**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: B  2004-2005: Applied Mathematics II, 2 credits. Grade: B  2005-2006: Applied Mathematics III,2 credits. Grade: B |  |  |  |

1. Once you have completed column C2, submit the **Word document** to [documents-academicreview@apegs.ca](mailto: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 – Civil 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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| **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. |  |  |  |  |
| **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. |  |  |  |  |
| **C1**  **APEGS Syllabus** | **C2**  **Self-Assessment (by applicant)** | | **C3**  **for Staff only** | **C4**  **for ARC only** |
| **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-B2 Electric Circuits and Power:** Current, voltage, Ohm’s law, Kirchoff’s voltage and current laws, power; DC circuits, network theorems, network analysis; simple transients, AC circuits. Impedance concept, resonance; application of phasors and complex algebra in steady-state response; application of Laplace transforms; simple magnetic circuits; basic concepts and performance characteristics of transformers; an introduction to diodes and transistors; rectification and filtering; simple logic circuits. |  |  |  |  |
| **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** |
| **16-Civ-A1 Elementary Structural Analysis:** Computation of reactions, shearing forces, normal forces, bending moments, and deformations in determinate structures. Influence lines for moving loads. Moment distribution, slope deflection, and energy methods for indeterminate structures without sidesway. | |  |  |  |  |
| **16-Civ-A2 Elementary Structural Design:** Limit states design concepts. Loading due to use and occupancy, snow, wind, and earthquake. Design of tension members, beams, and columns in timber and steel. Design of timber connections and simple welded and bolted connections in steel. Design of determinate reinforced concrete beams and columns. | |  |  |  |  |
| **16-Civ-A3 Elementary Environmental Engineering:** Population, economic growth, industrialization, urbanization and energy-use, as causes of environmental pollution.  The characteristics of particles, chemistry of solutions and gases, material balances, reaction kinetics, microbiology and ecology, as related to the environment.  The application of environmental principles (technical and non-technical) to: water resource management, water and wastewater treatment, air pollution control, solid waste management, environmental impact assessment, sustainable development and environmental ethics. | |  |  |  |  |
| **16-Civ-A4 Geotechnical Materials and Analysis:** Materials: Origin of soils, soil identification and classification. Compaction. Permeability, pore water pressure and effective stress. Compressibility and consolidation. Shear strength, stress paths, and critical states. Frost action. Associated laboratory tests.  Analysis: Elastic stress distribution, settlements, times of settlements. Introductory analysis of lateral earth pressures, bearing capacity, and slopes. Seepage; well flow and confined 2-D flow problems. | |  |  |  |  |
| **16-Civ-A5 Hydraulic Engineering:** Dimensional analysis and hydraulic models. Application of continuity, momentum and energy principles. Steady, closed conduit flow in single pipes and pipe networks. Steady, open-channel flow under uniform and gradually varied conditions, control sections, hydraulic jumps, and energy dissipaters. Hydraulic transients; surges and water hammer in closed conduits, surface waves in open channels. Concepts and principles of turbo machinery, especially centrifugal pumps; similarity relations and cavitation; operation of pump-and-pipe systems.  Introductory concepts of hydraulic structures, including environmental aspects of hydraulic works and water quality management. | |  |  |  |  |
| **16-Civ-A6 Highway Design, Construction, and Maintenance:** Route surveying. Geometric design, including horizontal and vertical alignment and intersections. Properties of road-making materials. Asphalt mix design. Structural design for flexible and concrete pavements. Earthworks and drainage. Pavement management, including condition evaluation, maintenance, and rehabilitation. | |  |  |  |  |
| **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** |
| **16-Civ-B1 Advanced Structural Analysis:** Analysis of statically indeterminate structures, including trusses, beams, frames, and arches. Formulation of flexibility (force) and stiffness (displacement), and matrix methods of analysis. | |  |  |  |  |
| **16-Civ-B2 Advanced Structural Design:** Limit states design of steel members and connections in continuous framing; of slabs and footings in reinforced concrete, of pre-stressed concrete members and assemblies; and of composite steel-concrete construction. Influence of creep and shrinkage in concrete construction. | |  |  |  |  |
| **16-Civ-B3 Geotechnical Design:** Characterization of natural deposits, subsurface investigation, and field measurements. Design procedures for settlement and stability of shallow and deep foundation systems in soil and rock. Design of excavations and retaining structures; slopes and embankments. Geoenvironmental design topics covering seepage through dams and landfills and the control of seepage through the use of filters and low permeability layers including the use of geosynthetic liners and filters. | |  |  |  |  |
| **16-Civ-B4 Engineering Hydrology:** Hydrologic processes: precipitation and snow melt, infiltration, evaporation and evapotranspiration, ground-water flow, runoff. Point and area estimates of precipitation. Stream flow measurement. Runoff hydrographs, unit hydrographs, conceptual models of runoff, and basics of hydrologic modeling. Channel system: reservoir and lake routing, channel routing and flood wave behavior Statistical methods: frequency and probability with application to precipitation, floods, and droughts.  Urban and highway drainage structure design. | |  |  |  |  |
| **16-Civ-B5 Water Supply and Wastewater Treatment:** Physical, chemical, and microbiological characteristics of water and wastewater. Regulation of water quality for supply and discharge, elements of receiving water characterization and specification of effluent limits. Elements of water and wastewater treatment including, coagulation, flocculation, filtration, settling, softening, disinfection, fluoridation, taste and odour control and biological processes. Sludge disposal.  Quantity and quality estimation of water and wastewater. Water storage and distribution systems. Wastewater collection systems. | |  |  |  |  |
| **16-Civ-B6 Urban and Regional Planning:** The context of urban planning; basic planning studies, including population, economic, and land-use studies. The strategy, development, and engineering associated with comprehensive plans and full infrastructure development including housing, industry, transportation, recreation, water and sewerage, social service components. The use of analytical procedures and data systems. Plan implementation measures and controls, including zoning, land subdivision, and urban renewal. The role of the planner in directing and monitoring urban and regional development. | |  |  |  |  |
| **16-Civ-B7 Transportation Planning and Engineering:** Socio-economic impacts on transportation, demand modelling. Characteristics of transportation systems; rail, road, air, water, and pipelines. Transportation systems in Canada. Characteristics of traffic flow, queuing theory, capacity analysis, space-time diagrams. Urban traffic management, traffic signals, pedestrians, accidents. Intelligent transportation systems. | |  |  |  |  |
| **16-Civ-B8 Management of Construction:** Size and structure of Canadian design and construction sectors. Methods of project delivery, project management, and organizational form. Site investigation. Estimating and bidding, project planning, scheduling and control, activity planning. Safety practices and regulations, insurance, quality assurance and control. Labour relations. Contract administration. Litigation. | |  |  |  |  |
| **16-Civ-B9 The Finite Element Method:** Introductory concepts in discretization techniques for solving Civil Engineering problems. The finite element method including; derivation of element and global force-displacement equations employing both the variational and direct stiffness methods, criteria for selection of approximating functions, available finite elements, general constitutive relations, substructure analysis and constraint equations, numerical methods of solution. Finite element applications to structural, geotechnical, and hydraulic engineering analysis. | |  |  |  |  |
| **16-Civ-B10 Traffic Engineering:** Introductory concepts in traffic engineering and control. Vehicle – driver – roadway environment; theories of traffic flow; application of queuing theory, capacity and delay analysis of unsignalized and signalized intersections; design optimization of isolated and co-ordinated traffic signal timing plans; traffic simulation model calibration and application; and field data collection and analysis. State-of-practice analysis and design methods. | |  |  |  |  |
| **16-Civ-B11 Structural Materials:** Properties and uses of non-renewable and recycled materials; energy efficient design and green material selection. Linear and nonlinear material behavior, time-dependent behavior; structural and engineering properties of structural metals; behavior of wood; production and properties of concrete; bituminous materials, ceramics, plastics; advanced composite materials; cements and aggregates: types, chemistry, microstructure. Sustainability and durability issues of structural materials. | |  |  |  |  |
| **16-Civ-B12 Risk and Safety in Civil Engineering:** Introductory concepts in fundamentals of uncertainty, risk, risk analysis, safety and decision-making in civil engineering. Risk and safety issues related to planning, design, construction/implementation and operations in the context of environmental, transportation, structures, geotechnical, natural hazards or other civil engineering disciplines. | |  |  |  |  |
| **16-Civ- B13 Numerical Methods:** Numerical solution of systems of linear and non-linear algebraic equations, eigenvalue problems. Numerical solutions of systems of ordinary and partial differential equations. Initial value and boundary value problems. Finite difference and finite element methods. Numerical stability. | |  |  |  |  |
| **16-Civ- B14 Open Channel Hydraulics:** Analysis and characteristics of flow in open channels (natural and artificial); channel design considerations including uniform flow (rivers, sewers), flow measuring devices (weirs, flumes), gradually varied flow (backwater and other flow profiles, flood routing), rapidly varied flow (hydraulic jump, spillways), and channel design problems (geometric considerations, scour, channel stabilization, sediment transport). | |  |  |  |  |
| **16-Civ- B15 Coastal Engineering:** Basic wave theory, wave measurement, wave statistics, wave record analysis, wave transformation, tides, water levels and storm surges. Design of breakwaters and ocean structures; hydraulic and numerical coastal models. Design of a breakwater, design of a hydraulic model of the breakwater and testing with the hydraulic model to determine breakwater stability. Environmental considerations, coastal zone management, coastal sediment transport and design in the coastal zone. | |  |  |  |  |
| **16-Civ- B16 Advanced Environmental Engineering:** Population, economic growth, industrialization, urbanization and energy-use, as causes of environmental pollution. Mass and energy balance for environmental engineering systems under steady state and unsteady state conditions. Physical and transport properties of homogeneous and heterogeneous mixtures. Contaminant partitioning and transport in air, water and solids. Characteristics of particles, chemistry of solutions and gases, material balances, reaction kinetics, microbiology and ecology, as related to the environment. Application of environmental principles (technical and non-technical) to: water resource management, water and wastewater treatment, air pollution control, solid waste management, environmental impact assessment, and environmental ethics. Thermal pollution, noise pollution, greenhouse effect, acid precipitation, ozone depletion, air toxics, and ground-level ozone and fine particulates (photochemical smog). Sustainable development, life cycle analysis, and principles of environmental quality objectives, standards and guidelines.  Applicable federal and provincial environmental regulations. Analysis of environmental impact using technical and non-technical parameters. Environmental impact assessment legislation and regulatory framework. Environmental impact assessment applied to solid and liquid waste management, effluent control, air pollution control, urban development, and transportation systems. Environmental audits. Introduction to geographical information systems (GIS). Environmental management systems (EMS) ISO 14000/14001 standards, and applications. Principles of sustainable development and implications of finite biosphere and complexities for engineering design and decision-making. Design of controlled environments to enhance health and protection of natural resources for sustainable development. Resource problems and design with ecological, economic, demographic and social dimensions. Techniques to integrate knowledge and define policy. Risk analysis. Life cycle analysis. Risk management. | |  |  |  |  |
| **16-Civ-B17 Intelligent Transportations Systems:** Modern techniques to optimize the performance of a transportation system with emphasis on traffic networks in congested urban areas; Intelligent Transportation Systems; analysis of advanced traffic management and information systems; history of ITS; ITS user services and subsystems; ITS interoperability and system architecture; enabling technologies for ITS; introductory concepts in telecommunication technologies for ITS; introductory concepts in control theory for transportation systems; traffic flow modelling; static and dynamic transportation network analysis; incident detection; freeway control; and surface street network control. | |  |  |  |  |
| **16-Civ-B18 Geomatics:** Satellite-based positioning systems (GPS); observations and development of mathematical models used for absolute and differential static and kinematic positioning; error analysis; quantitative remote sensing methods using optical, infrared and microwave radiation; physical principles, including governing equations; imaging system geometries; space and airborne sensor systems; radiometric corrections, including calibration and atmospheric correction; geometric corrections; geographic Information Systems (GIS); characteristics of GIS data structures and database management systems; applications to map projections; geodetic datums; coordinate systems; georeferencing; spatial modelling and analysis. | |  |  |  |  |
| **16-Civ-B19 Foundation Engineering:** Design of spread footings, rafts and pile foundations according to modern professional practice. Procedures for estimation of bearing capacity and settlements, both immediate and long term, design of structures associated with foundation excavations, drainage and site developments such as braced cuts, retaining walls and anchored sheet pile bulkheads. The role of geological history, penetration testing and simple index properties in prediction of foundation performance. | |  |  |  |  |
| **16-Civ-B20 Building Engineering and Services:** Functioning of the building enclosure: behaviour of building elements and their sub-assemblies under differential temperature and pressure stresses; fundamentals of acoustics; nature and use of building materials; response of building materials to climatic cycles, radiation, precipitation, heating and cooling; principles of building service systems, including electrical, gas, communications, service-water supply and distribution; introduction to plans, codes, and standards for utility distribution systems.  The range of requirements that drive a building’s design including architecture, engineering, constructability, building codes, and budget. The influence of technology, energy conservation, and environmental constraints on built form. Integration of structural and mechanical systems into building types including residential, office, commercial, and retail. | |  |  |  |  |
| **16-Civ-B21 Advanced Structural Mechanics:** Stress and equilibrium conditions, strain and compatibility conditions, stress-strain relations and yield/failure criteria are considered in the context of civil engineering materials. Two-and three-dimensional elasticity theory is developed, with an introduction to the use of tensor notation. Advanced topics in bending, shear and torsion of beams are also covered, as is elementary plate bending theory. Energy methods including virtual work, potential energy, strain energy, and related approaches. Importance of dynamic loads in the design of structures. | |  |  |  |  |
| **16-Civ-B22 Dynamics of Engineering Structures:** Structural dynamics related to practical analysis of earthquake-resisting structures. Analysis of single-degree systems include: free vibration, response to time-dependent forces, response to earthquake support motions, response spectra, hysteresis models, and computation of inelastic response. Concepts of energy dissipation, ductility, and inelastic displacement demands. Multi-degree building systems. Earthquake design provisions in national codes including: design loads, and special provisions for earthquake-resisting reinforced concrete and structural steel systems and members. | |  |  |  |  |