**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 – Naval Architecture 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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| --- | --- | --- | --- |
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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-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. |  |  |  |  |
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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-B6 Basic Electromagnetics:** Introduction to the fundamental electromagnetic fields and forces used in engineering, including fundamental laws, principles, and equations developed by Gauss, Faraday, Ampere, Kirchoff, Maxwell, leading to electromagnetic design and applications in engineering, such as for capacitors, dielectrics, and magnetic devices. |  |  |  |  |
| **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-Nav-Al Fundamentals of Naval Architecture:** Hull form definition: principal dimensions, ships' lines, coefficients of form. Hull form characteristics: integration methods, Bonjean curves, wetted surface, hydrostatic curves. Equilibrium conditions. Initial stability, metacentric height, cross curves of stability, GZ curve, free surface effect, effects of changes in weight on stability, stability criteria, inclining experiment. Dynamical stability. Trim, moment causing trim, effect of added weights on draft, trim and heel. Submerged equilibrium, trim dive. Stability when grounded. Intact stability of unusual ship forms. Free communication effect. Subdivision and damage stability calculations. Stability criteria for damaged stability. Load line regulations, tonnage regulations. Use of computers in ship's calculations. |  |  |  |  |
| **16-Nav-A2 Hydrodynamics of Ships (I), Resistance and Propulsion:** Review of fluid dynamic concepts, dimensional analysis, frictional resistance, wave-making resistance, other components of resistance. Use of models, presenting model resistance data. Functional relationship between resistance and hull form. Algorithms for resistance calculations. Advanced marine vehicles. Powering of ships, theory of propeller action. Law of similitude for propellers, interaction between hull and propellers. Model self-propulsion tests. Geometry of screw propellers. Cavitation. Propeller selection and design. Other propulsion devices such as: jet propulsion, air propulsion (sail, air propellers), paddle wheels, vertical-axis propellers (Kirsten, Voith-Schneider) etc. Ship standardization trials. |  |  |  |  |
| **16-Nav-A3 Hydrodynamics of Ships (II), Ship Motion:** Ocean waves, wave spectral density. Rigid body dynamics of marine vehicles and structures, ship responses to regular and irregular waves. Introduction to hydroelastic analysis methods of ships and ocean structures. Manoeuvring and control of ship motions, assessing ship's performance in a seaway. Directional stability. Design aspects. |  |  |  |  |
| **16-Nav-A4 Ship Structure and Strength of Ships:** Ship types, framing systems, longitudinal strength requirements, classification rules. Structural components, hull materials, methods of joining structural parts. Hull outfit and fittings with special emphasis on construction process, hull preservation and maintenance. Deckhouses and superstructures. Ship structural loads, analysis of hull girders (stress and deflection), vertical shear force, bending moment, torsion, midship section and bulkhead configurations. Thermal effects on primary stresses and deflections. Bending of flat plates, shear lag and stress diffusion. Load carrying capability and structural performance criteria. Reliability of structures, ultimate strength. Analytical optimization of structures. |  |  |  |  |
| **16-Nav-A5 Ship Design:** Preliminary design methods for the design of marine platforms and vehicles from mission statement to the selection of one or more acceptable solutions. Weight and cost estimation, power requirements estimation, and selection of principal design characteristics. Economic and operational evaluation of alternative solutions. Optimization. |  |  |  |  |
| **16-Nav-A6 Advanced Strength of Materials (16-Mec-A7):** Stress-Strain Analysis: Stress and strain, transformations, principle stresses, graphical representation by Mohr’s circles of biaxial and triaxial cases, generalized Hooke’s law including thermal strains, equations of equilibrium and compatibility, plane strain and plane stress problems. Failure theories and limit analysis. Euler critical loads for columns, curved beams, thick-walled cylinders and rotating discs, contact stresses, strain gauges and application, stress concentrations including fracture mechanics. Energy Methods: Strain energy principles, virtual work, Castigliano’s theorem. Applications to cases in axial, bending, and torsional loadings. Applications to statically indeterminate 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** |
| **16-Nav-B1 Applied Thermodynamics and Heat Transfer (16-Mec-A1):** Thermodynamics: Review of the fundamental laws of thermodynamics, introductory psychrometry and analysis of the ideal gas compressor cycle, Rankine cycle, Otto cycle, Diesel cycle, Brayton cycle and the vapour compression refrigeration cycle. Heat Transfer: Application of the principles of steady and transient conduction heat transfer, natural and forced convection heat transfer and radiation heat transfer. Thermal analysis of heat exchangers. |  |  |  |  |
| **16-Nav-B2 Marine Engineering:** Ship system formulations, main propulsion system requirements, main propulsion system trade- off studies, arrangement of machinery, piping diagrams, auxiliary systems. Characteristics of internal combustion engines, marine uses for such engines. Marine steam generators, selection and design of boilers. Main propulsion steam engines. Main propulsion steam turbines. Main propulsion gas turbines. Electric propulsion drives. Propeller shafting and shafting system vibration analysis. Pumps, blowers, compressors, ejectors, condensers, heat exchangers, distilling plants. Hull machinery design considerations and machinery installations, machinery foundation designs, hydrostatic power transmission equipment, and systems. Machinery for environmental control and waste treatment. Electric generating plants, switchboards and panels, lighting and power distribution, power equipment, lighting fixtures. Electronics navigation and radio communication. Automation systems. Safety considerations. Fundamentals of pressurized-water nuclear steam supply systems for use in marine propulsion, reactor design considerations, nuclear fuels, reactor coolants, reactor control, shielding, safety, health, physics, economics. |  |  |  |  |
| **16-Nav-B3 Small Commercial Ships:** Types of small commercial ships. Specific design criteria for each type. Scantling, powering, propulsion and stability requirements. Type specific systems. Various construction materials and their construction techniques. Regulations applicable to small commercial ships. Classification society rules. |  |  |  |  |
| **16-Nav-B4 Advanced Structural Analysis:** Analysis of statically indeterminate structures, including trusses, beams and frames. Moment distribution, slope deflection and energy methods. Force and deformation methods applied to matrix formulation. Bending and buckling of plates. (Prerequisite examinations: 16-Nav-A4 and 16-Mec-A4) |  |  |  |  |
| **16-Nav-B5 Ship Production and Shipyard Management:** General aspects of shipyard organization and management; history and background of modern industry; industrial tendencies; principles of organization; principles of management. Plant location, layout and construction; handling of materials, production engineering and inspection, quality control, procedure control and systems. Control of production, time and motion study. Material control, plant safety. Industrial relations, personnel management, training, human relations and labour organizations. Drydocking and maintenance of ships. |  |  |  |  |
| **16-Nav-B6 Design and Manufacture of Machine Element (16-Mec-A4):** Theory and methodology related to conceptual design; review of the methods used in stress analysis; simple design factor approach; variable loads; stress concentrations; bolts and bolted joints; welded joints; springs; shaft and bearing design; clutches, brakes, and braking systems. The role and characterization of manufacturing technology within the manufacturing enterprise is also examined. Topics include an overview of the deformation process, joining processes, consolidation processes, material removal processes, material alteration processes; composites manufacturing, nano-and-microfabrication technologies rubber processing, glass working, coating processes, mechanical assembly, electronics packaging and assembly, and production lines; and process selection and planning; quality control systems. |  |  |  |  |
| **16-Nav-B7 Environmental Control in Ships:** Heating, Ventilation and Air Conditioning: Psychometrics, heating load, cooling load, comfort, ventilation and room air distribution. Humidifying and dehumidifying, duct and fan design, piping and pump design. Heating, ventilating and cooling systems and components. Refrigeration. Noise Control: Sound wave characteristics, measurement instruments. Sources of noise, absorption and transmission. Free field and reverberant conditions. Noise control techniques in ships. Energy Management Technology: Energy resources and supplies, control systems and instrumentation, lighting, systems operation, engineering/economic analysis principles, energy audit procedures. Shipboard waste management, collection systems. Environmental pollution and management. Water quality; principles involved in design and operation and physical, chemical, and biological treatment processes, and shipboard waste treatment. |  |  |  |  |
| **16-Nav-B9 Ocean Engineering and Offshore Structures:** Hydrostatics of rigid floating or submerged structures; mooring systems; wave and ice loads; diffraction theory; offshore platform design requirements; safety and risk management. |  |  |  |  |