**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 – Building Engineering**

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

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| **Applicant Information:** | **Last Name, First Name** | | | |
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| **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-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-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. |  |  |  |  |
| **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-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, bio-printed devices and waste treatment systems for sustainability. |  |  |  |  |
| **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. |  |  |  |  |
| **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. |  |  |  |  |

**DISCIPLINE 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**  **(Six of eight required)** | **WES assessment: year, course name, credits and grade.** | | **Program Syllabus: page number, course name** | **Preliminary Review** | **Final Review** |
| **24-Bld-A1 Elementary Structural Analysis:**  Structural Analysis I:Analysis of statically determinate structures: deflections, strain energy concepts, virtual work principles. Mueller Breslau principle, influence lines. Approximate methods for statically indeterminate structures. Collapse load analysis.  Structural Analysis II:Analysis of statically indeterminate structures: the methods of consistent deformations, slope deflection, and moment distribution. Application of virtual work principles. Introduction to matrix methods. | |  |  |  |  |
| **24-Bld-A2 Elementary Structural Design:**  Structural Design I:Basis for limit states design. Code requirements. Structural steel design: tension and compression members, beams and beam-columns. Connections. Introduction to the design of timber members (light wood frame + tall wood structures).  Structural Design II:Reinforced concrete behaviour in flexure, compression, shear, and bond. Ultimate strength design of reinforced concrete beams, columns, walls, and footings. Introduction to prestressed concrete. Introduction to masonry structures (loadbearing and veneer). | |  |  |  |  |
| **24-Bld-A3 Construction Engineering:**  Construction Engineering:The nature of construction and the environment in which the industry works; understand the regulations governing professional practice within the construction industry, building codes (as well as quality standards such as ISO 9000 and energy guidelines), project planning, scheduling, and control; construction safety.  Project Management for Construction:Introduction to project management techniques in construction, including organizational structures for project delivery (traditional general contractor/fixed price, cost plus,  construction management, project management, etc.), construction contracts and related documents, cost estimating and bidding planning and scheduling, cash flow analysis, project tracking and control.  Labour and Industrial Relations in Construction:The study of labour legislation with special emphasis on the construction industry, union organization, the theory and practice of negotiations, mediation, contract administration, and arbitration. Review of actual contracts.  Construction Processes:A study of current construction methods and techniques, including site preparation, excavation and earthwork, foundation design and layout, deep excavation, shoring and underpinning. Superstructure construction of timber, masonry, industrialized building techniques, concrete form design, slip-forming, precast construction, concrete reinforcing, steel, and masonry construction; design, erection,  and removal of temporary construction work. Current field practice and safety considerations. Cold temperature construction.  Building Design Process: Addressing the relationship of the multiple consultants involved in building design (integrated design process); with an architect often as the prime consultant, and engineers and other  subconsultants from several disciplines addressing particular building systems. Should be familiar with the communication and transfer/coordination of information among all participating parties.  Construction documentation: understand all the components of construction documentation forming the basis for construction contracts, and be able to prepare and coordinate such documentation. Become familiar with 3D modelling software and the role and benefits of Building Information Modelling (BIM) within the design and construction phases of buildings. | |  |  |  |  |
| **24-Bld-A4 Building Engineering Control Systems:**  HVAC System Design: Principles of HVAC system design and analysis; component and system selection  criteria including room air distribution, fans and air circulation, humidifying and dehumidifying processes, piping and ducting design; air quality standards; control systems and techniques; operational economics.  Thermal Analysis of Buildings: Two- and three-dimensional steady-state and transient conductive heat  transfer together with convection and radiation as applied to building materials and geometries. Heating and cooling load analysis, including building shapes, construction type, solar radiation and solar control devices, infiltration, occupancy effects, and daily load variations. Applications for thermal load analysis. Introduction to heat exchangers.  Building Acoustics: Introduction to the aural environment in buildings, psychological impact, subjective and  objective scales of acoustics measurements, noise control criteria and regulations, hearing mechanism,  instrumentation, noise sources, room acoustic assessment, sound absorption and reverberation control, walls, barriers and enclosures, sound transmission and losses, acoustical materials and structures, vibration and passive and active noise control systems for buildings.  Building Illumination: Introduction to the visual environment in buildings, visual perception and psychological impact, production, subjective and objective scales of measurement and control of light, design of artificial lighting systems, calorimetry; calculation methods for artificial lighting, light sources and luminaries; photometry, brightness, luminance, and illumination. Design with respect to natural lighting and daylighting; integration of lighting systems with mechanical systems, design of shading devices to control daylighting. | |  |  |  |  |
| **24-Bld-A5 Building Science:**  General introduction to the thermal environment. Topics include heat, temperature, one dimensional  steady-state processes. Convection: natural and forced. Radiation. Combined radiative and convective surface transfer. Psychometrics. Thermal comfort. Air quality. Condensation: surface and interstitial. Introduction to compressible viscous flow, friction, and flow in pipes; boundary layer and wind  effects. | |  |  |  |  |
| **24-Bld-A6 Geotechnical Materials and Analysis:**  Soil Mechanics: Index properties and classification of soils. Weight-volume relationships. Soil structures. Moisture-density relationships. Permeability, deformation, and strength of soils. Principle of total and effective stresses. Steady stage seepage through isotropic soil media. Stress distribution due to external loads and analysis of total settlements. Outline of theory of consolidation. Fundamentals of stability of earth  retaining walls, slopes, and footings. | |  |  |  |  |
| **24-Bld-A7 Building Envelope Design:**  Building Envelope Design: Technical influences in the design of building envelope, including the control of heat flow, air and moisture penetration, building movements, and deterioration. Application of air/vapour barrier and rain-screen systems. Performance assessment and building codes through case studies and design projects. Design of walls, roofs, joints and assemblies. Cause of deterioration and preventive measures, on-site investigation. Relevant building codes and standards. | |  |  |  |  |
| **24-Bld-A8 Traditional Building Materials:**  Properties of the major traditional building materials including: wood, steel, concrete, and masonry. Their  structural, thermal (conduction and specific heat), and acoustical properties. Consideration of impact of moisture, corrosion (including galvanic corrosion of steel), bio- and thermal-degradation, stability to  ultraviolet, solar radiation, andhostile environments. Attention alsoto embodied energy due to  manufacturing and transportation, carbon footprint, and general sustainability issues of each material.  Concrete: understand the mechanisms of cement hydration, the role of admixtures in altering physical and placing properties; characteristics of aggregates affecting the performance of fresh and hardened concrete;  installation of concrete in cold and hot weather environments and impact on performance; in-situ, tilt-up, and prefabricated concrete construction, concrete formwork; pre-stressed and post-stressed concrete; waterproofing and durability issues with exposed concrete, cold joint treatment, waterstops, concrete reinforcing  techniques.  Steel: heat treatment, alloying and impacts on performance, protection steel (coatings, galvanizing, etc.),  steel fastening methods (rivets, bolts, welding).  Wood: wood species and grades; impact of moisture on wood and dimensional changes, light wood frame techniques, tall/mass wood and issues of fire-protection, decay resistance, engineered wood products and performance (LDL, LSL, LVL, PSL, CLT, NLT, DLT, wood trusses) connection methods.  Masonry: fired clay and concrete bricks/blocks; reinforced load-bearing masonry; masonry veneer,  accessories, mortars, vertical and lateral loads. | |  |  |  |  |
| **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** |
| **24-Bld-B1 Computer Programming:** Construction Information Systems: Information technology and information management in construction. Resolution of technical problems by means of software (spreadsheets, data bases, etc.). Programming with Visual Basic. AutoCAD. 3D Modelling. BIM. GIS. | |  |  |  |  |
| **24-Bld-B2 Advanced Structural Analysis:**  Introduction to Structural Dynamics: Theory of vibration. Dynamic response of simple structural systems. Effects of blast, wind, traffic, and machinery vibrations. Basic concepts in earthquake resistant design. Computer applications.  Matrix Analysis of Structures: Classical and matrix methods of structural analysis; influence coefficients, transformation matrices. Matrix formulation of the force and of the displacement methods of analysis. Direct stiffness approach; substructure technique. Introduction to finite-element method. Computer applications. | |  |  |  |  |
| **24-Bld-B3 Advanced Structural Design:**  Foundation Design:Loads, bearing capacity, and settlement. Lateral pressures. Foundation drainage and water-proofing. Spread footings. Strip footings. Pile foundations. Caissons. Retaining walls. Sheet-piling walls. Braced cofferdams. Cellular cofferdams. Anchors.  Design of Reinforced Concrete Structures:Design of long columns, columns subjected to biaxial bending, two-way slabs, flat plates, girders, and shells. Design of frames, shear-walls, and prefabricated structures. Prestressed concrete: losses, short- and long-term deflections; design requirements for shear, flexure, bond, and anchorage.  Design of Steel Structures: Trends and developments in structural-steel design. Framing systems. Floor  systems; composite construction; plate girders. Design of braced frames, moment-resisting frames.  Connections. P-Delta effects. Structural stability. Light steel frame design. Introduction to steel-bridge  design.  Design of Masonry Structures: loadbearing and veneer systems.  Design of Tall (Mass) Wood Structures: For various engineering wood products, understand the mechanical properties of timber, including failure modes such as splintering, shearing, etc. Understand the concepts involved in service life and durability of timber, from both a solicitation point of view (climate, temperature, UV, humidity, etc.) and a failure point of view (wood related pathology, mechanical failures, etc.); Design and sizing of sections for both ultimate and serviceability limit states according to the CSA O86 Standard (beams, columns, walls, made of both sawed timber and engineered wood products (glulam, CLT)); Design of joints (bolts, rivets, dowels, screws, nails, etc.); Understand fire resistance-related aspects: calculation based on the residual cross section method. | |  |  |  |  |
| **24-Bld-B4 Modern Building Materials:**  Engineering properties of building materials such as: plastics, synthetic fibres, adhesives, sealants, caulking compounds, foams, sandwich panels, composites, polymer concrete systems, fibre-reinforced concretes, plastic mortars, polymers for flooring, roofing, synthetic wall papers. Moisture, structural, thermal, and acoustical properties of modern building materials. Consideration of corrosion, bio and thermal-degradation, stability to ultraviolet and solar radiation, effects of fire and elevated temperatures. | |  |  |  |  |
| **24-Bld-B5 Fire and Smoke Control in Buildings:**  Topics treated include fire and smoke control; failure mechanisms of building enclosure illustrated by case studies; code requirements for enclosure systems; systems approach for fire safety. | |  |  |  |  |
| **24-Bld-B6 Building Energy Conservation Technologies:** Standards of energy efficiency in buildings. Trends in energy consumption. Energy audit: evaluation of energy performance of existing buildings, weather normalization methods, measurements, disaggregation of total energy consumption, use of computer models, impact of  people behaviour. Energy efficiency measures in buildings: approaches, materials and equipment, operating  strategies, evaluation methods of energy savings. Renewable energy sources: passive or active solar  systems, geothermal systems, free-cooling. Optimum selection of energy sources. Air-to-air energy recovery. | |  |  |  |  |
| **24-Bld-B7 Indoor Air Quality:** Elements of indoor air quality, physical/ chemical characteristics of contaminants, health effects, standard requirements. Estimation of the levels of indoor air contaminants in buildings. Design of ventilation systems for pollutant control. Air pollution due to outdoor air supply through ventilation systems. Effect of outdoor air pollution on indoor air quality. | |  |  |  |  |
| **24-Bld- B8 Control Systems in Buildings:**  Introduction to systematic solution of building engineering problems using control systems. Techniques treated include linear programming, network analysis, nonlinear programming. Introduction to decision analysis and simulation. Application of optimization methods for solution of design problems in building science, building environment, building structures, and construction management.  Introduction to automatic control systems. Control issues related to energy conservation, indoor air quality and thermal comfort in buildings, ventilation. Classification of HVAC control systems. Control system hardware: selection and sizing of sensors, actuators and controllers. Practical HVAC control systems; elementary local loop and complete control systems. Designing and tuning of controllers. Building  automation systems and networking. | |  |  |  |  |
| **24-Bld-B9 Building Services:**  Principles of building service systems, including electrical, gas, communications, service-water supply and distribution; sanitary and storm waste water systems. Introduction to plans, codes, and standards for utility distribution systems. | |  |  |  |  |