, one semester, mathematics class in calculus, probability & statistics, or linear/matrix algebra that, together with a second similar subsequent calculus, probability & statistics, or linear/matrix algebra course, covers all of the basics of these sub-disciplines and which, with the second subsequent course, represents a pre-requisite for future mathematics courses in its sub-discipline.

Group 1B – Additional Foundation Science

Although chemistry, physics, and mathematics are foundational sciences to geoscience, knowledge of other sciences may be necessary to understand many geoscience principles. As a result, geoscientists should also have basic knowledge in this broader array of scientific disciplines.

Chemistry, Physics, Mathematics

The chemistry, physics, and mathematics courses described in Group 1A typically have a second semester course that follows on from the first course to complete presentation of the first year curriculum in chemistry, physics, calculus, probability & statistics, and linear/matrix algebra.

A geoscientists general science background will be more complete if they take both of these introductory courses, if the applicant intends to submit one or two chemistry, physics, or mathematics course in the Group 1B category, the Board prefers that the first of those courses be these second chemistry, physics and mathematics courses. A second chemistry or physics course can then be a second year course that requires the introductory chemistry or physics courses described above as pre-requisites. The second mathematics course can be another first year, introductory course in another mathematics sub-discipline (calculus, probability & statistics, linear/matrix algebra), or a second year course that requires the two introductory mathematics sub-discipline courses described above as pre-requisites.

Biology

Geoscience practice may, because of interactions between the biosphere and geosphere, require basic, foundational knowledge of topics traditionally included in a university biology curriculum.

If a applicant wishes to submit one or more courses in Biology in Group 1B category, the Board requires that the first of, or a pair of, biology courses that provide an introductory overview of biology, covering all of the basics of the discipline at both macro- (organismal and ecological) and micro- (molecular, cell and genetics) scales; these courses should serve as pre-requisites for subsequent, second year biology courses, and should include a laboratory.

Computer Programming

The software to undertake specific geoscience applications is not always available; as a result, the geoscientist may be required to write or develop computer software to undertake specialized, geoscience-oriented, computer applications; courses in computer programming offer the geoscientist a skill-set that may be of significant use in their geoscience career.

If a applicant wishes to submit one or more courses in computer programming in Group 1B, the Board requires the first of, or a pair of, computer programming courses that present an introduction to the method of writing computer programs; these courses need not involve any specific computer programming language, but rather should present the operational algorithms and data structures used by programmers to achieve specific results, and include algorithm performance analysis; if two computer science courses are to be offered to satisfy Group 1B requirements, these do not necessarily have to involve the same computer programming language (although they must include different algorithmic and data structure curriculum).

Note:

- ***Eligible computer programming courses are not courses that teach students the basics of word processing and/or spreadsheet calculations, or that overview the use of computers and the organization of computer systems in society.***

Statistics

Because:

i) statistics curricula in many universities are offered through mathematics departments,

ii) probability curricula are intimately related to the statistics curricula, and

iii) because students taking both probability and statistics courses enhance their scientific numeracy;

the Board makes no distinction between probability and statistics courses and mathematics courses in the GKE, using them inter-changeably in the 1A and 1B Groups; as a result, probability, statistics, calculus, and linear/matrix algebra courses can all serve mathematics EU requirements in Groups 1A or 1B; additionally, probability & statistics courses can serve as statistics EU requirements in Group 1B.

Notes:

- ***The intent of the Group 1B EU requirements is to ensure that a professional geoscientist has a broad scientific background. As a result, the Board will not accept more than three numerically-oriented courses that satisfy mathematics and statistics requirements in Group 1B (for a total of four numerically-oriented courses). This is because two mathematics and two statistics courses would not provide the applicant with a broad background in the foundation sciences, because too few other science courses would have been completed.***

- ***At many universities, fundamental science courses are sometimes offered in specialized sections tailored to various student groups (e.g., calculus for physical sciences, physics for engineers, chemistry for pre-med students, etc.). The intent is to make the course relevant to these various student groups.***

- ***Modifications within these courses range from merely using class, laboratory, or exercise examples with particular relevance to the corresponding student groups (e.g., using a genetics problem in a probability course), to the emphasis of certain traditionally-included course components of the science to the exclusion of others (e.g., focusing on the mechanics of limb motion during walking in a physics course for biology majors, requiring the exclusion, due to time constraints, of electromagnetic induction theory).***

- ***Such courses may not be designated or acceptable for geoscience or engineering students or acceptable for a geoscience or engineering degree program. Therefore, these courses may not satisfy the EU requirements in Groups 1A and 1B.***

CATEGORY 2. FOUNDATION GEOSCIENCE

The streams of professional geoscience registration (Geology, Environmental Geoscience, Geophysics) have certain knowledge requirements that are common to each stream. These are described in Group 2A. However, each stream also has certain knowledge requirements that are specific to the stream. These are described in Group 2B.

Group 2A – Compulsory Foundation Geoscience

Four compulsory foundation geoscience courses, shown in Group 2A below, are common to the three geoscience streams, and so every applicant for professional geoscience registration must have background in these fields. These courses must be one semester in duration (or equivalent) taught at a level of 2nd year or higher and including a laboratory component.

Field Techniques

A field-based course that presents the basics of geoscience data collection, including the collection of strike and dip information, the construction of geological maps, cross sections, and stratigraphic columns.

This course should provide the geoscientist with exposure to the mapping and measuring of as wide a variety of rock types, ages, structures, sedimentary and metamorphic facies, and igneous phases, and contact relationships as geographically possible.

This course should be the equivalent of a one semester university course, but can be a full-time course taken within a confined time period (*e.g.*, 8 hrs/day for 14 days = 112 contact hours; note that a traditional course with 3 hours of lecture and laboratory (each), plus 3 hours of study per week for 13 weeks = 117 total hours).

Mineralogy and Petrology

A one-semester course, with laboratory, presenting the basics of mineralogy and petrology, including crystallography (crystal classes and systems), the optical theory necessary for petrographic mineral identification, the classification and hand-sample identification of minerals, mineral compositions and structures, the principles and uses of X-ray diffraction, and basic petrologic classification using mineral modes.

Sedimentation and Stratigraphy
A one-semester course, with laboratory, presenting the basics of sedimentation and stratigraphy, in a plate tectonic framework, including principles of topography, the law of superposition, cross-cutting relationships, the rule of V's, layer-cake geology, igneous bodies, and contact relationships such as structures, unconformities, disconformities, and igneous intrusions, sedimentary facies, and depositional environments.

Structural Geology
A one-semester course, with laboratory, presenting the basics of structural geology, including geological structure identification and geometry, plane and line measurement, the principles of stress and strain, brittle and ductile deformation, folding, faulting, shearing, and foliation, tensional and compressive strength, Mohr's circle, formation mechanisms, structural data analysis, and map interpretation.

Group 2B – Additional Foundation Geoscience

Additional foundation geoscience courses differ for each of the three geoscience streams, precisely because geoscientists must have different academic training to effectively practice in these different streams.

In this section, a number of the required courses are common in the Geology and Environmental Geoscience streams with others specific to the Geophysics stream. They are presented in the table below followed by detailed descriptions for each course.

The Board requires that each of the courses presented in the sections below requires a 2nd year or higher, one-semester course, with laboratory component. Of the detailed descriptions presented in the following sections, it is anticipated that, the majority of these topics will be addressed by the course material and the acceptance of the course as a required EU will be at the discretion of the Board.

Group 2B – Geology and Environmental Geoscience Streams

2B Geology stream	2B Environmental Geoscience stream
Geochemistry	Geochemistry
Geophysics	Geophysics
********	********
Igneous Petrology	Hydrology
Metamorphic Petrology	Hydrogeology
Sedimentary Petrology	********
********	Geomorphology or Soil Science
Sedimentology	Glacial Geology
Glacial Geology or Geomorphology	Remote Sensing
Remote Sensing	

Geochemistry

The course should present an overview of concepts involving geochemistry, including equilibrium, saturation, precipitation, crystallization, partitioning, fractionation, dissolution, buffering, pH, and redox processes as these relate to the geochemistry of the ocean and atmosphere, and the origin, distribution and geochemical cycles of elements in/on the Earth.

This can be achieved as a course focused in applied, aqueous, thermodynamic, or general geochemistry; unfortunately, courses dealing with isotope geochemistry, lithogeochemistry, and petrogeochemistry typically do not provide this background, and should be used to satisfy requirements in Group 2C as advanced geochemistry courses.

Geophysics

The course should present concepts involving applied geophysics, including the theory, survey design, instrumentation, applications, interpretation, and limitations of seismic, gravity, magnetic, radiometric, resistivity, induced polarization, self potential, electromagnetic, ground penetrating radar, LIDAR, etc, surveys applied to mineral and petroleum exploration, environmental assessment, monitoring, and remediation, and engineering geology, as appropriate.

Igneous Petrology

The course should present an overview of concepts involving igneous petrology, including magma origin and evolution, solid solution, liquidus, solidus, cotectic, peritectic, eutectic, solvus, equilibrium, and fractional crystallization, the application of physical and chemical principles to the origin and occurrence of igneous rocks, liquid immiscibility, filter pressing, heat transfer, mineral phase equilibria, and igneous activity through time.

Metamorphic Petrology

The course should present an overview of concepts involving metamorphic petrology, including the nature, origin, and textural, compositional, and metamorphic grade classification of metamorphic rocks, heat flow, partial melting, isograds, isobars, metamorphic facies, and metamorphic and metasomatic phase equilibria.

Sedimentary Petrology

The course should present an overview of concepts involving sedimentary petrology, including hand sample and microscope description, classification, and interpretation of ancient and modern sediments and sedimentary rocks, and their composition, texture, sorting, diagenesis, and the geochemistry and mineralogy of clastic, carbonate, and (other) chemical sedimentary rocks.

Sedimentology

The course should present an overview of concepts involving sedimentology, including the depositional environment and processes, facies architecture, basin structure and evolution, and an introduction to sequence stratigraphy.

Glacial Geology

The course should present the study of the mass balance of glaciers, the characteristics of flow, erosion and deposition by active and stagnant ice masses, facies relationships in processes and products of glaciated terrain; it should include an assessment of terrain from air photos, maps, geophysical and sample (core) data.

Geomorphology

The course should present an overview of the processes and principles responsible for landscape development; it should include an introduction to induced and natural hazards, such as landslides, coastal erosion, etc., with a practical introduction into air photo and satellite imagery interpretation and terrain analysis in land development and resource applications.

Remote Sensing

The course should introduce the physical principles and geodetic theory, principles, designs, and acquisition of data from various remote sensing platforms, methods of mapping, enhancing, analyzing and interpreting images for study of geological, hydrological, biological, and oceanographic processes and human activities using computer-based visualization methods.

Hydrology

The course should present an introduction to hydrological processes and resulting spatial patterns at various scales, including precipitation, evaporation, transpiration, infiltration, runoff, surface water quality and hydrogeological data analysis.

Hydrogeology

The course should present an introduction to physical hydrogeology, including groundwater flow theory, flow nets, acquifer testing, groundwater quality, and controls on groundwater contamination transport.

Soil Science

The course should present an introduction to the physical, chemical, and biological properties of soil, weathering and pedogenesis, principles of identification and classification of soils, and the nature and distribution of soil classes and their relationship to climate and geomorphology.

Note:

- ***The laboratory components of the three petrology courses described above should include transmission microscope petrography of relevant rocks that will allow student to formally name the rock, document its mineralogy, and describe its textural, structural, and other salient characteristics.***

Group 2B – Geophysics Stream

As noted above, additional foundation geoscience courses, Group 2B, differ for the Geophysics stream.

2B Geophysics stream
Digital Signal Processing
****
Global Geophysics / Physics of the Earth
****
Seismology / Seismic Methods
****
Exploration Geophysics
****
Radiometrics /Gravity & Magnetics
****
Electrical & Electromagnetic Methods

In this section, the EU requirements of the geophysics stream, Group 2B, are listed in the table above and the detailed course descriptions follow. Of the detailed descriptions presented in the following sections, it is anticipated that, the majority of these topics will be addressed by the course material and the acceptance of the course as a required EU will be at the discretion of the Board. To satisfy the requirements of the Board, each of the courses presented in the section below must be a 2nd year or higher, one-semester course, in most cases with a laboratory, however in some cases, at the discretion of the Board, a tutorial or special session may be substituted for the laboratory component.

Digital Signal Processing

The course should present the application of time series analysis and image processing techniques to large geophysical data sets; topics should include sampling, the problem of aliasing, time and frequency domains, 1D and 2D Fourier transforms, the Z transformation, spectral analysis, windows, filtering and deconvolution.

Global Geophysics

The course should present an overview of concepts involving global (pure) geophysics, including earthquake seismology, gravity, the geoid, geomagnetism, paleomagnetism and geodynamics, heat flow, radioactivity and geochronology, with applications to global tectonics and deep (crustal, mantle, core) structural investigation.

Physics of the Earth

The course should present an overview of concepts involving the physics of the earth, including an introduction to physics of the Earth’s interior, with emphasis on Earth’s structure, evolution and current dynamic state, at different temporal and special scales and using seismic observations, heat flow, the physics of minerals under high pressures and high temperatures, elasticity, fluid mechanics, equation of state, and seismological, thermal, and compositional models.

Seismology

The course should present an overview of concepts involving seismology, including Hooke's law for isotropic continua, elastic wave equation, reflection and refraction methods for imaging the Earth's internal structure, plane waves in an infinite medium and interaction with boundaries, body wave seismology, inversion of travel-time curves, generalized ray theory, crustal seismology, surface waves and earthquake source studies.

Seismic Methods

The course should present an overview of seismic methods used in geophysical surveys, including concepts and techniques of seismic imaging (migration), practical considerations such as algorithm characteristics and data geometry, post-stack and pre-stack migration, and DMO methods examined from Kirchhoff, Fourier, and downward continuation perspectives.

Exploration Geophysics

The course should present an overview of exploration geophysics, including the theory, survey design, instrumentation, applications, interpretation, and limitations of seismic, gravity, magnetic, radiometric, resistivity, induced polarization, self potential, and electromagnetic surveys applied to mineral and petroleum exploration, environmental assessment, monitoring, and remediation, and engineering geology, as appropriate.

Radiometrics

The course should present an overview of concepts involving radiometric geophysical applications, including the theory of radioactive decay, radiometric dating, survey design, measurements, quality control, and data processing and interpretation.

Gravity & Magnetics

The course should present an overview of concepts involving gravity and magnetic (potential field) geophysical applications, including theory, terrestrial field characteristics, surveying, and the processing, modeling and interpretation of gravity and magnetic data.

Electrical & Electromagnetic Methods

The course should present an overview of concepts involving electrical and electromagnetic geophysical applications, including theory, terrestrial field characteristics, surveying, and the processing, modeling and interpretation of conductivity/resistivity, induced polarization, self potential, ground penetrating radar, and tilt-angle-, phase shift-, and amplitude-based electromagnetic data.

CATEGORY 3. OTHER GEOSCIENCE / SCIENCE

Group 2C – Other Geoscience / Science

There are nine other geoscience / science courses that are required to complete the academic requirements for professional registration. These courses must serve to ‘round out’ the academic training of a professional geoscientist. Therefore, these are not prescriptively identified as being specific to any one stream, but they should complement and reinforce the curriculum and academic training obtained through the remainder of the ‘stream’.

For these other geoscience / science courses, the Board typically requires a 2nd year or higher, one-semester course, with a laboratory component or an alternative where appropriate to the content of the course, in a geoscience field, or a related scientific discipline, in any case provided that the field and the course are relevant to the applicant’s stream. Up to two of these nine courses may be selected from another related scientific discipline and the Board will determine if the course is acceptable to the applicant’s academic training stream.