**Self-Assessment Form**

**Instructions for Applicants**

**General:**

1. You must use your WES course-by-course (CxC) assessment to complete this form.
	1. When completing the self-assessment form, use the Bachelor’s degree courses.
	2. Only use your Master’s or Ph.D. in engineering **if they are necessary**. If you use too many graduate courses, the degree will **not be** eligible to use for waiving confirmatory exams.
2. Only complete column C2. Do not enter any information in column C3 or C4. If you do, it will be deleted.
	1. Enter the year, course name, credits and grade from the WES assessment Course-by-Course Analysis.
	2. Both the Basic Studies and Discipline Specific Syllabus Tables contain compulsory subjects and elective subjects. Include courses that cover any part of the syllabus even if you have more than the minimum number in the elective sections.
	3. Colour code the content in column C1 by highlighting it the same colour as the corresponding course you entered in column C2.

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| **C1** **APEGS Syllabus** | **C2** **Self-Assessment (by applicant)** | **C3** **for Staff only** | **C4** **for ARC only** |
| **COMPULSORY SUBJECTS** **(all required)** | **WES assessment: year, course name, credits and grade.**  | **Program Syllabus: page number, course name** | **Preliminary Review** | **Final Review** |
| **20-BS-A1 Mathematics:** Vector and Linear Algebra: Applications involving matrix algebra, determinants, eigenvalues and eigenvectors, vector functions and operations, orthogonal curvilinear coordinates. Calculus: first and second order linear ordinary differential equations, series solutions of ordinary differential equations, applications of partial derivatives, Lagrange multipliers, multiple integrals, line and surface integrals, integral theorems (Gauss, Green, Stokes). Power series. | 2004-2005: Applied Mathematics I, 2 credits. Grade: B2004-2005: Applied Mathematics II, 2 credits. Grade: B2005-2006: Applied Mathematics III,2 credits. Grade: B |  |  |  |

1. Once you have completed column C2, submit the **Word document** to documents-academicreview@apegs.ca.

**Program Syllabus (only required if requested by APEGS):**

1. Provide the program syllabus in a PDF document through the Contact Us page on the APEGS website.
2. If the course names in the program syllabus are different than those in your WES assessment you must provide an explanation of how they correlate in the program syllabus column of the form.
3. Use the page number of the PDF document of the program syllabus (not the original page number).

***By submitting this self-assessment, I declare that I have read and followed the instructions and that this self-assessment is accurate and complete, to the best of my knowledge and ability, and that I have provided all the relevant information that I have available to me. I understand that if information is incorrect or missing, that it may delay my application and may result in the assignment of academic deficiencies.***

**Self-Assessment Form – Geological Engineering**

Use the information provided on the WES assessment to complete this information

|  |  |
| --- | --- |
| **Applicant Information:**  | **Last Name, First Name**  |
|   |
| **APEGS File #** |   |
| **Institution Information** |
| **Credential** | **Awarded By** | **Major/Specialization** | **Year** | **Country** |
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**SELF-ASSESSMENT – FOR APPLICANT TO COMPLETE**

**BASIC STUDIES SYLLABUS TABLE**

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| **COMPULSORY SUBJECTS** **(all required)** | **WES assessment: year, course name, credits and grade.**  | **Program Syllabus: page number, course name** | **Preliminary Review** | **Final Review** |
| **20-BS-A1 Mathematics:** Vector and Linear Algebra: Applications involving matrix algebra, determinants, eigenvalues and eigenvectors, vector functions and operations, orthogonal curvilinear coordinates. Calculus: first and second order linear ordinary differential equations, series solutions of ordinary differential equations, applications of partial derivatives, Lagrange multipliers, multiple integrals, line and surface integrals, integral theorems (Gauss, Green, Stokes). Power series. |  |  |  |  |
| **20-BS-A2 Probability and Statistics:** Concepts of probability, events and populations, probability theorems, concept of a random variable, continuous and discrete random variables, probability distributions, distributions of functions of a random variable, sampling and statistical estimation theory, hypothesis testing, simple regression analysis. |  |  |  |  |
| **20-BS-A3 Computation Methods:** Use of computers for numerical solution of engineering problems, including techniques involving high-level languages and other computational tools (e.g., spreadsheets). Data representation, approximations and errors. |  |  |  |  |
| **20-BS-A4 Engineering Design Process:** Design process and methods. Project management & teamwork. Requirements and function analysis in design. Conceptual design and testing. Concept evaluation design factors such as: cost, quality, manufacturability, safety, etc. Systems modelling & design detail. |  |  |  |  |
| **20-BS-B1 Statics and Dynamics:** Force vectors in two- and three-dimensions, equilibrium of a particle in two- and three-dimensions; moments and couples; equilibrium of rigid bodies in two- and three-dimensions; centroids, centres of gravity; second moment of area, moment of inertia; truss, frame and cable static analysis; friction. Planar kinematics of particles and rigid bodies; planar kinetics of particles and rigid bodies; work and energy, impulse, and momentum of particles and rigid bodies. |  |  |  |  |
| **20-BS-B3 Mechanics of Materials:** Definitions of normal stress, shearing stress, normal strain, shearing strain; shear force and bending moment diagrams; members subjected to axial loading; members subjected to torsional loading; compound stresses, Mohr's circle; deformation of flexural and torsional members; failure theories; elastic and inelastic strength criteria; columns. |  |  |  |  |
| **20-BS-B4 Mechanics of Fluids:** Fluid characteristics, dimensions and units, flow properties, and fluid properties; the fundamentals of fluid statics, engineering applications of fluid statics; the one-dimensional equations of continuity, momentum, and energy; laminar and turbulent flow, flow separation, drag and lift on immersed objects; wall friction and minor losses in closed conduit flow; flow of incompressible and compressible fluids in pipes; dimensional analysis and similitude; flow measurement methods. |  |  |  |  |
| **20-BS-B8 Properties of Materials:** Properties of materials for mechanical, thermal and electrical applications. Atomic bonding, solid solutions, crystallisation. Equilibrium phase diagrams, applications to steel and aluminium alloys, heat treatments. Structure and special properties of polymers and ceramic materials. General characteristics of metallic composites, polymeric composites and concrete. Introduction to materials in hostile environments: corrosion, creep at high temperature, refractory materials, subnormal temperature brittle fracture. |  |  |  |  |
| **20-BS-B11 Geology:** The structure of the earth, plate tectonics, earthquakes and igneous activity. Minerals and rocks including their formation, identification, basic properties, and classification. Processes of weathering, erosion, transport, and deposition of geological materials and their results of significance to engineering. Occurrence, flow, and quality of groundwater. Introductory aspects of structural geology including faulting, folding, and the overall formation of discontinuities and their effect on the engineering properties of rock masses. Aerial photography and geological maps. |  |  |  |  |
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| **ELECTIVE SUBJECTS** (minimum of one required) | **WES assessment: year, course name, credits and grade.**  | **Program Syllabus: page number, course name** | **Preliminary Review** | **Final Review** |
| **20-BS-B7 Thermodynamics:** Basic concepts and definitions, energy concepts and the first law of thermodynamics, properties of pure substances, closed systems, open systems, the second law of thermodynamics, enthalpy, entropy, exergy, gas power cycles, vapor and combined power cycles, refrigeration cycles. |  |  |  |  |
| **20-BS-B9 Organic Chemistry:** Principles of organic chemistry developed around the concepts of structure and functional groups. The main classes of organic compounds. Properties of pure substances. Introduction to molecular structure, bond types, properties, synthesis and reactions, reaction mechanisms, as a means of systematizing organic reactions. |  |  |  |  |
| **20-BS-B10 Biology:** Cellular reproduction, growth, and differentiation; metabolism and bioenergetics of living cells; cell structure and function related to the material properties of plant and animal tissues; introductory microbiology — characteristics and classification of microorganisms; interactions of microorganisms with humans in the natural world; kinetics and mathematical models of microbial growth; engineered biological systems such as bio-reactors, bio-instrumentation, bioprinted devices and waste treatment systems for sustainability. |  |  |  |  |
| **20-BS-B12 Engineering Graphics:** Engineering drawing: Orthographic sketching. Standard orthographic projection. Principal views, selection and positioning of views. Visualization. Conventions and practices. First and second auxiliary views. Basic descriptive geometry. Section views, types, hatching conventions. Basic dimensioning requirements. Tolerance for fits and geometry control. Detail drawings and assembly drawings, other drawings and documents used in an engineering organization. Bill of materials. Fasteners and welds. |  |  |  |  |
| **20-BS-B13 Advanced Mathematics:** Solutions of differential equations, boundary value problems and orthogonal functions, Fourier series, complex variable analysis. |  |  |  |  |

**DISCIPINE SPECIFIC SYLLABUS TABLE**

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| **C1** **APEGS Syllabus** | **C2** **Self-Assessment (by applicant)** | **C3** **for Staff only** | **C4** **for ARC only** |
| **COMPULSORY SUBJECTS** **(all required)** | **WES assessment: year, course name, credits and grade.**  | **Program Syllabus: page number, course name** | **Preliminary Review** | **Final Review** |
|  **04-Geol-A1 Mineralogy and Petrology:** Introduction to crystallography and crystal chemistry. Physical and chemical properties of minerals in hand specimens. Identification of minerals and rocks with the petrographic microscope. Field and laboratory classification of igneous and metamorphic rocks. The nature of magmas and processes of magmatic differentiation. Metamorphic facies concepts. Interpretation of mineral assemblages of igneous and metamorphic rocks in the light of the phase rule and phase relations of relevant mineral assemblages. Textural and physical properties of rocks relevant to engineering problems. |  |  |  |  |
|  **04-Geol-A2 Hydrogeology:** Hydrologic cycle: precipitation, evaporation, transpiration, deep and shallow groundwater circulation. Physics of flow through porous media. Hydraulic conductivity and groundwater storage. Occurrence, transmissivity and storage characteristics of surficial and bedrock aquifers. Groundwater exploration methods: geophysics, remote sensing, mapping, borehole investigations. Groundwater flow patterns: recharge, discharge, flow net construction and analysis. Aquifer development and management. Control of pore pressures and groundwater flow in geotechnical engineering. |  |  |  |  |
|  **04-Geol-A3 Sedimentation and Stratigraphy:** Classification of sedimentary rocks, processes of weathering, erosion, sedimentation and diagenesis. Formation of carbonate, clastic and chemical precipitate rocks. Principles of stratigraphic and paleontological correlation; sedimentary facies: geological and practical significance. Distribution of major Precambrian and Phanerozoic systems. Facies associations; modern and ancient sedimentary environments. The engineering properties and behaviour of sedimentary rocks and the use of stratigraphic principles in the solution of engineering problems. |  |  |  |  |
| **04-Geol-A4 Structural Geology:** Stress and strain. Brittle and ductile rock deformation behaviour. Fabric analysis of deformed rocks. Structural features of stable and mobile parts of the crust. Fold and fault development. Mountain building and orogenies. Theories in geotectonics. Methods of structural analysis. Field mapping and graphical data processing; maps, cross-sections, block diagrams, structure contour maps, stereographic projections, equal area nets, and strain indicators. Kinematic and dynamic interpretation. The application of structural geology to the solution of engineering problems. |  |  |  |  |
| **04-Geol-A5 Rock Mechanics:** Engineering properties and classification of intact rocks. Rock mass properties and classification. Laboratory and in-situ testing of rock. In-situ stresses and stress measurement techniques. Stability analysis of rock slopes and excavations. Rock excavation techniques. Design of excavations, slopes, tunnels and shafts. Rock reinforcement and support. Groundwater considerations in rock engineering |  |  |  |  |
| **04-Geol-A6 Soil Mechanics:** Rock weathering and development of soils. Engineering classification of soils. Soil physical properties: porosity, density, capillarity, permeability. Shear strength, consolidation and settlement. Normally and over consolidated soils. In-situ stresses in soil masses. Lateral earth pressures. Mechanics, stability and analysis of soil slopes. Pore water pressure, seepage pressure, groundwater considerations in soil engineering. |  |  |  |  |
| **04-Geol-A7 Applied Geophysics:** Basic principles, interpretation, and limitations of geophysical methods applied to the exploration for coal, oil and natural gas, minerals, groundwater, and for geotechnical studies of the surface and subsurface. Introduction to electrical, electromagnetic, and magnetotelluric surveys; magnetic and gravity surveys; seismic reflection and refraction surveys; radiometric methods. Introduction to geophysical well logging techniques. Case histories of applications to engineering problems. |  |  |  |  |
| **C1** **APEGS Syllabus** | **C2** **Self-Assessment (by applicant)** | **C3** **for Staff only** | **C4** **for ARC only** |
| **ELECTIVE SUBJECTS** (minimum of three required) | **WES assessment: year, course name, credits and grade.**  | **Program Syllabus: page number, course name** | **Preliminary Review** | **Final Review** |
| **04-Geol-B1 Contaminant Hydrogeology:** Groundwater geochemistry, isotopes in groundwater. Movement of dissolved species. Diffusion and dispersion regimes. Classification of contaminants. Organic contaminants, introduction to multiphase flow, LNAPLs and DNAPLs. Assessment, control and remediation of contaminants. Waste management. Deep well disposal. |  |  |  |  |
| **04-Geol-B2 Terrain Analysis:** Elements of photogrammetry. Interpretation of aerial photos – recognition elements (tone, pattern, texture, size and shape, occupance). Identification of structures and terrain features. Glacial, fluvial, coastal, and permafrost landforms – identification and engineering characteristics. LANDSAT imagery. Operation, characteristics, and uses of thermal infrared and RADAR remote sensing.. |  |  |  |  |
| **04-Geol-B3 Site Investigation:** Uses and sources of geological and geotechnical information. Methods of site investigation: trial pits, boreholes, sampling, laboratory and in-situ testing, geophysical methods. In-situ instrumentation and post construction monitoring: measurement of stress, deformation and settlement, pore pressures, permeability, groundwater contamination. Design of site investigations and monitoring schemes. |  |  |  |  |
| **04-Geol-B4 Geomorphology and Pleistocene Geology:** Basic geomorphological concepts: formation and composition of landforms, geomorphologic cycles. Weathering and soils. Mass wasting. Fluvial processes and landforms. Coastal processes and landforms. Glacial geomorphology and landforms. Frozen-ground phenomena. Karst geomorphology. Physical geology of Canada. Quaternary geology of selected areas of Canada. Influence of geomorphology on human activity. |  |  |  |  |
| **04-Geol-B5 Environmental Geology:** Geological hazards, volcanoes, landslides, earthquakes, subsidence, floods, erosion. Preparation of hazard maps. Return period concepts and risk assessment. Environmental considerations for landfills, deep cavern and deep well disposal of wastes. Mining reclamation. Control of sediment and dissolved contaminants. Preservation and restoration of soils, landscaping and contour restoration, revegetation and erosion control. Preparation of environmental impact statements. Laws and procedures pertaining to environmental assessments. |  |  |  |  |
| **04-Geol-B6 Resource Geology (choose one)** **04-Geol-B6-1 Petroleum Deposits:** Physical properties, geochemistry, origin, migration, accumulation, and history of oil and natural gas, and their associated waters. Geological conditions of oil and gas entrapment. Structural and stratigraphic factors controlling the distribution of reservoir rocks, porosity, permeability and fluid saturations. Environmental problems associated with the development of hydrocarbons. **04-Geol-B6-2 Coal Deposits:** Coal depositionalenvironments and their significance. Nature, origin, diagenesis, metamorphism, and classification of organic sediments. Rank, physical, and petrological properties of coal. Glacial and tectonic deformation effects on rank and seam dimensions. Trace element geochemistry of coal. Stratigraphic and geographic occurrence of Canadian (and world) coals. Properties of environmental and mining significance. **04-Geol-B6-3 Metallic and Industrial Mineral****Deposits:** Nature, mode of occurrence and processes of formation of metallic and industrial minerals including minerals deposited from magmas, high-temperature vapours and aqueous solutions; formed by evaporation or precipitation in surface waters; formed by mechanical accumulation or accumulated by residual weathering. Processes of element/mineral migration and concentration. Stratigraphic and structural controls on occurrence. Solution geochemistry and isotopic characteristics of ore bearing fluids and ore deposits. Illustrative case histories for important deposits of sulphides, oxides, native elements, silicates, and ionic salts. |  |  |  |  |
| **04-Geol-B7 Petroleum Development:** Drilling equipment, controls and techniques. Circulation systems and well completions. Drilling problems associated with overpressure, underpressure, permafrost, evaporites, sour-gas, loss of circulation. Reservoir fluid phase behaviour. Material balance equations. Porosity and permeability characteristics of reservoirs. Steady and transient flow of oil, water and gas through porous media. Well stimulation. Capillary pressure and multiphase flow. Segregated and diffuse flow regimes. Oil and gas well testing and analysis. Natural drive mechanisms. Secondary and tertiary oil recovery. Introduction to history matching and numerical simulators. Conventional and geostatistical methods of oil and gas reserve estimation. |  |  |  |  |
| **04-Geol-B8 Resource Economics & Valuation:** Growth of mining and petroleum industries. Estimation of future demands. Significance of the resource sector in the Canadian economy. Prices, exchanges and futures markets. Types and grades of concentrates, smelter charges and returns. Properties, specifications and markets for industrial rocks and minerals. Relative value of hydrocarbon fractions. Evaluation of mining and oil prospects; mining and oil law, taxes and tariffs, labour, transportation, technical factors, property acquisition and claims, development methods, production estimates. Evaluation of geological engineering and commercial aspects of developed properties. Feasibility reports. Costs: access; transportation; mining; milling; well-development, well stimulation; primary, secondary and tertiary recovery. Capital costs, amortization and depreciation, rate-of-return on investment calculations. |  |  |  |  |
| **04-Geol-B9 Exploration & Mining Geology:** Planning and execution of exploration programs. Sampling methods. Legal aspects of exploration in Canada. Principles of geochemistry in mineral exploration. Field analytical techniques. Primary and secondary dispersion patterns, weathering, soil formation. Anomalies in residual and transported overburden, stream waters, stream sediments, vegetation. Factors affecting relative mobility of elements. Background values, threshold values, orientation surveys. Application, planning and interpretation of geophysical surveys. Planning surface drilling programs. Logging, sampling, analysis and interpretation of drill core data. Mineralogical study of ore and recommendations for benefication. Introduction to mining methods, selection and layout. Mapping and sampling underground. Planning subsurface drilling programs. Structural interpretation and analysis of underground drilling. Quality control aspects of mining and milling. Conventional and geostatistical methods of ore-deposit reserve estimation. |  |  |  |  |
| **04-Geol-B10 Geophysical Exploration Methods (choose one): 04-Geol-B10-1 Gravity and Magnetic Fields:** Theory and quantitative interpretation of the gravity and magnetic fields in geophysical exploration. Interpretation of regional gravity and magnetic maps. Identification of local anomalies. Data acquisition and data reduction for gravimeters and magnetometers. Design and conduct of field surveys. Potential field, Fourier, forward modeling and inversion methods in data interpretation and analysis. **04-Geol-B10-2 Electrical Methods:** Theory and quantitative interpretation of electrical, electromagnetic and magnetotelluric data in geophysical exploration. Electrical properties of rocks. Self potential, induced polarization, electromagnetic induction and magnetotelluric methods. Operation of field instrumentation, data reduction. Design and conduct of field surveys. Potential field, forward modeling and inversion methods for data interpretation. **04-Geol-B10-3 Exploration Seismology:** Theory of elasticity and elastic properties of rock. Wave propagation in elastic media. Interaction of waves with boundaries. Body-wave seismology. Surface waves. Earthquake source studies. Artificial energy sources. Refraction and reflection methods. Theory of operation and selection of seismometers. Design and conduct of field refraction and reflection surveys. Fundamentals of digital processing: static corrections, velocity analysis and corrections, Fourier analysis and filtering, stacking, migration. Interpretation of refraction and reflection seismograms. |  |  |  |  |