**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 examinations to satisfy any academic deficiencies.***

**Self-Assessment Form – Computer 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-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-B5 Digital Logic Circuits:** Boolean algebra, truth tables and minimization techniques. Logic devices, combinational logic, encoders, decoders and shift registers. Design of asynchronous circuits and synchronous circuits, arithmetic circuits and finite state machines together with clock and timing considerations. Introduction to programmable logic and computer-aided design and simulation tools for digital system design. |  |  |  |  |
| **20-BS-B13 Advanced Mathematics:** Solutions of differential equations, boundary value problems and orthogonal functions, Fourier series, complex variable analysis. |  |  |  |  |
| **C1**  **APEGS Syllabus** | **C2**  **Self-Assessment (by applicant)** | | **C3**  **for Staff only** | **C4**  **for ARC only** |
| **ELECTIVE SUBJECTS**  (minimum of two required) | **WES assessment: year, course name, credits and grade.** | **Program Syllabus: page number, course name** | **Preliminary Review** | **Final Review** |
| **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-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-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. |  |  |  |  |
| **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. |  |  |  |  |

**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** |
| **20-Comp-A2 Digital Systems Design:** Boolean algebra. Design of combinatorial and sequential logic. Implementation using simple gates. Programmable logic devices and gate arrays. Characteristics of digital integrated circuit families. Analysis and design for controllers, processors, and memories. Microprocessors, including components, data flow, signals, and timing. Small system design, interconnection of associated devices. Computer interfacing, including parallel and serial I/O, interrupts and DMA. Common bus structures. | |  |  |  |  |
| **20-Comp-A3 Computer Architecture:** Architecture, programming and I/O. Computer structure and typical processor architecture. CPU and memory organization, buses. Characteristics of I/O and storage devices. Processing unit and controller design, hardwired and microprogram control. Instruction sets and addressing modes; assembly language programming, I/O and interrupt servicing. | |  |  |  |  |
| **20-Comp-A4 Program Design and Data Structures:** Programming language syntax and semantics. Design of structured and modular programs in a high level language (C, C++). Basics of object-oriented programming: classes. Non-numerical processing. Design and construction of programs involving structured data: arrays, stacks, queues, lists, trees, and records. | |  |  |  |  |
| **20-Comp-A5 Operating Systems:**  Operating system principles, components, and programming. Design and implementation of operating systems. Synchronization of concurrent processes, resource allocation, scheduling, protection, and privacy. Data, task, and job management: loading, linking; I/O control. Multi-core, multithreading and multiprocessing. Virtualization, hypervisors and containers. Real-time aspects. Basic characteristics of modern operating systems: unix, Windows. | |  |  |  |  |
| **20-Comp-A6 Software Engineering:** Software cycles and requirements analysis. Design, implementation, test, verification and validation, documentation, quality assurance, control and life-cycle management of correct, reliable, maintainable, and cost effective software. Current design methodologies, including modularization, graphical design tools, design in high-level languages, and data flow driven designs. Planning and management of software projects. Software maintenance and configuration management. | |  |  |  |  |
| **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** |
| **20-Comp-B1 Advanced Computer Architecture:** Architecture of high speed workstation and personal processors and systems. Instruction set design for pipelined machines. Caches. Multiple processor architectures, highly parallel machines, systolic arrays, neural networks, multitasking machines, real-time systems, interconnection of multiple processor systems. Architectures for specialized purposes, array processors, vector processors. Virtual machines.  Embedded systems and control. | |  |  |  |  |
| **20-Comp-B2 Principles of VLSI:** Very large scale integrated circuits. Fabrication processes in CMOS and BICMOS. Simplified design rules. Design methodology. Static and dynamic logic, multiphase clocking. Memory elements and memory structures. Gate arrays and standard cell technology; placement and routing. Programmable logic devices. I/O devices. Testing. | |  |  |  |  |
| **20-Comp-B3 Data Bases and File Systems:** Concepts and structures for design and implementation of data bases and file systems. Data models, data normalization, data description languages, query facilities, data integrity and reliability, concurrency. Data bases: hierarchical, network and relational databases; data organization. Relational query languages: relational algebra and calculus, SQL. Relational database design. Transaction processing, query processing, reports. Security and integrity; concurrency control. File organization: sequential, indexed and direct access, multiple key, and hashing. File processing: records, files, compaction. Sorting, merging and updating files. Algorithms for inverted lists, multilist, indexed sequential and hierarchical structures. File I/O: control, utility, space allocation, and cataloguing. Index organization. NoSQL (e.g. MongoDB) databases. | |  |  |  |  |
| **20-Comp-B4 Computer Graphics:** Hardware and software systems for graphics. Input and output devices, display devices. Techniques for describing and generating image. Object modeling and display techniques. Transformations in two and three dimensions: scaling, translation, rotation, clipping and windowing. Visual realism: perspective, visibility, hidden surface elimination, illumination, shading and rendering. Graphic software and data structures, display data structures and procedures, efficient algorithms. Current graphics standards. Use of XR content (VR – virtual reality; AR – augmented reality) on mobile devices and optical headsets. Optional inclusion of video formats and streaming and of animation techniques. | |  |  |  |  |
| **20-Comp-B5 Computer Communications:** Data communications, including signals, modulation and reception. Error detecting and correcting codes. Including circuit and packet switching. Multiplexing, including time, frequency and code division multiplexing. Digital networks, including ISDN, frame relay and ATM. Protocols: the ISO/OSI reference model, X.25. Internetworking and router-based networks: the TCP/IP suite of protocols, routing and flow control, Internet addressing and domain names. Local area networks, topologies, access schemes, medium access and logic layers; CSMA/CD and token ring protocols; segmented and hubbed LANs. Wireless transmission technologies (e.g. Wi-Fi, cellular networks.) This syllabus requires knowledge of linear systems as described in 16-Elec-A1. | |  |  |  |  |
| **20-Comp-B6 Computer Control and Robotics:** Discrete-time and quantized data control systems. Z-transform and state space methods. Principles of digital control. Digital controllers and components. Controller software. Industrial and robotic systems. Descriptions of 3D space, geometry of robotics manipulators. Transducers and interfacing. This syllabus requires knowledge of linear systems as described in 16-Elec-A1. | |  |  |  |  |
| **20-Comp-B7 Digital Signal Processing:** Theory of discrete-time linear systems. Digital filtering. Discrete Fourier analysis. Application to voice and image processing, communications, etc. Hardware for digital signal processing, including digital signal processors. This syllabus requires knowledge of linear systems as described in 16-Elec-A1. | |  |  |  |  |
| **20-Comp-B8 Computer Integrated Manufacturing:** The integration of mechanical, electronic and informational components in manufacturing. Hierarchical and distributed computer control, including hardware and software. Collecting, controlling, processing and disseminating data. Sensors and tool control, station control. “Factory floor” local area networks and protocols; manufacturing data bases. Process design and operation. CAD/CAM, manufacturing resource planning, and numerical control (CNC). Additive or subtractive manufacturing processes (e.g. 3D printing, sintering, milling, laser and ablative technologies, fabricator shops). | |  |  |  |  |
| **20-Comp-B9 Artificial Intelligence and Expert Systems:** Concepts of artificial intelligence. Overview of knowledge-based and expert systems. Logic programming. Programming languages commonly used for AI and expert system implementation. Knowledge representation. Rule-based and object-based systems. | |  |  |  |  |
| **20-Comp-B10 Distributed Systems:** Characteristics of distributed systems. Networked vs. centralized systems. Fundamental concepts and mechanisms. Client-server systems. Process synchronization and interprocess communications. Principles of fault tolerance. Transaction processing techniques. Distributed file systems. Operating systems for distributed architectures. Security. | |  |  |  |  |
| **20-Comp-B11 Advanced Software Design:** The design and programming aspects of the construction of large software systems. Advanced object-oriented design. Language support for modular programming, visual programming systems, GUI design and implementation. | |  |  |  |  |
| **20-Comp-B12 Computer Security:** Types of threats, terminology, network basics, internet fraud, theft, cyber stalking, DoS attacks, malware, hacking, industrial espionage, encryption and cryptography, security technology: accvess control, virus scanners, firewalls, IDS, certificates, SSL/TLS, VPN, Wi-fi security; security policies; forensics. | |  |  |  |  |
| **20-Comp-B13 Mechatronic Design:** Microprocessors microcontrollers, architectures, programming languages, embedded software and event-driven control, software design, communications and protocols, peripherals: sensors and interface circuits. | |  |  |  |  |
| **20-Comp-B14 Discrete Mathematics:** Logic: propositional equivalences, predicates and quantifiers, sets, set operations, functions, sequences and summations, the growth of functions. Algorithms: complexity of algorithms, the integers and division, matrices. Methods of proof: mathematical induction, recursive definition. Basics of counting: pigeonhole principle, permutations and combinations, discrete probability. Recurrence relations: inclusion-exclusion. Relations and their properties: representing relations, equivalence relations. Introduction to graphs: graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths. Introduction to sorting. | |  |  |  |  |
| **25-Comp-B15 Computer Room Design (or Data Centre Design)**  Considerations for creation of data centres with high density computing components. Not all topics required, but would include power, cooling, fire suppression and networking as mandatory; Sizing and configuration of power supply and backup (UPS/battery, generator, dual power supplies); Sizing cooling and configuring ventilation (hot / cold corridors, cooling capacity, power demands); Networking for high density computing equipment; Configuration of high density compute - blades & chasses ; GPU (graphics processing units); Fire suppression methods and techniques; Floor layout for high density computing; Physical security; Redundancy and backup of data, systems, and networking. | |  |  |  |  |
| **25-Comp-B16 Electronics**  Devices: circuit models and characteristics. Integrated circuits.  Diodes, rectifiers, and wave shaping networks.  Field effect and bipolar transistors: small-signal and AC analysis.  Single-stage amplifier design.  Operational amplifiers and applications.  Large-signal analysis, wave shaping and bistable circuits including multivibrators, triggers, and waveform generators.  Digital electronics including basic logic gates and memory elements.  Hybrid analog/digital devices including A/D and D/A converters. | |  |  |  |  |