Course	Credits	Duration (hour)	Description
General Mathematics I	3	48	Cartesian coordinates; polar coordinates; complex numbers; addition, product, root & geometrical representation of complex numbers; polar representation of complex numbers; function; functions algebra; limit and relevant theorems; infinite limit and limit in infinite; left-hand and right-hand limit; connectivity; derivative; derivation formula; inverse function and its derivative; trigonometric functions derivative and their inverse functions; Rolle's theorem; mean theorem; Taylor expansion; geometrical and physical applications of derivative; curves and acceleration in polar coordinates; application of derivative in approximation of equations roots; definition of integral of continuous functions and piecewise continuous; basic theorems of differential & integral arithmetic; primitive function; approximate methods of integral estimate; application of integral in computation of area, volume, length of curve, moment, center of gravity and labor (in Cartesian and polar coordinates); logarithm and exponential function and their derivative; hyperbolic functions; integration methods such as change of variable, component and decomposition of fractions; transform of special variables of sequence and numerical series and relevant theorems. Power series and Taylor theorem and recursive functions.
Physics I	3	48	Measurement, Motion in two and three dimensions, forces and Newton's laws and its application, momentum, systems of particles, rotational kinetics, rotational dynamics, angular momentum, work and kinetic energy, potential energy, conservation of energy, gravitation, temperature, molecular properties of gasses, first law of thermodynamics, entropy and second law of thermodynamics.
Technical Drawing & Construction Planning	2	24	Geometrical construction, Orthographic projection and other projections, Descriptive geometry, intersections and development.
Prerequisite Mathematics	3	48	Principle of Mathematical Induction, Complex numbers; Functions: Odd, Even and Periodic functions Hyperbola functions and their graphs.
Prerequisite physics	3	48	Mechanics, work and energy, waves, sound, heat.
Engineering Geology	2	24	The nature and scope of physical geology, matter and energy. Minerals. Igneous activity and rocks, Sedimentary rocks, metamorphic rocks, erosion on hill slopes, running water, underground water, tectonic. Earthquakes.
Physics Lab I	1	24	Implementing theoretical principles of Mechanical Physics in a physical laboratory in practical ways.
Environmental Engineering	2	24	Description of environment and its applications, getting to know: the environment's challenges in modern world, ecology foundations, principles of physical and chemical treatment of water and wastewater, Hydraulic analysis of water systems, air quality, water resources and relevant pollution, physical & chemical and biologic properties and available standards, water treatment process, wastewater treatment process, solid hazardous material's

Architectural Design and Urban development	2	24	In order to students become familiar with architecture theory and recognition of different operations in architecture. Cooperation procedure between civil engineers and architects. Description of operations in architecture.
Surveying and Operations	2	24	Horizontal and vertical distance measurement, angles and direction, traverses, errors, control and construction surveys, coordinate systems, land records, and coordinate geometry, office and field practice.
General Mathematics II	3	48	Matrix Algebra: Determinants and their properties, Applications to systems of linear equations, Homogeneous systems; Series: Convergence of series of real numbers, Tests of convergence, Series of functions; Integration: The Definite Integral; Definition: The Riemann Sum; Techniques of Integration including advanced methods of substitution, partial fractions, by parts and reduction formulae, Applications; Improper Integrals: Convergence; Partial Differentiations, total derivations.
Statics	3	48	Force systems, equilibrium, structures, distributed forces, friction, moments and products of inertia. Revision on scalar and vector quantities, Newton's laws, systems of units, force, moment of force, couple. Various force systems and their resultants, free body diagrams, equilibrium of rigid bodies and their equations of equilibrium and reactions determination, static indeterminacy and partial constraints. 1-Structures Trusses (method of joints, method of sections), frames and machines. 2-Distributed forces Centers of gravity, mass, volume of rigid bodies, composite volumes, areas and lines and their centers. 3-Beams Equations of axial and shear forces and bending moment and their diagrams for the beams under concentrated and distributed loads. 4-Cables Flexible cables under concentrated and distributed transverse loads, Parabolic cables, catenary cables. 5-Area moments of inertia Definitions of rectangular and polar moments of area, radius of gyration, product of area Transfer of axes, rotation of axes, principal axes, Mohr's circle. 6-Friction Dry friction laws, friction angle, friction in wedges, screws, bearings, Rolling resistance. 7-Virtual work Method of virtual work and its application in machines. Method of potential energy.
Construction Materials & Lab.	2	24	Physical properties of common construction materials primarily metals, concrete and asphalt; examination of properties with respect to design and use of end product, design and control of concrete and asphalt mixtures, introduction to reinforced concrete; principle of testing; characteristics of test; properties of materials.

Differential Equations	3	48	Nature of differential equations and their solution, family of graphs and vertical routes, physical patterns, separable equation, first order linear differential equation, homogeneous equation, second order linear equation, homogenous equation with fixed constants, method of indefinite constants, method of changing parameters, application of second order equations in physics and mechanics, solution of differential equation with series, Bessel and Gamma functions, Legendre polynomial, an introduction to differential equations set, Laplace transform and its application in solving differential equations.
Computer Programming	3	48	Introducing organization and main parts of computer, machine language and assembly, numeric and non-numeric data representation, algorithms and sub-algorithms and flowchart, basic concepts such as frequency, familiarity with C & C++ programming language: constants and variables, computational and logical phrases, different types of instructions, different types of conditional operations loops, vectors and matrices, subprograms, input and output instructions, common algorithms such as methods of search and arrangement, practical examples of programming. Using C language for course project.
Strength of Materials I	3	48	Concepts of stress and strain, combined stresses, compression, combined stresses in beams and frames, analysis of stresses and deformation in bodies loaded by axial, torsion, and bending loads.
Dynamics	3	48	A study of kinematics of a particle, moment of inertia of masses, rotation and plane motion of rigid bodies, principles of work and energy, impulse, and momentum, as applied to engineering problems.
Structural Analysis I	3	48	Analysis of statically determinate structures (beams, trusses, Frames, arches and cable) deflection of structures, stability, internal forces of frames, zero load method, area moment method, influence lines for statically determinate structures, Analysis of space trusses.
Soil Mechanics	3	48	In this course, the physical and mechanical properties of soil are discussed. These properties are categorized in seven subjects as: Strength of soil, permeability, compaction, consolidation, stress distribution, slope stability and ranking states of equilibrium.
Fluid Mechanics	3	48	Fluid and their properties, Pressure and head, Buoyancy, Motion of fluid particles and streams, Manometer, Hydrostatics Forces, Flow measurements based on Bernoulli equation, Viscous Flow in Pipes and Ducts, The momentum equation and its application, The energy equation and its application, Behavior of real fluids, Incompressible flow around a body, Power transmission by pipeline.
Statistics and Probability	2	24	Basic principles of statistics, charts, graphs, presentation and analysis of data averages, median, mode, deviations, probability, normal curves and applications.
Engineering Economics	2	24	A study of methods and techniques used in determining comparative financial desirability of engineering alternatives. Includes time value of money (interest), depreciation methods and modern techniques for analysis of management decisions.
Numerical Computation	2	24	Error and approximation, roots of equations, Solving system of linear equations using different methods. Solving system of non-linear equations, Curve fitting and Interpolation, Numerical integration and differentiation, Solving Partial differential equations, case studies in engineering.

Concrete Technology	2	24	Mineral aggregates; properties and testing. Portland Cement; manufacturing, composition, hydration, properties and testing. Proportioning concrete Mixes. Mechanical properties and testing of hardened concrete. Masonry, manufacturing and testing. Manufacturing, properties.
Road Construction	2	24	To getting familiar with highway design principles and their usage in design and implementation of infrastructure of roads. Roads studies, principles of navigation on topographical maps, earthworks, road's geometry, implementation of geometry plan, horizontal path of road design, vertical path design, drainage.
Steel Structures I	3	48	Factors influencing strength and serviceability of steel structures; LRFD limit state design procedures. Use of theories of plasticity and stability in development of design methods and specifications, bolted and welded connections, temperature effects, and affect of different fabrication methods on behavior of structure.
Hydraulics & Lab	3	48	Open channel flow, natural streams and waterways, hydrologic analysis and design, pressure flow, analysis and design of pipe networks and pump systems.
Reinforced Concrete Structures I	3	48	Behavior of reinforced concrete structural elements. Theories of design; concepts of design and proportioning of sections for strength and serviceability. Design of beams, one-way slabs, short columns and isolated footings. Physical and mechanical properties of concrete, design methods and requirements, analysis and design of rectangular, T, I section in bending, shear, torsion, members in compression and bending, interaction curves for columns, effect of slenderness in design of columns.
Mechanical and Electrical Installations	2	24	Water and wastewater installations, Thermal installations, Electrical installations
Soil Mechanics Lab	1	24	Field and laboratory experimental studies of advanced aspects of soil behavior, compressibility, shear strength, pore water pressure, dynamic tests, advanced instrumentation and measurement techniques, research reports required.
Soil Mechanics II	2	24	Analyses and solving of typical geomechanical problems, for example: calculation of initial tension, calculation of increased tension in the soil due to external loads, calculation of water flow in soils and filter nets.
Steel Structures II	2	24	Introduction to the design of structural elements found in steel buildings, in particular the design of steel connections. Bolted Connections, Welded Connections, rigid connections, hinge type connection, base plates design, composite floor design.
Reinforced Concrete Structures II	3	48	This course discusses the fundamental principles and behavior of reinforced concrete under different types of loading. By the end of this course, students will be exposed to methods for analyzing and designing the following reinforced concrete members One-way Slabs, Short columns (using interaction diagram), Slender/long columns (in braced frames), Isolated and Continuous Footings.

Road Pavement	2	24	Theories and different methods of pavement design, bearing capacity of pavement, considerations and conditions during asphalt paving, cement concrete pavement (rigid pavement), Concrete block pavement, Damage analysis and maintenance of roads.
Technical English language	2	24	Learning the most up-to-date words of building, surveying, and civil engineering terms and definitions.
Structural Analysis II	3	48	Approximate analysis of structures including trusses and multistory frames. Influence lines, cables and arches. Principles of limit analysis for structures and structural elements. Stiffness method, flexibility method, influence of temperature & displacement & bearing rotation, symmetry, matrix algebra.
Foundation Engineering	2	24	Settlement and bearing capacity of shallow and deep foundations; beam on elastic foundation; design of footings and pile foundations; foundations on metastable soils; the use of computer codes for foundation problems.
Principles of Dam Engineering	2	24	Environmental concepts, water quality, hydrological studies, topographical studies, choice of dam type, Tailing Dams, site investigations, gravity dams, arch dams, hollow gravity and buttress dams, weirs, earth and fill dams. Environmental Issues, Finance and Economic Aspects, foundation.
Strength of Materials II	3	48	This course covers the principles of deflection of beams, elastic stability, thick cylinders, rotating discs and shafts, bending of circular plates, elastic stability of simple frames and more detailed discussion of stresses and displacements due to bending and shear.
Welding Technology and Inspection Technology	2	24	Safety issues and procedures of welding, different types of welding methods and instruments, and power supplies. Electric arc welding, creating electric arc, setting the correct electrode gap, and electrode angles, oxidation conditions. Basic weld joints: butt joint, lap joint, corner joint, edge joint, and T-joint. Oxyacetylene welding. An introduction to welding methods 1-Technical Safety Welding and cutting 2-Electric arc welding (SMAW) 3-SAW, 4-MAG-MIG, 5-GTAW, 6-RW
Construction Methods	2	24	Methods of construction, primarily buildings. Construction types: steel; plain, reinforced, and pre stressed concrete; masonry. Foundations; associated details of frames, walls, roofs, floors, openings, finishes. Disasters, failures, and their causes. Industrialization of the building process.
Specialized project	3	48	In this course a research topic related to civil engineering is defined to student and the student should do his research in a specified date (maximum 12 months) under supervision of related professor. Finally a written report and oral presentation to the public should be provided with presence of at least one referee.
Computer Applications in Civil Engineering	2	24	Introduction to computer applications in civil and environmental engineering. Integration of design, data management, computer programming and problem-solving skills with computer tools and techniques. Topics include modeling, linear and non-linear design, making executive maps, systems analysis, optimization, database management, computer programming and optionally data structures.

Steel Structures Project	1	24	Loading, Analysis and design a ten story steel building and its foundation / some parts of the structure calculated by hand and all parts of the structure calculated by computer (Auto-Cad, ETABS and SAFE)
Concrete Structures Project	1	24	Loading, Analysis and design a ten story concrete building and its foundation / some parts of the structure calculated by hand and all parts of the structure calculated by computer (Auto-Cad, ETABS and SAFE)
Transportation Engineering	2	24	Introduces technological, economic, and social aspects of transportation. Emphasizes design and functioning of transportation systems and their components. Covers supply-demand interactions; system planning, design, and management; traffic flow, intersection control and network analysis; institutional and energy issues; and environmental impacts. Study of transportation functions and transportation systems including land, air and marine modes; transportation system elements including travel way, vehicle, controls and terminals; emphasis on highway geometric design.
Bridge Engineering	2	24	Introduction to history of bridge-building, including types of bridges, aesthetics, and materials for modern bridges; Loadings on bridges including standard truck and lane loading, impact loads, longitudinal and centrifugal forces, wind and seismic loads, thermal loads; Serviceability criteria including deflection and fatigue; Design of reinforced concrete bridges, slab bridges, concrete slab with steel stringer bridges, T-beam or plate girder bridges, box girder bridges, and prestressed concrete bridges; Bridge maintenance including inspection and rehabilitation.
Repair and rehabilitation of structures	2	24	Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures. Course objectives Learn various distress and damages to concrete and masonry structures. Understand the importance of maintenance of structures. Study the various types and properties of repair materials. Asses the damage to structures using various tests. Learn the importance and methods of substrate preparation. Learn various repair techniques of damaged structures, corroded structures.
Loading	1	16	Probability laws for wind, earthquake and live loads, forces generated by wind, Iranian code, forces generated by earthquakes, Iranian code & U.B.C. approach, vertical loads, approximate solutions for vertical & horizontal loads, some systems to carry vertical & horizontal loads.
Concrete Technology Lab	1	24	Practical Experiments Related to “Concrete Technology” Course. Mineral aggregates; properties and testing. Portland Cement; manufacturing, composition, hydration, properties and testing. Proportioning concrete Mixes. Mechanical properties and testing of hardened concrete. Masonry, manufacturing and testing.

Hydraulic Structures	3	48	Hydraulic aspects of the theory and design of hydraulic structures. Storage dams, spillways, outlet works, diversion works, drop structures, stone structures, conveyance and control structures, flow measurement and culverts.
Principles of Earthquake and Wind	3	48	Introduction to plate tectonics and seismology. Rupture mechanism, measures of magnitude and intensity, earthquake occurrence and relation to geologic, tectonic processes. Probabilistic seismic hazard analysis. Strong earthquake ground motion; site effects on ground motion; structural response; soil-structure interaction; design criteria.
Project Evaluation & Cost Estimation	1	24	General Introduction to get acquainted with types of contract, conditions of contract and getting tenders. Developing relationship with employer, consulting engineers, contractor, and formulating duties of groups. Develop an enhanced understanding of quantity take-off and cost estimating of construction resources including materials, labor, and equipment. Skills and knowledge of cost estimating will provide preparation for builders and designers to contribute to construction firms, project management consultants, and owners upon graduation. Topics include: types of cost estimates; budget estimates; preconstruction services estimates; quantity take-off; self-performed estimates; subcontractor work estimates; and bid preparation.
Road Construction Project	1	24	In this project a 1:5000 or 1:10000 scaled map with initial traffic information given to students in group and all of the required calculations and design should be done according road's national regulations and codes. On a specified date it should be submitted with a complete detail interpreted report. The project needs defense. Using Civil3D and AutoCad for course project.
Principles of Traffic Engineering	2	24	Basic characteristics of traffic, such as drivers, vehicles, volumes, speeds, delay, origins and destinations, intersection performance, capacity, termination and accidents; techniques for making traffic engineering investigations; traffic laws and ordinances, regulations, design and application of signal systems.
Excavation Methods and Retaining Structures	2	24	In this lesson, students will learn how to excavation and retaining structures. The basics of the design are explained and students will be able to decide on the most excavation method for different projects.
Training	1	-	Students have to work in a civil engineering related site in a field related to their interests or project for 300 hours. The project should be practical and in implementation phase. Training report needed and evaluated by advising professor.