Philadelphia University

Faculty of Engineering and Technology

Civil Engineering Department

Study Plan 2021-2022 Course descriptions

Calculus (1) (216111)

The course covers the following main topics: the distinction between algebraic and transcendental functions, an introduction to analytic geometry, applications of differentiation, and a brief introduction to integration.

Prerequisite (-----)

Calculus (2) (250102)

This course presents advanced principles of calculus to provide the necessary foundation for student progression. It covers the following main topics: techniques of integration, sequences and series, conic sections, and polar coordinates

Prerequisite (216111)

General Physics (1) (216131)

This course is for first-year students majoring in engineering, physics, or other sciences. It introduces students to the basic language and ideas of physics that are found in all branches of science and technology. It provides a clear and logical presentation of the fundamental concepts and principles of physics, enhancing their understanding through a wide range of interesting real-world applications.

Prerequisite (-----)

General Physics (2) (216132)

The course covers the main concepts, principles, methods, and results of classical physics. It primarily covers Newtonian mechanics, with topics including vectors, the dynamics and motion of a single particle in one, two, and three dimensions, and circular motion. Newton's laws of motion, work, energy and force, conservation of energy, linear momentum, rotational motion, angular momentum, general rotation and static equilibrium; elasticity and fracture.

Prerequisite (216131)

Engineering drawing620131 620132

Instruments and their use, graphic geometry ،lettering, orthographic and isometric drawing and sketching, sectional views ،introduction to descriptive geometry, surface intersections and developments ،and computer (ACAD)

Prerequisite (620132)

Engineering Workshop (1)

Developing basic skills in the fields of manual filing, turning (lathe work), welding, piping and plumbing, carpentry, sand casting, glasswork, sheet metal fabrication, and metal forming.

Prerequisite (-----)

Programming Language (0630263)

Data types and constant/variable types. Types of operations. Input and output statements. Arithmetic, logical, and relational expressions. Type conversion. Control statements. Loop statements. Functions. Arrays. Pointers. Strings. Files. Structures. Introduction to object-oriented programming.

Prerequisite (216099)

Engineering Skills (640253)

Understanding the definition of engineering. Analyzing basic engineering problems. Proposing and evaluating design solutions. Communicating effectively within a team environment. Reading research papers and writing technical reports. Understanding professionalism and being aware of ethical responsibility. Understanding the basics of project management and planning for managing simple projects.

Prerequisite (116108)

Entrepreneurship (610550)

Basic Concepts of macro & micro economics, Economy architecture, production process, the effect of Science and Technology on production, the use of Science and Technology in production, Skills, Free business, Services and commodities production, Methods of project propagation, Marketing studies, Export, import and interior market consumption, Project forming, project requirements, economic appraisal studies, project financing, banking, companies, Cost studies, Project management, Marketing.

Prerequisite (640253)

Engineering Geology (670231)

Study of soil structures, soil components, rock formation, surface structures, factors affecting erosion, corrosion, soil exploration.

Prerequisite (250102)

Statics (670211)

Introduction to the basic concepts: force and displacement vectors, force systems, equivalent systems, static equilibrium, analysis of simple structures, internal forces (shear and moment), friction, geometric properties: center of gravity, moment of inertia.

Prerequisite (216101+250102)

Strength of Materials (670212)

Stress, strain, stress-strain relationship, axial loads, torsion, bending, shear, sectional deformation, column buckling.

Prerequisite (670211)

Strength of Materials Lab. (670213)

Tensile test, shear and bending moment test, hardness test, impact test, fatigue test, creep test, bridge deformation test, buckling test.

Prerequisite (670212)

Construction Materials (670214)

Interatomic forces and energy relationships, types of bonds, ordered (crystalline) materials, creep, fatigue and cracking in materials related to the internal structure of the material, basic geological concepts. Binding materials. Concrete aggregates and their tests, water quality, admixtures, and fresh concrete, concrete mix design, methods of mixing, transporting, pouring, and curing concrete, properties and uses of concrete, concrete tests, and bricks.

Prerequisite (250102)

Construction Materials Lab. (670216)

Cement tests at the construction site, testing the fineness of cement, testing the optimum consistency of cement paste, testing the initial and final setting time, specific gravity and density of cement, testing the slump of concrete, testing the flow table, testing the compressive strength of concrete, testing the tensile strength of concrete, testing the grain gradation of aggregates, testing the specific gravity and absorption of coarse aggregates, testing the specific gravity and absorption of fine aggregates.

Prerequisite (670214)

Building Construction & Civil Drawing (670217)

Structural elements, types of buildings, types of loads, types of slabs, one-way and two-way, calculating dead loads on solid and hollow slabs, distributing loads from slabs to beams, calculating loads on columns, calculating moments on beams, determining whether a column is short or slender, calculating dimensions of the column area, site preparation, excavation work, types of foundations, Calculating the area and thickness of the insulated foundation, openings in the building such as doors, windows and ventilation openings, drawing sections in beams, columns and slabs.

Prerequisite (670214)

Soil Mechanics (670331)

Introduction to soil mechanics, types of soil particles, soil minerals, soil classification, soil compaction in the laboratory and hydraulic properties of soil, stresses in soil due to external loads, compression theory and settlement calculations, shear strength of soil.

Prerequisite (670231)

Soil Mechanics Lab. (670332)

Use of soil testing methods to determine the physical properties of different types of soil. Laboratory experiments include moisture testing, specific gravity testing, and soil gradation (using sieves for coarse-grained soil and using a hydrometer for fine-grained soil). Limits of stability (liquid limit, plastic limit). Compaction, water permeability within soil (constant and variable pressure), soil compaction, direct shear, compression of unsupported specimens.

Prerequisite (670331)

Structures (1) (670311)

Analysis of statically determined structures: Stability and determination of structures, types of loads, moment and shear diagrams, deflection and settlement of supports, and thermal changes. Methods of dummy work, moment area, and associated beam method. Influence lines for statically determined beams, frames, and webs.

Analysis of statically undetermined structures: harmonic translation method, three-moment equation, extraction of values of moments of bonds.

Prerequisite (670212)

Structures (2) (670312)

Analysis of non-statically determined structures: force method, slope and deflection method, moment distribution method, matrix analysis of structures.

Prerequisite (670331)

Highways Geometric Design (670324)

Design controls and standards, driver, pedestrian, vehicle and road characteristics, sight distance, horizontal and vertical path design, cross-section and its elements, elevation and its methods, quantity calculation for earthworks, intersections at the same level, intersections at multiple levels, drainage network design.

Prerequisite (670261)

Pavement Design (670323)

Types of pavements and their definition, soil classification for road works, properties and types of asphalt materials used in road works, design of asphalt mixtures using the Marshall method, stress analysis in concrete and flexible pavements, pavement layers, calculation of equivalent axial loads, design of concrete and flexible road pavements, road maintenance.

Prerequisite (670324)

Design of Highways lab. (670322)

Viscosity, penetration, ductility, ductility, flash point and burning point tests of asphalt, physical properties tests of soil used in road works and determination of bearing capacity for California soil, asphalt mix design using Marshall method, skid resistance of surface layer.

Prerequisite (670323)

Reinforced Concrete -1 (670411)

Introduction to the materials used, analysis and design of the bending of beams with rectangular and T-shaped sections, finding the longitudinal reinforcement in different sections of the beam when it is single or double reinforced, studying shear forces and how to resist diagonal tension in beams, studying the bonding force between the reinforcing bars and concrete and determining the ends of these bars. Analysis and design of solid and ribbed roof slabs, design of short columns and concrete members subjected to compressive loads and bending moments.

Prerequisite (670312)

Reinforced Concrete -2 (670412)

Introduction to design according to working stresses. Study of the service life of the structure for different purposes. Study of deflections and cracks in structures. Design of deep beams and beams subjected to torsional loads. Design of roof slabs without beams (fungal slabs) and slabs with ribs. Design of columns subjected to double bending moments. Design of slender columns, frames, and staircases. Modeling of structures. Design of foundations.

Prerequisite (670411)

Steel Structures (670414)

Properties of structural steel, ductile design of structural members, tension members, compression members, beams-columns, design of connections by welding and bolting, design of structural structures (trusses, frames), introduction to ductile design.

Prerequisite (670312)

Transportation & Traffic Engineering (670422)

Transportation systems, elements and components of transportation systems, traffic flow theory, transportation demand, transportation planning, environmental impact assessment, traffic studies, traffic safety studies, the concept of road traffic capacity and level of service, capacity analysis for two-lane and multi-lane roads and highways, capacity analysis of signal-controlled and non-signal-controlled intersections.

Prerequisite (670324)

Surveying (670261)

Principles of surveying engineering, track surveying and linear measurements, leveling operations and their applications in topographic mapping (contouring) and longitudinal and transverse sections. Calculating areas, volumes, and soil quantities. Measuring angles and polygonal areas. Tachymetric surveying and measuring distances using electronic devices. Theory of errors and correction of measurements. Principles of triangulation measurements, basic principles of photogrammetry and remote sensing, and computer applications.

Prerequisite (250102)

Surveying Lab. (670262)

Using leveling devices and theodolites in surveying work, drawing longitudinal and cross-sectional sections and topographic maps, marking buildings, structures and beams, using the total station in surveying work, using the plan meter in calculating irregular areas, closed and open polygons, Calculating the lengths of buildings using the theodolite, calculating the heights of objects using the theodolite.

Prerequisite (670261)

Project Management (670571)

Introduction to project management, its tasks and basics, identifying project stakeholders and their responsibilities. Project planning, defining project tasks, their duration, and their interrelationships. Project timeline development and analysis, identifying the critical path. Project progress review, project status assessment, and use of acquired analytical methods to control project duration and cost.

Prerequisite (670412)

Specifications, Contracts & Quantity Surveying (670572)

Ability to identify contract requirements and elements, knowledge of contracting processes, project tendering methods, contract types, contract documents, and bill of quantities. Familiarity with the Jordanian Contracting Contract Book for construction projects. Understanding the specifications required for construction projects and familiarity with Jordanian specifications for construction projects. Ability to calculate quantities for various construction elements in the project and prepare a bill of quantities.

Prerequisite (670412)

Hydraulics (670441)

Flow in pipes, analysis of pipe networks, basics of flow in open channels, analysis of flow in open channels, classification of flow (homogeneous flow), critical, subcritical and supercritical flow, gradual change in flow, abrupt change in flow (hydraulic jump), analysis of water surface diagram, dimensional analysis, geometric symmetry, pumps, turbines.

Prerequisite (670381)

Hydrology (670541)

General introduction to hydrology, the hydrological cycle and its components, precipitation and its properties, evaporation and its measurement, rain and its types, methods of measuring precipitation, hydrographic analysis, hydrographic unit, flood peak frequency analysis, flood wave tracking, determining the volume of water reservoirs, introduction to groundwater hydrology, groundwater flow equations and types of aquifers.

Prerequisite (670441)

Hydraulics Lab. (670442)

Conduct scientific experiments as follows: Calculate Reynolds number, calculate extrusion force, sharp orifice and free extrusion flow, pressure resulting from dead weights, estimate the height of the average center of gravity, groundwater flow and pilot well unit, calculate the energy lost from the hydraulic jump, Flow over submersible dams, inferring water flow from rainfall using hydrological model, hydraulic hammer.

Prerequisite (670441)

Sanitary Engineering Lab. (670444)

Preparation of various laboratory solutions, titration of acids and bases, water analysis tests including: measuring solids, alkalinity, turbidity, water hardness, electrical conductivity, chemical oxygen demand (COD), biological oxygen demand (BOD), and cup test (coagulation/flocculation).

Prerequisite (670443)

Foundations Engineering (670531)

Types of foundations, review of the basics of soil mechanics (stress, settlement, shear), soil investigations, soil pressure, soil bearing capacity, factors affecting foundation design, and retaining wall design.

Prerequisite (670331)

Engineering Training 670499

The student will spend a seven-week training period after completing 115 credit hours in the industry (inside or outside Jordan) under the supervision of a faculty member in the department. The student will be required to submit periodic reports, a final report, and take a final exam. This will be within a separate semester.

Prerequisite (115 Cr.Hs.)

Engineering project (1) 670551

The student must connect with one or more faculty members from the department who will assign him a project. The student will study and analyze the project and submit a proposal for its implementation in the next stage.

Prerequisite (100 Cr.Hs.)

Engineering project (2) 670552

The student implements the project identified by the department in light of the results achieved in the first phase.

Prerequisite (670551+670499)

Fluid Mechanics (670381)

Basic fluid properties, basic units of measurement, pressure and its measurements, fluid statics (forces acting on flat, inclined and curved submerged bodies), buoyancy, kinematic fluids, the concept of control volume, the continuity equation in fluids, the energy equation in fluids, applications of the Bernoulli equation, the concept of momentum in fluids.

Prerequisite (670211)

Sanitary Engineering (670443)

Water use sectors, forecasting future needs, production requirements, and population forecasting. Engineering design standards for water treatment units, various treatment processes - types, principles, mechanisms, and engineering design. Wastewater treatment: engineering design standards. Its types, principles, mechanisms, and engineering design - including primary processes, sedimentation, filtration, biological treatment, and various sterilization processes.

Prerequisite (670381)

General Chemistry (1) 216141

This course introduces the basic theories of chemistry and covers the atomic nature of matter, stoichiometry, the periodic table, aqueous solution and concentrations, and oxidation-reduction reactions.

Prerequisite (-----)

General Chemistry (1) lab 216143

Practical chemistry typically includes titration techniques such as acid-base titration and determination of the equivalence point, preparation of laboratory materials, study of physical properties such as solubility and adsorption, analysis of samples to determine their components, and laboratory safety concepts.

Prerequisite (216141)

Calculus (3) (250202)

Complex functions - mapping, integrals in complex planes, Teller and Laurent series, singularities and residue theory, property values and property vectors.

Prerequisite (250102)

Linear algebra and calculus (250205)

Systems of linear equations, matrices, determinants, Cramer's rule, vector spaces, linear transformations, eigenvalues and eigenvectors.

Prerequisite (250102)

Engineering Analysis (2) 610262

Introduction to numerical analysis. Develop a basic understanding of numerical algorithms and skills in implementing algorithms to solve mathematical problems on a computer.

Prerequisite (250205)

Engineering Workshop (2) 620172

Home electrical circuits, fluorescent lamp circuits, series and parallel circuits, switch installations, fuses, electronic soldering, electronic device maintenance, and circuit board design.

Prerequisite (620171)

Dynamics 620212

The study of plane motion and the forces acting on a particle, a group of particles, or a solid. The course includes applications of Newton's second law of motion to linear motion and motion along a curved path. The course also covers applications of the principles of work, energy, impulse, and momentum.

Prerequisite (670211)

Engineering Analysis(1) 610260

Basic Concepts and ideas, first Order Differential Equations. Second and higher order Differential Equations, Power Series Method, and Laplace Transform.

Prerequisite (250102)

Engineering Statistics 670203

Data presentation and processing, probability theory, random variables, probability distribution, modeling theory, statistical estimation, hypothesis testing, statistical analysis.

Prerequisite (610260)

Restressed Concrete (670517)

The behavior of concrete and reinforcing steel under sustained loading, as well as the analysis and design of pre-tensioned and post-tensioned concrete members, and the design of these members in an integrated structure. The objective of this chapter is to calculate the stress and tensile loads in a composite system with pre-stressed or cast-in-situ concrete for a concrete slab at various stages of construction and service. This chapter also covers the calculation of convexity, deflections, and cracking of restressed concrete.

Prerequisite (670412)

Environmental Engineering (670343)

Definition of the environment, overview of the ecosystem, conservation theory, material balance, mixing methods, and types of reactors.

Quality and properties of water and wastewater (physical and chemical microbial properties), water quality standards, types and sources of water pollutants, and the different stages of drinking water treatment and wastewater treatment. Its objectives (primary, secondary, and tertiary). Air pollution, types of pollutants, their origin and fate, acid rain, ozone layer depletion, and global warming. Air pollution control devices and their mechanisms of action.

Prerequisite (670444+216141)

Special Topics in Civil Engineering (670553)

Lectures and discussions focusing on specialized and advanced topics in the field of civil engineering that have not been previously presented in any other courses.

Prerequisite (Department Approval)

Airports & Railways Engineering (670522)

Introduction to aviation engineering and civil airports, aircraft characteristics related to airport design, airport parts and the characteristics of each part, airport pavement design, introduction to railways and their types.

Prerequisite (670422)

Computer Applications in Civil Engineering (670554)

Teaching basic CAD AUTO commands, introduction to Prokon software. RC frame construction analysis and design using ETABS, slab and mat base analysis and design using SAFE. Contour mapping and road alignment determination using CIVIL AUTO. Quantity estimation of civil engineering structures and construction management.

Prerequisite (120 Cr.Hs.)

Fundamentals of Finite Element (670555)

This course covers the theory and application of matrices in the structural analysis of two-dimensional trusses, beams, and frames, and three-dimensional space frames, both determinate and indeterminate systems. Methods used will include the direct stiffness method and the elastic-stiffness method. With an introduction to computer-based techniques for structural analysis. This course is an introduction to the finite element method.

Prerequisite (120 Cr.Hs.)