APPLIED SCIENCE (APSC)

APSC 100 Engineering Practice 1 Units: 9.00
This course introduces fundamental professional engineering skills and provides an opportunity to apply engineering science and mathematics content in situations emulating professional practice. It consists of three modules: Module 1. Problem analysis and modeling; Module 2. Experimentation and measurement; Module 3: Engineering design. The course provides an introduction to personal learning styles, team dynamics, oral and written presentation skills, laboratory data collection, analysis and presentation, project management, information management, problem analysis and modeling, numeric computation, economics, design methodologies, and workplace safety.
NOT OFFERED 2024-2025
K9(Lec: Yes, Lab: Yes, Tut: Yes)
Offering Term: FW
CEAB Units:
Mathematics 0
Natural Sciences 16
Complementary Studies 36
Engineering Science 24
Engineering Design 33
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. CLOs coming soon; please refer to your course syllabus in the meantime.

APSC 101 Engineering Design & Practice Units: 3.20
This course develops the ability to conceive, design, and implement solutions in an engineering context via team-based design projects. It develops complex problem solving, teaming, critical thinking, and communication skills, and provides guidance in incorporating safety, ethical, economic, and social factors in engineering problem solving. Examples and project topics are chosen to complement instruction in other first year courses, specifically including programming and graphics. This course is integrated with APSC 199, and coordinated by the same instructors.
K3.2(Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: Corequisites: APSC 199
Exclusions: APSC 100
Offering Term: F
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 13
Engineering Science 8
Engineering Design 17
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Create and use quantitative models to analyze systems
2. Define and deconstruct a complex engineering problem.
3. Generate and evaluate multiple alternatives, supporting chosen approach.
4. Design, implement, and evaluate a simple prototype.
5. Evaluate performance of design relative to specifications and theoretical predictions.
6. Identify, organize,#and critically evaluate information from#an appropriate range of sources.
7. Takes initiative to plan, organize, and complete task as an individual and team member, in order to meet goals.
8. Seek and integrate diverse and alternative viewpoints, including Indigenous perspectives where applicable, in decision-making.
9. Provides effective feedback to peers.
10. Produce clear, concise, precise and well-organized written communication with language appropriate for the audience.
11. Produce graphical elements that are generally well designed, and support the main purpose.
12. Describes how safety is integral to producing effective solutions from start to finish.
13. Integrate appropriate standards, codes, legal and regulatory factors throughout design activities.
14. Incorporate concepts of sustainable design and

APSC 102 Experimentation Units: 2.00
This course introduces concepts of planning and designing experiments to determine or measure particular system characteristics. The course content includes laboratory data collection, error analysis, data analysis and visualization, lab safety, occupational hazards, and the design of experimental investigation for simple systems.
K2(Lec: No, Lab: Yes, Tut: Yes)
Requirements: Prerequisites: Corequisites: Exclusions: APSC 100
Offering Term: FW
CEAB Units:
Mathematics 0
Natural Sciences 24
Complementary Studies 0
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Appraises the validity of conclusion relative to the degrees of error and limitations of theory and measurement.
2. Designs investigations involving information and data gathering, analysis, and/or experimentation.
3. Follows safety protocol in a laboratory environment.
4. Generates ideas and working hypothesis when presented a research question.
5. Synthesizes data and information to reach conclusion.
6. Uses basic experimental equipment.

APSC 103 Engineering Client-based Design Project Units: 3.50
This client-based team design project develops skills including design, project management, technical communications, and professionalism in an experience emulating professional practice. Students work in teams to define problems, gather and identify appropriate information, work effectively with teammates, generate ideas, select ideas, and implement a solution to a problem presented by a client.
K3.5(Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: APSC 101 Corequisites: Exclusions: APSC 100
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 18
Engineering Science 8
Engineering Design 16
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Work effectively and harmoniously with different learning styles and personalities.
2. Apply project management principles and concepts (budgeting time and money, project planning, organizing meetings) to planning, implementing and delivering a client project.
3. Develop a process that follows established design principles, to generate a solution to a practical problem provided by a client.
4. Apply principles of science, math and engineering to analyze and generate solutions to complex problems.
5. Locate, evaluate, and effectively use information in technical communications.
6. Communicates concisely, articulately and effectively using a variety of mediums (Technical writing, Presentations, Graphics, Formal and Informal communications).
7. Broadly describe the roles of an engineer and their responsibility and impact on society.

APSC 111 Physics I Units: 3.30
This course is an introduction to Newtonian mechanics in the context of engineering applications. Lecture topics are: vectors, motion of a particle, particle dynamics, work and energy, statics and dynamics of rigid bodies, conservation of energy, momentum, and collisions.
(Lec: 2.8, Lab: 0, Tut: 0.5)
Offering Term: F
CEAB Units:
Mathematics 0
Natural Sciences 40
Complementary Studies 0
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Utilize and apply vector quantities in components or magnitude and direction, including scalar and vector products.
2. Apply first principles of kinematics to determine the motion in 1, 2 and 3 dimensions of pointlike objectsApply the concept of relative velocity, and vector addition of motion.
3. Calculate and describe behaviour of rotating objects in a plane through rotational kinematics, including the concept of centripetal acceleration.
4. Determine the resultant acceleration due to forces using free body diagrams, and work with specific forces such as springs, gravity and friction.
5. Compute work done by a force, and describe the consequent changes in kinetic energyIdentify conservative forces and their effect on potential energy, and apply first principles to solve dynamics problems using conservation of energy principles.
6. Describe the concepts linear impulse and linear momentum, and conservation of linear momentum, and apply these principles to calculate the motion of (pointlike) objects undergoing elastic and inelastic collisions.
7. Determine the centre of mass of a system, for both discrete points and distributed objects.
8. Analyze the dynamics of rigid bodies rotating in a plane referencing the concepts of torque and rotational kinetic energyCalculate the moment of inertia of rigid bodies, and translate it using the parallel axis theorem.
9. Describe and calculate mechanical equilibrium of a system using first principles (sum of forces and torques) to solve two-dimensional statics problems.

APSC 112 Physics II Units: 3.30
This course continues from APSC 111 to introduce electricity and further develop fundamental ideas of mechanics in the context of engineering applications. Lecture topics include: oscillations and waves, electric charge, electrical current and resistance, EMF, D.C. circuits and electrical measurements, electric field and potential, magnetic fields and their origin, and electromagnetic induction.
(Lec: 2.8, Lab: 0, Tut: 0.5)
Requirements: Prerequisites: APSC 111 and APSC 171
Corequisites: Exclusions:
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 35
Complementary Studies 0
Engineering Science 5
Engineering Design 0
Course Equivalencies: APSC 112 APSC 114
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Calculate and describe the motion of systems in simple harmonic motion such as mass-spring systems and simple pendulums.
2. Describe and calculate the motion of transverse and longitudinal waves, and work with basic wave phenomena such as superposition, reflection, standing waves, beats and the Doppler effect.
3. Calculate the electric field due to discrete charges and, using integrals calculate the electric fields due to continuous charge distributions.
4. Calculate electric potential energy and electric potential for discrete and continuous charge distributions.
5. Understand the behaviour of current in circuits, and calculate currents and potentials in simple DC circuits.
6. Understand and describe magnetic fields. Calculate forces and torques on particles and loops in a magnetic field.
7. Understand the sources of magnetic fields, and calculate the magnetic fields produced by current carrying wires.
8. Understand and describe magnetic induction, and calculate electromotive forces in circuits due to changing magnetic flux.

APSC 114 Electricity and Magnetism Units: 3.30
This course continues from APSC 111 to introduce electricity and further develope fundamental ideas of mechanics in the context of engineering applications. Leture topics include: oscillations and waves, electric charge, electrical current and sestance, EMF, D.C. circuits and electrical measurements, electric field and potential, magnetic fields and their origin, and electromagnetic induction.
(Lec: 2.8, Lab: 0, Tut: 0.5)
Requirements: Prerequisites: APSC 111 and APSC 171 Corequisites: Exclusions:
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 30
Complementary Studies 0
Engineering Science 10
Engineering Design 0
Course Equivalencies: APSC 112 APSC 114
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Calculate and describe the motion of systems in simple harmonic motion such as mass-spring systems and simple pendulums.
2. Describe and calculate the motion of transverse and longitudinal waves, and work with basic wave phenomena such as superposition, reflection, standing waves, beats and the Doppler effect.
3. Calculate the electric field due to discrete charges and, using integrals calculate the electric fields due to continuous charge distributions.
4. Calculate electric potential energy and electric potential for discrete and continuous charge distributions.
5. Understand the behaviour of current in circuits, and calculate currents and potentials in simple DC circuits.
6. Understand and describe magnetic fields. Calculate forces and torques on particles and loops in a magnetic field.
7. Understand the sources of magnetic fields, and calculate the magnetic fields produced by current carrying wires.
8. Understand and describe magnetic induction, and calculate electromotive forces in circuits due to changing magnetic flux.

APSC 115 Physics I Units: 3.50
This course is an introduction to Newtonian mechanics in the context of engineering applications. Concepts presented include the motion of a particle, particle dynamics, work and energy, conservation of energy, momentum and collisions, and statics and dynamics of rigid bodies.
(Lec: 3, Lab: No, Tut: 0.5)
Requirements: Prerequisites: Approval of Associate Dean (Academic) Corequisites: Exclusions: APSC 111
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 42
Complementary Studies 0
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. CLOs coming soon; please refer to your course syllabus in the meantime.

APSC 131 Chemistry of Engineering Materials and Processes Units: 3.30

This course introduces engineering materials and process thermodynamics, with particular emphasis on the central role of chemistry in society's pursuit of the United Nations Sustainable Development Goals. The first unit focuses on structure / property relationships of engineering materials such as metals, semiconductors, ceramics, glasses and polymers. In addition to mechanical properties, specific attributes such as conductivity, photovoltaic activity, viscoelasticity and chemical stability are examined in the context of engineering design decisions. The pressure-volume-temperature dependences of liquid and gas phase properties are also studied. The second unit focuses on the 1st and 2nd laws of thermodynamics as they relate to engineering processes involving heat and work. State functions such as internal energy, enthalpy and entropy are used to define efficiency limitations in energy conversion devices such as engines and heat pumps.
(Lec: 2.8, Lab: 0, Tut: 0.5)
Offering Term: F
CEAB Units:
Mathematics 0
Natural Sciences 32
Complementary Studies 0
Engineering Science 8
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Categorize groups of elements in the periodic table related to physical properties.
2. Differentiate between the different structures of atoms and molecules.
3. Describe molecular interactions in relation to material properties (solids, liquids, gases).
4. Describe how the chemical structure of crystalline solids (metallic, ionic, covalent,#molecular) and amorphous solids (glasses, polymers) lead to their engineering properties.
5. Apply knowledge of structure/property relationships to select appropriate engineering materials.
6. Define an appropriate system boundary and apply the 1st Law to closed and open systems.
7. Use the 2nd laws of thermodynamics to#describe processes involving changes in internal energy, enthalpy, and entropy (efficiency in relation to natural systems, spontaneity).
8. Apply knowledge of the chemistry of natural and engineered systems to solve problems related to society's pursuit of the United Nations Sustainable Development Goals (SDGs).

APSC 132 Chemistry of Natural and Engineered Systems Units: 3.30

This course introduces equilibrium thermodynamics, chemical process dynamics and electrochemistry in the context of sustainable engineering design. The first unit defines Gibbs energy as a means of describing the equilibrium state of multi-phase and reactive systems, including acid/base reactions in aqueous solution. The second unit focuses on the rate and mechanism of chemical reactions as well as the physical processes of heat and mass transfer. The third unit deals with principles of electrochemistry as they apply to corrosion and industrial galvanic / electrolytic cells.
(Lec: 2.8, Lab: 0, Tut: 0.5)
Requirements: Prerequisites: APSC 131 Corequisites: Exclusions:
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 25
Complementary Studies 0
Engineering Science 15
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Apply knowledge of the chemistry of natural and engineered systems to solve problems related to society's pursuit of the United Nations Sustainable Development Goals (SDGs).
2. Describe phase changes of pure substances and binary mixtures using phase diagrams and simple thermodynamic equilibrium equations.
3. Apply equilibrium thermodynamic concepts to quantify the state of reversible reaction systems, including acid/base and redox processes.
4. Formulate differential and integrated kinetic rate equations to describe the dynamics of elementary reactions and their sequences.
5. Identify heat and mass transfer mechanisms and apply appropriate constitutive models (Fick's Law, Fourier's Law) to describe diffusive transport.
6. Describe and apply equilibrium electrochemistry principles, including half-cell reactions, standard cell potentials, and the Nernst equation to describe galvanic and electrolytic cells as well as corrosion phenomena.

APSC 135 Introductory Chemistry for Technology Students Units: 4.50
This course will examine the essential fundamentals of chemistry, as a basis for application to the various fields of engineering, drawing specific applications to current engineering practices in civil, mechanical, chemical, and mining engineering. The course will survey chemical fundamentals including stoichiometry, solution concentration, chemical equilibrium and acid-base equilibria. Physical chemistry content will include thermochemistry, behaviour of gases, chemical kinetics and electrochemistry. Students will explore organic chemistry principles including naming organic compounds, recognizing key organic functional groups, illustrate properties and study typical reactions, while highlighting the acquired knowledge to applied engineering scenarios. Special emphasis will be placed upon data manipulation and interpretation and proposing solutions/engineering designs to real world applications.
(Lec: 4, Lab: 0, Tut: 0.5)
Requirements: Prerequisites: Approval of Associate Dean (Academic) Corequisites: Exclusions: APSC 131, APSC 132
Offering Term: S
CEAB Units:
Mathematics 0
Natural Sciences 47
Complementary Studies 0
Engineering Science 7
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Demonstrate fundamental concepts of chemistry such as stoichiometry, chemical reaction balancing and solution concentration calculations.
2. Describe the concepts of chemical equilibrium and conduct calculations related to equilibrium constants and reaction quotients. Apply chemical equilibrium to thermodynamic properties.
3. Classify the relative strength of an acid/base, calculate acid/base ionization constants and examine typical acid base reactions.
4. Summarize the behaviour of gases, distinguish between various gas laws and use these laws to solve gas related problems.
5. Explain the laws of thermodynamics, summarize thermodynamic properties of ideal gases, and use these laws to solve mass and energy related problems.
6. Describe the fundamentals of reaction rates and rate laws.
7. Define oxidation-reduction reactions and balance redox reactions.
8. Name various representations of organic compounds

APSC 141 Introduction to Computer Programming for Engineers 1 Units: 1.00
This course introduces concepts and practice of computer programming. The emphasis is on the design of correct and efficient algorithms, introducing variables, operators, flow control, and conditions. Applications are made to engineering problems.
(Lec: 0.7, Lab: 0.3, Tut: 0)
Offering Term: F
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 0
Engineering Science 12
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Describe computational machinery and the relation between computer hardware and software.
2. Translate complex problems into programmatic flow charts. Convert flow charts into programs.
3. Declare and initialize variables of various types and apply them within coded expressions translated from symbolic equations.
4. Translate logical statements to coded conditional statements and create: if, if/else, chained if/else, and switch/case structures.
5. Construct program sequences as well as achieve looped statements using for, while, and do/while repetition structures.
6. Analyze real-life engineering problems and create code to achieve solutions while following a systematic approach.
7. Use proper coding techniques for syntax, indentation, commenting, and variable naming.
8. Implement debugging strategies to detect, find, and rectify programming errors.

APSC 142 Introduction to Computer Programming for Engineers 2 Units: 2.30
This course introduces concepts, theory and practice of computer programming. The emphasis is on the design of correct and efficient algorithms and on programming style, building from APSC 141. Applications are made to engineering problems.
(Lec: 1.5, Lab: 0.8, Tut: 0)
Requirements: Prerequisites: APSC 141 Corequisites: Exclusions:
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 0
Engineering Science 28
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Correctly index 1D and 2D arrays for assigning and returning element values.
2. Declare and initialize strings and utilize string functions to manipulate string elements.
3. Reproduce simple algorithms for searching and sorting 1D arrays, and arrays of strings.
4. Utilize pointers to access memory addresses and implement the basics of memory allocation and management.
5. Simplify programs using functions with pass-by-value and pass-by reference inputs and set variable scopes appropriately.
6. Analyze real-life engineering problems and create code to achieve solutions while following a systematic approach.
7. Automate requirements testing by writing effective unit and functional tests.
8. Identify common insecure coding practices and apply mitigations.
9. Use proper coding techniques for syntax, indentation, commenting, and variable naming.
10. Implement debugging strategies to detect, find, and rectify programming errors.

APSC 143 Introduction to Computer Programming for Engineers Units: 3.30
This course introduces concepts, theory and practice of computer programming. Implementation uses microcomputers. The emphasis is on the design of correct and efficient algorithms and on programming style. Applications are made to engineering problems. NOTE: This course is only available to students in the MRE program, and by permission to other students.
K3.3(Lec: Yes, Lab: Yes, Tut: No)
Offering Term: SF
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 0
Engineering Science 40
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Describe computational machinery and the relation between computer hardware and software.
2. Declare and initialize variables and arrays (1D and 2D) of various types and apply them within coded expressions translated from symbolic equations.
3. Translate logical statements to coded conditional statements and create: if, if/else, chained if/else, and switch/case structures.
4. Construct program sequences as well as achieve looped statements using for, while, and do/while repetition structures.
5. Correctly index 1D and 2D arrays for assigning and returning element values.
6. Declare and initialize strings and utilize string functions to manipulate string elements.
7. Reproduce simple algorithms for searching and sorting 1D arrays, and arrays of strings.
8. Utilize pointers to access memory addresses and implement the basics of memory allocation and management.
9. Simplify programs using functions with pass-by-value and pass-by-reference inputs and set variable scopes appropriately.
10. Develop functions that can be used recursively to efficiently solve programming problems.
11. Analyze real-life engineering problems and create code to achieve solutions while following a systematic approach.
12. Use proper coding techniques for syntax, indentation, commenting, and variable naming.
13. Implement debugging strategies to detect, find, and rectify programming errors.
14. Work effectively as a team member to complete an

APSC 145 Introduction to Computer Programming for Engineers Units: 3.30
This course introduces concepts, theory and practice of computer programming. Implementation uses microcomputers. The emphasis is on the design of correct and efficient algorithms and on programming style. Applications are made to engineering problems. NOTE: This course is only available to students in the college bridging program.
K3.3(Lec: Yes, Lab: Yes, Tut: No)
Offering Term: S
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 0
Engineering Science 40
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. CLOs coming soon; please refer to your course syllabus in the meantime.

APSC 151 Earth Systems Engineering Units: 3.30
This course provides an introduction to the complex Earth System (the solid earth, hydrosphere, atmosphere, and biosphere) and our interactions with it. The science behind our exploration and understanding of our planet and its ongoing evolution is explored in combination with the engineering geology of geo-materials, geo-resources, geo-dynamics and geo-risk. The connection between the Earth System and human activity is explored in depth, including local and global-scale impacts of engineering works, geopolitics, and resource issues. Examples of the terrestrial sources of geo-materials used in engineering activities are highlighted along with the technical, social, economic and environmental challenges associated with their life cycle including sustainability, contamination, biodiversity loss, social impact and climate change.
(Lec: 2.8, Lab: 0.5, Tut: 0)
Offering Term: F
CEAB Units:
Mathematics 0
Natural Sciences 18
Complementary Studies 10
Engineering Science 12
Engineering Design 0
Course Equivalencies: GEOL 104/105 / APSC 151
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Visualize the components of the Earth System and understand the evolution of, and interactions between the Geosphere, Hydrosphere, Atmosphere and Biosphere.
2. Describe and differentiate processes of change within the mantle, the crust and on surface in the context of Earth History and the Evolution of Life.
3. Characterize, classify, identify fundamental minerals and igneous rocks (primary materials) and their engineering properties.
4. Characterize, classify, identify fundamental minerals and igneous rocks (primary materials) and their engineering properties.
5. Characterize, classify, identify ongoing processes including deformation, tectonics, weathering, erosion, deposition and glaciation and their impacts on the past, current and future.
6. Associate societal needs with and human impact on the Earth System.
7. Associate geological processes and history with engineering properties of geo-materials.
8. Assess challenges related to surficial engineering geology and ongoing geological, processes including groundwater, geotechnical construction, surface mining and natural hazards.

APSC 161 Engineering Graphics Units: 3.50
The principal objectives of the course are (1) to develop the student's ability to visualize and communicate three-dimensional shapes and (2) to acquire the skills needed to use computer-aided design software. Topics covered are orthographic projection, isometric sketching, auxiliary and section views as well as dimensioning and working drawings. Computer-aided design software is used to create solid models of the parts and assemblies as well as to generate dimensioned drawings. Students apply their learning in a project where they design their own version of a consumer product. Students learn by hands-on exercises in free-hand sketching and computer-based drawing.
NOT OFFERED 2024-2025
(Lec: 2, Lab: 1.5, Tut: 0)
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 0
Engineering Science 37
Engineering Design 5
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. CLOs coming soon; please refer to your course syllabus in the meantime.

APSC 162 Engineering Graphics Units: 2.50
The principal objectives of the course are (1) to develop the student's ability to visualize and communicate three-dimensional shapes and (2) to acquire the skills needed to use computer-aided design software. Topics covered are orthographic projection, isometric sketching, auxiliary and section views as well as dimensioning and working drawings. Computer-aided design software is used to create solid models of the parts and assemblies as well as to generate dimensioned drawings. Students apply their learning in a project where they design their own version of a consumer product. Students learn by hands-on exercises in free-hand sketching and computer-based drawing.
(Lec: 1.5, Lab: 1, Tut: 0)
Offering Term: F
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 0
Engineering Science 20
Engineering Design 10
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Sketch freehand orthographic views of object from isometric view.
2. Sketch freehand an isometric view by visualizing object from orthographic views.
3. Sketch an auxiliary view from orthographic views.
4. Sketch freehand a section view from orthographic views.
5. Demonstrate knowledge of dimensioning, tolerancing, and other drawing conventions.
6. Demonstrate knowledge of using solid-modelling CAD software.
7. Design a product satisfying specified constraints.

APSC 171 Calculus I Units: 3.30
Graphs and derivatives of vector-valued functions; related applications. Implicit derivatives and related rate applications. Fundamental Theorem of Calculus, Riemann integral; applications to problems involving areas, volumes, mass, charge, work, etc. Integration by substitution, by parts, and partial fractions. Introduction to second-order differential equations and complex numbers.
K3.3(Lec: Yes, Lab: No, Tut: Yes)
Offering Term: F
CEAB Units:
Mathematics 40
Natural Sciences 0
Complementary Studies 0
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Constructs mathematical descriptions or expressions to model a real-world problem.
2. Uses an appropriate derivative-related tool to solve a mathematical problem that arises from modeling a real-world problem.
3. Uses an appropriate integral-related tool to solve a mathematical problem that arises from modeling a real-world problem.
4. Uses an appropriate differential equation solution technique or numerical method to solve a mathematical problem that arises from modeling a real-world problem.
5. Selects and describes appropriate numerical methods to solve mathematical problems that arise from modeling a real-world problem.
6. Uses solution to mathematical problems to inform the real-world problem that gave rise to it.

APSC 172 Calculus II Units: 3.30
This course continues calculus concepts from APSC 171, including space curves, speed, and velocity. Functions of several variables, partial derivatives, differentials, error estimates, gradient, maxima and minima. Double and triple integrals, polar and cylindrical coordinates; applications to mass, center of mass, moment. Series, power series; Taylor polynomial approximations, error analysis.
(Lec: 2.8, Lab: 0, Tut: 0.5)
Requirements: Prerequisites: APSC 171 Corequisites: Exclusions:
Offering Term: W
CEAB Units:
Mathematics 40
Natural Sciences 0
Complementary Studies 0
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Use an appropriate derivative-related method in two or three dimensions to solve a mathematical problem that arises from modeling a real-world problem.
2. Construct and use power-series representations as alternative function representations and as function approximations.
3. Use an appropriate integral-related method in two or three dimensions to solve a mathematical problem that arises from modeling a real-world problem.

APSC 174 Introduction To Linear Algebra Units: 3.30
Systems of linear equations; real vectors spaces and subspaces; linear combinations and linear spans; linear dependence and linear independence; applications to systems of linear equations and their solution via Gaussian elimination; bases and dimension of real vector spaces; linear transformations, range, kernel and Rank-Nullity theorem; matrix representation of a linear transformation; composition of linear transformations and matrix multiplication; invertible matrices and determinants; eigenvalues and eigenvectors of square matrices. Applications of the course material to engineering systems are illustrated.
(Lec: 2.8, Lab: 0, Tut: 0.5)
Offering Term: WS
CEAB Units:
Mathematics 40
Natural Sciences 0
Complementary Studies 0
Engineering Science 0
Engineering Design 0
Course Equivalencies: MATH 110B/112 / APSC 174
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Solve parametrized and unparametrized systems of linear equations using Gaussian elimination and back substitution by applying elementary row operations on an augmented matrix; for parametrized systems also determine the number of solutions as a function of the parameter.
2. Perform basic matrix algebraic operations (addition, scaling, multiplication), and compute and utilize properties of the determinant of a real n x n matrix (including using it to assess whether a matrix is invertible).
3. Explain the mathematical concept of a real vector space, and determine whether a given subset of a vector space is a vector subspace by working with both the usual Euclidean space Rn and other vector spaces.
4. Demonstrate an understanding of linear combination, linear dependence, linear span, basis and dimension by: i) determining whether a given vector in is the linear span of a family of vectors and whether that family of vectors is linearly independent, ii) computing a basis for a given vector space and its dimension.
5. Define a linear mapping between vector spaces and determine if a given mapping is linear.
6. Define the kernel and image of a linear mapping, compute them for a given real matrix, and explain how they are related to the column vectors of that matrix.
7. Define eigenvalues, eigenspaces and eigenvectors for a given vector space endomorphism and compute them for a real n x n matrix.
8. Prove linear algebraic results for general vector spaces.

APSC 175 Calculus II Units: 3.50
This course reviews topics of Calculus I, including differential and integration methods, to bridge the gap between college-level calculus courses and Calculus II. Students will expand their understanding of calculus principles into multiple variables and dimensions to address engineering challenges. Functions of several variables, partial derivatives, differentials, error estimates, gradients, optimization, and double and triple integrals will be studied in Cartesian, cylindrical, and spherical coordinates for applications in statics, mechanics, transport phenomena, and other physical phenomena relevant to engineering.
(Lec: 3, Lab: No, Tut: 0.5)
Requirements: Prerequisites: APSC 171, Approval of Associate Dean (Academic) Corequisites: Exclusions: APSC 172, MATH 121, MATH 124
Offering Term: S
CEAB Units:
Mathematics 42
Natural Sciences 0
Complementary Studies 0
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Interpret derivative-related methods in one variable to examine engineering phenomena.
2. Interpret integral-related methods in one variable to examine engineering phenomena.
3. Develop functions of two or three variables to describe and assess engineering phenomena.
4. Perform differential operations on functions of two or three variables to examine engineering phenomena.
5. Apply integral methods for functions of two or three variables to examine engineering phenomena.
6. Use differential and integration methods to make engineering design choices.

APSC 182 Applied Engineering Mechanics Units: 1.70
Identification, visualization and quantification of forces on elements and forces within statically determinate engineering structures and systems. Two- and three-dimensional force equilibrium of rigid bodies; force distribution within engineering systems like simple trusses, frames and machines; internal shear forces and bending moments in force carrying elements; and engineering stress and strain. (Lec: 1.45, Lab: 0, Tut: 0.25)
Offering Term: FW
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 0
Engineering Science 15
Engineering Design 5
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Draw free-body diagrams.
2. Identify equations of equilibrium.
3. Solve trusses.
4. Calculate internal forces.
5. Create shear force and bending moment diagrams.
6. Solve a frame.
7. Evaluate stresses and strains.
8. Calculate displacements.

APSC 199 Engineering Communications 1 Units: 0.50
This course develops skills that are necessary to organize and present technical information in a professional context. It will develop skills relevant to technical and non-technical audiences, including effective argumentation, structure, concision, and vocabulary. Students will demonstrate proficiency in spoken and written English relevant to engineering activities. This course is integrated with APSC 101, and coordinated by the same instructors. K0.5(Lec: Yes, Lab: No, Tut: No)
Requirements: Prerequisites: Corequisites: APSC 101
Exclusions:
Offering Term: F
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 6
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Organize and present technical information in a professional context.
2. Demonstrate the correct use and choice of technical vocabulary.
3. Use correct grammar, sentence structure and syntax, word order, paragraph structure, formality, and tone to address and sign off on a letter adhering to academic writing conventions needed for a professional report.
4. Demonstrate how to report relevant information and when to discard unnecessary details.
5. Build listening comprehension skills.

APSC 200 Engineering Design & Practice II Units: 4.00
In this course students will participate constructively on teams to create solutions to open-ended complex problems, using standard design methods and tools. This project-based course provides instruction primarily in the first 6 weeks of the semester focusing on problem scoping, creativity and idea generation, decision making incorporating technical, economic, societal, and environmental factors, safety, engineering codes and regulations, and engineering ethics. The final 6 weeks of the course centre around a design project delivered by each discipline. This course is integrated with APSC 293, and coordinated by the same instructor.
K4(Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: APSC 100 or APSC 103 ; APSC 199 or have passed the English Proficiency Test Corequisites: APSC 293 Exclusions: APSC 202
Offering Term: FW
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 12
Engineering Science 0
Engineering Design 36
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Apply information research, assessment, and management concepts in engineering design.
2. Design creative solution(s) for open-ended, complex problems, applying engineering principles and theories from other disciplinary courses where applicable.
3. Apply design processes and tools for problem definition, idea generation and decision making.
4. Make design decisions using financial factors, environmental factors, social factors, and public interests.
5. Consider equity, diversity, inclusion and indigenization during the design process.
6. Incorporate the core principles of project management into the development. of design solutions (including frameworks, objectives, scheduling, work breakdown, milestones, and life cycle)
7. Discuss engineering as a regulated profession, including reference to relevant .engineering regulations/codes/ standards, ethics, equity, health and safety
8. Discuss professional/technical associations in engineering and discipline.
9. Discuss the role of ethics in a project with reference to real world engineering applications.
10. Demonstrate effective teaming skills.
11. Demonstrate ability to identify and to address personal educational needs.

APSC 202 Engineering Design and Practice II: Client-Based Design Units: 4.30
In this course students will participate constructively on teams to create solutions to client-based open-ended design problems using standard design methods and tools. This project-based course provides instruction on problem scoping, creativity and idea generation, decision making incorporating technical, economic, societal, and environmental factors, safety, engineering codes and regulations, and engineering ethics. Students work in teams to define problems, gather and identify appropriate information, work effectively with teammates, generate ideas, select ideas, and implement a solution to a presented problem from a client. This course is integrated with APSC 293, and taught by the same instructor.
K4.3(Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: APSC 101 and permission of the Associate Dean (Academic) Corequisites: APSC 293 Exclusions: APSC 100, APSC 103, and APSC 200
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 16
Engineering Science 0
Engineering Design 36
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Apply information research, assessment, and management concepts in engineering design.
2. Design creative solution(s) for open-ended, complex problems, applying engineering principles and theories from other disciplinary courses where applicable, to generate a solution to a practical problem provided by a client.
3. Apply design processes and tools for problem definition, idea generation and decision making.
4. Make design decisions using financial factors, environmental factors, social factors, and public interests.
5. Consider equity, diversity, inclusion, and indigenization during the design process.
6. Incorporate the core principles of project management into the development of design solutions (including objectives, scheduling, work breakdown, milestones, and client meetings) to plan, implement and deliver a client project.
7. Discuss engineering as a regulated profession, and the roles of an engineer and their responsibility and impact on society.
8. Discuss professional/technical associations in engineering and discipline including reference to relevant engineering regulations/codes/standards, ethics, equity, health, and

APSC 210 Engineering Design and Practice Units: 4.00
The objective of APSC-210 is to develop the professional skills used by engineers and demonstrate them by team-based project work. It addresses the objectives of APSC 101, APSC 103, and APSC 200 primarily for students who are transferring into engineering from an advanced diploma technology program. It focuses on developing complex problem solving, modeling, and professional skills in the context of the engineering profession, and integrates content knowledge in engineering science and mathematics. It includes instruction on problem scoping, creativity and idea generation, decision making incorporating technical, economic, societal, and environmental factors, safety, engineering codes and regulations, and engineering ethics and equity. Students work in teams to define problems, gather and identify appropriate information, work effectively with teammates, generate ideas, select ideas, and implement a solution to a presented problem.
K4 (Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: Approval of Associate Dean (Academic) Corequisites: APSC 293 Exclusions: APSC 100, APSC 101, APSC 103, APSC 200, APSC 202
Offering Term: S
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 12
Engineering Science 0
Engineering Design 36
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Design creative solution(s) for open-ended, complex problems, applying engineering principles and theories from other disciplinary courses where applicable .
2. Use math and science, and engineering science principles to simulate, analyze, and model real world problems.
3. Incorporate the core principles of project management into the development of design solutions (including frameworks, objectives, scheduling, work breakdown, milestones, and life cycle) .
4. Discuss engineering as a regulated profession, including reference to relevant engineering regulations/codes/ standards, ethics, equity, health and safety.
5. Develop effective teaming and leadership skills, with a focus on complementary team skills .
6. Make design decisions using financial factors, environmental factors, social factors, and public interests.
7. Apply information literacy to research (determining need, locating evaluating, citing, and using ethically) to inform concepts in engineering design.
8. Consider equity, diversity, inclusion and indigenization during the design process.

APSC 221 Economic and Business Practice Units: 3.00
This course will provide students in the Engineering program with the ability to appropriately incorporate selected economic and business practices into the practice of engineering. The topics covered include introductions to: cost concepts, cost estimation, time value of money, cash flow analysis, the effects of taxes and inflation on project economics, replacement analysis, risk and change management, and financial strength and viability of a new business venture. Assignments and examples are based on situations from engineering-based industries. This is an online course but requires students to write in-person examinations (mid-terms and final) at Queen's University during the Fall and Winter Terms (during the Summer Term, all examinations are completed online).
K3 (Lec: Yes, Lab: No, Tut: No)
Requirements: Prerequisites: Corequisites: Exclusions: APSC 321, COMM 244
Offering Term: FWS
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 36
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Recognise different cost concepts and apply them using a variety of cost estimation techniques.
2. Solve cash flow analysis problems utilizing the time value of money.
3. Determine the effect of taxes and inflation on project viability.
4. Apply replacement analysis concepts to determine minimum equivalent annual costs.
5. Examine risk and change management approaches for project management.
6. Assess the financial strength and viability of a new venture.
7. Write a basic business plan.

APSC 222 Engineering for Sustainability and Innovation Units: 3.00

Queen's Faculty of Engineering and Applied Science has partnered with the global How to Change the World social enterprise and other institutions to introduce a new multi-university course. Students are given the opportunity to work on an interdisciplinary and multi-university project focused on positively impacting the complex sustainability challenges faced by real world communities around the world. Throughout this course, students work in small (four or five person) teams to identify and understand a well-defined sustainability (social and/or environmental) problem faced by a real-world community, and then devise, design and propose
an implementable idea for positively impacting that problem. Limited places are available in the course and an application is required for consideration.
NOT OFFERED 2024-2025
K3.0 (Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: Permission of the Engineering Faculty Office Corequisites: Exclusions:
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 36
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Critically discuss the potential for engineering broadly – and their engineering discipline specifically – to positively impact complex (social, economic and environmental) sustainability challenges across diverse contexts.
2. Identify distinct concepts, knowledge, skills and competencies from engineering generally – and their engineering discipline specifically – that could be mobilised to usefully contribute to tackling a complex sustainability challenge or problem.
3. Work with colleagues from other disciplines to devise, design and propose engineering-enabled interdisciplinary ideas that could address a complex sustainability problem.
4. Identify and analyse the ethical and equity dimensions of a complex sustainability problem from an engineering perspective, and evaluate the likely ethical and equity implications of proposed solutions – and particularly the engineering aspects of the proposed solutions – to that problem.
5. Communicate the results of comprehensive engineering analyses and designs clearly and effectively to diverse audiences.

APSC 250 Biology Through an Engineering Lens Units: 3.50

This course provides an introduction to biology and biochemistry, and their applications in cell-based engineering systems and processes. Students will obtain a basic background in biology, including the biology of bacteria, fungi, viruses and human cells. These concepts will be related to applications relevant to modern engineering and will be taught from a systems engineering perspective through the lens of societal need. This will include such applications as; bioremediation for the treatment of waste water, production of vaccines, biomedical and biomechanical devices, and regenerative medicine. While taught from an engineering perspective, the course would be relevant to any student interested in the application of biology, and is designed to provide relevant examples across multiple disciplines. The course assumes basic first year level science knowledge.
NOT OFFERED 2024-2025
K3.5(Lec: Yes, Lab: No, Tut: No)
Requirements: Prerequisites: Corequisites: Exclusions: CHEE 229
Offering Term: FWS
CEAB Units:
Mathematics 0
Natural Sciences 30
Complementary Studies 0
Engineering Science 12
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. CLOs coming soon; please refer to your course syllabus in the meantime.

APSC 275 Statistics and Differential Equations Units: 4.00
The course will discuss the application of linear differential equations with constant coefficients, and systems of linear equations with engineering applications. Additionally, the course will explore relevant data analysis techniques including graphical and statistical analysis and presentation of experimental data, random sampling, estimation using confidence intervals, linear regression, residuals and correlation.
(Lec: 3, Lab: 0.5, Tut: 0.5)
Requirements: Prerequisites: Approval of Associate Dean (Academic) Corequisites: APSC 175, APSC 142 or APSC 143 or MNTC 313 Exclusions: MTHE 224, MTHE 225, MTHE 235, MTHE 237, MTHE 367
Offering Term: S
CEAB Units:
Mathematics 48
Natural Sciences 0
Complementary Studies 0
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Calculate and visualize summary statistics in engineering contexts.
2. Assess and interpret the probability of events in engineering contexts.
3. Perform hypothesis tests and fit models to characterize engineering phenomena.
4. Solve linear differential equations to explain engineering phenomena.
5. Construct and evaluate systems of differential equations to address engineering problems.
6. Use statistical and differential equation methods to make engineering design choices.

APSC 293 Engineering Communications 2 Units: 1.00
This course provides an introduction to effective engineering writing and speaking skills with the emphasis on professional correspondence, engineering reports, oral briefings, and formal oral presentations. These skills are developed in lectures and small group tutorials. This course is integrated with APSC 200, and coordinated by the same instructor.
K1(Lec: No, Lab: No, Tut: No)
Requirements: Prerequisites: APSC 100 or APSC 103 Corequisites: APSC 200 or APSC 202 or permission of instructor Exclusions: APSC 292, CHEE 260, ELEC 291, ELEC 391, GEOL 291, GEOL 292, MECH 290
Offering Term: FWS
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 12
Engineering Science 0
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Develop and apply excellent written communication skills.
2. Develop and apply excellent verbal communication skills.
3. Develop and apply excellent presentation skills.
4. Use graphics and figures to effectively support written and verbal communication.
5. Reflect on project activities and provide insight related to project and learning scenarios.

APSC 301 Professional Internship Units: 3.50
The professional internship involves spending a minimum of twelve months and a maximum of sixteen months in a paid internship position in industry or government. Students in the 12-month internship must register in APSC 302, APSC 303 and either APSC 301 or APSC 304. Students in the 16 month placement take APSC 301, APSC 302, APSC 303 and APSC 304. The nature of the work must satisfy the criteria defining professional experience for licensure as a Professional Engineer in Canada. The course includes prior workshops on interviewing, resume preparation and work performance. Successful completion of the course requires submission of a report of high quality on the experience within thirty days of completion of the work period. Career Services manage the non-academic aspects of the course.
K3.5 (Lec: No; Lab: No; Tut: No)
Requirements: Prerequisites: APSC 200 and APSC 293 or ELEC 290 or MREN 203 Corequisites: Exclusions:
Offering Term: S
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 21
Engineering Science 21
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. .

APSC 302 Professional Internship Units: 3.50
The professional internship involves spending a minimum of twelve months and a maximum of sixteen months in a paid internship position in industry or government. Students in the 12-month internship must register in APSC 302, APSC 303 and either APSC 301 or APSC 304. Students in the 16-month placement take APSC 301, APSC 302, APSC 303 and APSC 304. The Internship Coordinator must be satisfied that the work carried out has educational merit. The course includes workshops on interviewing, resume preparation and work performance. Successful completion of the course requires submission of a report of high quality on the experience within thirty days of completion of the work period. Career Services manage the non-academic aspects of the course.
K3.5(Lec: No; Lab: No; Tut: No)
Requirements: Prerequisites: APSC 200 and APSC 293 or ELEC 290 or MREN 203 Corequisites: Exclusions:
Offering Term: F
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 21
Engineering Science 21
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. .

APSC 303 Professional Internship Units: 3.50
The professional internship involves spending a minimum of twelve months and a maximum of sixteen months in a paid internship position in industry or government. Students in the 12-month internship must register in APSC 302, APSC 303 and either APSC 301 or APSC 304. Students in the 16-month placement take APSC 301, APSC 302, APSC 303 and APSC 304. The Internship Coordinator must be satisfied that the work carried out has educational merit. The course includes workshops on interviewing, resume preparation and work performance. Successful completion of the course requires submission of a report of high quality on the experience within thirty days of completion of the work period. Career Services manage the non-academic aspects of the course. Note that some programs may accept this course as part of their technical elective requirements. Credit may only be granted to students who have successfully fulfilled the necessary requirements to receive the Professional Internship designation.
K3.5(Lec: No; Lab: No; Tut: No)
Requirements: Prerequisites: APSC 200 and APSC 293 or ELEC 290 or MREN 203 Corequisites: Exclusions:
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 21
Engineering Science 21
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Demonstrate professional conduct and integrity in the workplace.
2. Take initiate to plan, organize and complete tasks in order to meet workplace goals, as an individual and as a team member.
3. Demonstrate inclusive leadership in the workplace (through individual accountability and responsibility, being a good listener, motivating the team, staying open to input, and valuing other's perspectives).
4. Produce clear, concise, precise and well-organized written communication in a professional workplace setting, with language and format appropriate for the audience and purpose.
5. Deliver formal and/or informal oral presentations in a professional workplace setting, with suitable language, content, style, timing and flow for the specific audience and purpose.
6. Evaluate and reflect on own knowledge, skills and learning and identify next steps for ongoing professional development.

APSC 304 Professional Internship Units: 3.50
The professional internship involves spending a minimum of twelve months and a maximum of sixteen months in a paid internship position in industry or government. Students in the 12-month internship must register in APSC 302, APSC 303 and either APSC 301 or APSC 304. Students in the 16-month placement take APSC 301, APSC 302, APSC 303 and APSC 304. The Internship Coordinator must be satisfied that the work carried out has educational merit. The course includes workshops on interviewing, resume preparation and work performance. Successful completion of the course requires submission of a report of high quality on the experience within thirty days of completion of the work period. Career Services manage the non-academic aspects of the course.
K3.5(Lec: No; Lab: No; Tut: No)
Requirements: Prerequisites: APSC 200 and APSC 293 or ELEC 290 or MREN 203 Corequisites: Exclusions:
Offering Term: S
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 21
Engineering Science 21
Engineering Design 0
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. .

APSC 381 Advanced Design and Skills for Innovation Units: 3.50
This multidisciplinary project-based course will provide students with a broad range of knowledge and skills for design and innovation. Topics span the breadth of the innovation process, including advanced topics such as risk analysis, FMEA, reliability, and elements of six sigma methodologies. Elements of project management, market and economic analysis, and other professional practice topics are interwoven. Students work in multidisciplinary teams on relevant and realistic projects, simulating the real-world engineering environment. Students must apply for registration in the course, and that permission by the instructor is needed. Given the course load, it is not advisable to take APSC 381 and APSC 401 at the same time.
NOT OFFERED 2024-2025
K3.5 (Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: Permission of the instructor
Corequisites: Exclusions:
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 0
Engineering Science 0
Engineering Design 42
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. CLOs coming soon; please refer to your course syllabus in the meantime.

APSC 400 Technology, Engineering & Management (TEAM) Units: 7.00
Multidisciplinary teams of engineering, commerce, law, and/or science students, as appropriate, undertake consulting projects with industrial, government, and not-for-profit clients. Typical project types include Process Improvement, Feasibility & Design, Business Strategy/ Marketing, Environmental, Start-ups, Blue-Sky, or a combination of topics which are selected based on prevailing industry trends. Following a phase of self-directed problem and scope definition, students will execute their projects in groups, guided by experienced professionals. Students will receive formal training in project management and participate in guest lectures by industry experts. Students interact regularly with clients at a technical and management level. The course concludes with a comprehensive report and presentation to the client. Participation in the course is by selection. Students must apply for admission into the course by providing a copy of their resume, unofficial transcript, and a cover letter substantiating their interest in the course. More information can be found on the course website: http://team.appsci.queensu.ca/
NOT OFFERED 2024-2025
K7(Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: Completion of 3rd year core courses and permission of the instructor. Corequisites: Exclusions: APSC 401
Offering Term: FW
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 42
Engineering Science 0
Engineering Design 42
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. CLOs coming soon; please refer to your course syllabus in the meantime.

APSC 401 Interdisciplinary Projects Units: 4.50
Multidisciplinary teams of engineering, commerce, law, science, social science, and humanities students, as appropriate, undertake consulting projects with industrial, government, and not-for-profit clients. Typical project types include social innovation, process improvement, business strategy/marketing, environmental, start-ups, blue-sky, or a combination of topics which are selected based on societal and industry interests. This is a winter term course, but students will meet with their teams and client at the end of the fall term. Following a phase of self-directed problem and scope definition, students will execute their projects in groups, guided by experienced professionals. Students will receive formal training in project management, effective teaming, client interaction, and communication in professional environments. Students interact regularly with clients at a technical and management level. The course concludes with a comprehensive report and presentation to the client. Participation in the course is by selection. Students must apply for admission into the course by providing a copy of their resume, unofficial transcript, and a cover letter substantiating their interest in the course. This course is co-taught with instructors teaching the equivalent courses in other Faculties.
K4.5(Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: Completion of 3rd year core courses and permission of the instructor. Corequisites: Exclusions: APSC 400
Offering Term: W
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 27
Engineering Science 0
Engineering Design 27
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Build and implement a plan that effectively uses time and resources to solve a problem.
2. Apply principles of design and problem solving.
3. Demonstrate professional written and oral communication skills.
4. Work effectively in a multidisciplinary team to solve a problem.

APSC 480 Multi-disciplinary Industry Units: 9.00
This course will enhance student's design, innovation, critical thinking, and professional skills by experiencing real-time industry-funded projects. Working in multidisciplinary teams, students are guided by experienced engineering professionals both internally and externally. Teams interface frequently with the client, including occasional external site visits. Projects cover a broad range of engineering disciplines, and often incorporate the development of physical prototype(s) or digital models/simulations for evaluation and testing, as well as techno-economic elements. Students will integrate elements of engineering design, innovation, and professional practice from prior courses, with enhancements from occasional lectures, workshops, and guest speakers. Project funding supports all necessary travel, communication, software, equipment, prototyping components and related services. Professional engineering skills such as communication, teamwork, project management, engineering economics, ethics, and safety will be integral to the projects. Students must apply for registration in the course, and that permission by the instructor is needed.
NOT OFFERED 2024-2025
K9(Lec: Yes, Lab: No, Tut: Yes)
Requirements: Prerequisites: Enrolment may be requested by contacting the Instructor. Corequisites: Exclusions:
Offering Term: FW
CEAB Units:
Mathematics 0
Natural Sciences 0
Complementary Studies 28
Engineering Science 0
Engineering Design 80
Offering Faculty: Smith Engineering
Course Learning Outcomes:

1. Develops professional engineering conduct and performance as part of a multidisciplinary team on a real industry client project.
2. Applies creative approaches to identify and develop alternative concepts and procedures.
3. Conducts risk analysis of a project, and manages risk for project considering operating performance, operating risk, and financial riskTools: Sensitivity Analysis, Risk Matrix.
4. Defines a problem in detail, including unstated customer/user/stakeholder needs, aesthetics, usability, user interface or other elements that impact user/operator experience.
5. Demonstrates conciseness, precision, and clarity of language in technical writing.
6. Demonstrates formal oral presentations with appropriate language, style, timing and flow.
7. Demonstrates habits that support regular reviewing