Code	**CE 101**
Name	**Civil Engineering Drawing**
Hour per week	3 (1 + 2)
Credit	2
ECTS	5
Level/Year	Undergraduate / 1
Semester	Fall
Type	Compulsory
Prerequisites	-
Content	This course provides fundamental knowledge and skills for the technical language of engineering visualizations by using computer aided drafting (CAD) tools. The course covers the following topics; Principles and General Rules of Engineering Drawing, Basics of CAD; Drawing, Editing and Configuration on the CAD Software; Orthographic Drawing; Sectioning; Dimensioning; Isometric and Oblique Projections.

Code	**CE 102**
Name	**Exploring Profession**
Hour per week	4 (2 + 2)
Credit	3
ECTS	6
Level/Year	Undergraduate / 1
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	This course is a required course for the students in the department of civil engineering and it presents past, status, and future challenges of civil engineering profession; ethics and professional responsibility; written and oral communication; concepts of analysis, design, computational approaches, and experiences with experiments in lab and a technical trip; interpretation of results and decision making

Code	**CE 202**
Name	**Numerical Methods for Engineers**
Hour per week	3 (3 + 0)
Credit	3
ECTS	4
Level/Year	Undergraduate / 2
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	The objective of the course is realize the need for numerical methods and understand their capabilities and weaknesses ; practice algorithmic thinking ; learn fundamental numerical techniques used in engineering calculations ; learn how to implement the studied techniques in MATLAB and be aware of its built-in functionalities.

Code	**CE 221**
Name	**Mechanics**
Hour per week	4 (4 + 0)
Credit	4
ECTS	6
Level/Year	Undergraduate / 2
Semester	Fall
Type	Compulsory
Prerequisites	-
Content	This course is the first engineering-science based course, which is required for the students in the department of civil engineering at AGU and it presents a proper utilization of vector algebra and free body diagrams to solve simple problems in engineering for both static and dynamic cases. This course, briefly, consists of a total of seventeen major areas of study: 1-) vector algebra of forces and moments, 2-) equilibrium of particles and rigid bodies, 3-) centroids of two and three dimensional bodies, 4-) analysis of several structures (trusses, frames, machines, and cables), 5-) friction, 6-) moments of inertia, 7-) kinematics of particles, 8-) kinetics of particles by using different methodologies (force-acceleration, work-energy, and impulse-momentum), 8-) kinematics of rigid bodies, and 9-) kinetics of rigid bodies by using different methodologies (force-acceleration, work-energy, and impulse-momentum).

Code	**CE 222**
Name	**Strength of Materials**
Hour per week	5 (3 + 2)
Credit	4
ECTS	6
Level/Year	Undergraduate / 2
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	CE221-Mechanics is prerequisite for this course (CE222, Strength of Materials), because students should be aware of a proper utilization of vector algebra and free body diagrams to solve simple problems in engineering for both static and dynamic cases. This course, briefly, consists of a total of nine major areas of study: 1-) concept of stress, 2-) stress and strain under axial loading, 3-) torsion, 4-) Design of Beams for Bending, 5-) Pure Bending, 6-) Shear Stress in Beams and Thin-Walled Members, 7-) Transformations of Stress and Strain, 8-) Deflection of Beams, and 8-) Columns.

Code	**CE 241**
Name	**Materials Science**
Hour per week	3 (2 + 1)
Credit	3
ECTS	5
Level/Year	Undergraduate / 2
Semester	Fall
Type	Compulsory
Prerequisites	-
Content	This course provides fundamental knowledge for understanding the properties and behavior of engineering materials, which is crucial for achievement of the structural safety, serviceability and the economics of the engineering projects. The course covers the following topics; the structure of matter; interatomic bonding, structural imperfections, concepts of force, stress, deformation and strain; elasticity; elastic and plastic behavior; viscosity; rheological models. Creep, relaxion, brittleness, ductility, hardness, fatigue, toughness, resilience, and damping characteristics of materials.

Code	**CE 244**
Name	**Materials of Construction**
Hour per week	3 (2 + 1)
Credit	3
ECTS	4
Level/Year	Undergraduate / 2
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	This course provides fundamental knowledge for understanding the properties and behavior of materials of construction, which is crucial for achievement of the structural safety, serviceability and the economics of the engineering projects. The course covers the following topics; ferrous metals, plastics, wood, clay bricks, binding materials (gypsum, lime, Portland cement), aggregates and concrete.

Code	**CE 262**
Name	**Geology for Civil Engineering**
Hour per week	3 (3 + 0)
Credit	3
ECTS	4
Level/Year	Undergraduate / 2
Semester	Fall
Type	Compulsory
Prerequisites	-
Content	This course mainly focus on Structure of the Earth, Geological cycles, minerals and rocks, External processes on land and in the sea, Internal processes, including deformation of rocks and earthquakes. It gives the topics of interest to Civil Engineering students. At the end of the course, it is aimed to determine the basic types of earth materials, earth structures and earth processes and expected to link this information to Civil Engineering applications.

Code	**CE 272**
Name	**Fluid Mechanics**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 2
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	By the end of this course, you should expect to be able to calculate: fundamental fluid properties for different fluids and flows, pressures in both static and flowing fluids, and the velocities associated with different flows, forces in complicated momentum balance problems, energy loss and the flow rates associated with different flow networks in channels and pipes, dimensionless numbers important for design of experiments and practical engineering work, properties of a boundary layer, both turbulent and laminar.

Code	**CE 300**
Name	**Summer Practice**
Hour per week	0 (0 + 0)
Credit	0
ECTS	4
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	-
Content	The course aims to provide students a real-world experience in civil engineering practice. The experience in the context of the practice may cover on-job/on-site practice of civil engineering profession such as engineering drawings and graphs, laboratory testing of construction materials, quantity of cost estimates, quality control and inspection on construction job sites, surveying, geotechnical applications etc. (40 working days).

Code	**CE 332**
Name	**Construction Engineering and Management**
Hour per week	3 (3 + 0)
Credit	3
ECTS	4
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	Construction managers need to learn the basics in commercial and residential construction in addition to leadership, planning and supervisory skills.The course provides students with skills in planning, designing, and implementing construction processes and systems. Students will understand basic construction history, examine responsibilities and risks involved in the construction process and demonstrate basic understanding of construction law, regulations, and means of project delivery.

Code	**CE 352**
Name	**Introduction to Transportation and Traffic Engineering**
Hour per week	3 (2 + 1)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	This course aims to introduce the fundamental concepts of transportation engineering through an in-depth study of highway transportation. It covers the topics such as introduction to highway, railway, and airport engineering; transportation planning; vehicle dynamics, geometric design of roads, pavement design principles, basics of traffic engineering.

Code	**CE 363**
Name	**Soil Mechanics**
Hour per week	5 (3 + 2)
Credit	4
ECTS	5
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	-
Content	Soil Mechanics is the branch of science that deals with the study of the physical properties of soil and the behavior of soil masses subjected to various types of forces. You examine the identification and classification of rocks and soils, the stresses that exist within a soil mass, soil deformation under loading and peculiarities of local soils. In particular, it is concerned with the interaction of structures with their foundation material. This includes both conventional structures and also structures such as earth dams, embankments and roads which are their-selves made of soil.

Code	**CE 366**
Name	**Foundation Engineering**
Hour per week	4 (2 + 2)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	CE 363 – Soil Mechanics
Content	This course, briefly, consist of application of soil mechanics, geotechnical design of foundations, including variety of footings, piles and drilled shafts and structural members such as retaining walls, sheet piles whose primary function is to provide lateral earth support, subsoil exploration, shallow foundations: bearing capacity, settlements, methods of site and soil exploration, mat foundations, pile foundations, drilled shaft and caisson foundations, lateral earth pressure, retaining walls.

Code	**CE 371**
Name	**Hydromechanics**
Hour per week	4 (3 + 1)
Credit	4
ECTS	5
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	CE 272 - Fluid Mechanics
Content	Flow in closed conduits, Laminar and turbulent flows. Friction factor in pipe flow. Computation of flow in single pipes. Pipe line system and networks. General characteristics and classification of open channel flow: pressure and velocity distribution. Continuity equation. Energy concept. Momentum principle. Uniform flow. Rapidly varied flow. Gradually varied flow. Design of non-erodible and erodible channels.

Code	**CE 374**
Name	**Hydrology and Water Resources Engineering**
Hour per week	4 (4 + 0)
Credit	4
ECTS	5
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	CE 272 – Fluid Mechanics
Content	Key concepts and methods in physical and engineering hydrology are discussed. Major discussion and learning is aimed towards understanding the fundamentals such as hydrological cycle, catchment, losses, hydrographs and hyetographs. Following this course, one would be able to predict the risks and occurrence probability of certain hydrologic events, knowledge will grow particularly on assessing the magnitude of the rainfall, and runoff from a catchment. Application focus on design of storm water drainage systems and management of flooding.

Code	**CE 382**
Name	**Reinforced Concrete**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	CE 222 – Strength of Materials
Content	This course, briefly, consist of general knowledge about building codes and structural concrete and steel mechanical properties, and also Load and Resistance Factor based design of Reinforced Concrete members such as flexural and shear design of beam members, required development length of steel bars in structural members, serviceability of members, and design of short and slender columns.

Code	**CE 383**
Name	**Structural Analysis**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	CE 221 - Mechanics
Content	This course, briefly, consist of main principles of structural analysis, virtual work principles, influence lines, and to determine the reactions at supports, bending moment and shear diagrams for either determinate or indeterminate systems using some specific methods such as force method, displacement methods, and stiffness methods.

Code	**CE 400**
Name	**Summer Practice**
Hour per week	0 (0 + 0)
Credit	0
ECTS	4
Level/Year	Undergraduate / 4
Semester	Fall
Type	Compulsory
Prerequisites	-
Content	The course aims to provide students a real-world experience in civil engineering practice. The experience in the context of the practice may cover construction site practice of civil engineering profession such as reinforced concrete or steel work, highway and hydraulic design and construction, concrete mix design, mixing and pouring applications, geotechnical engineering applications, etc. (40 working days)

Code	**CE 401**
Name	**Capstone Design - I**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Compulsory
Prerequisites	-
Content	The course aims to provide students the opportunity to work with real-world problems and challenges in teams to design and make/build their prototypes with the guidance of a faculty mentor. Design work may cover a civil engineering design of structural, geotechnical, hydraulic or transportation systems, as well as development of innovative and functional construction materials. At the end of the semester, teams present their design and solutions to a panel of judges and invited guests from the construction industry.

Code	**CE 402**
Name	**Capstone Design - II**
Hour per week	4 (2 + 2)
Credit	3
ECTS	6
Level/Year	Undergraduate / 4
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	The course aims to provide students the opportunity to work with real-world problems and challenges in teams to design and make/build their prototypes with the guidance of a faculty mentor. Design work may cover a civil engineering design of structural, geotechnical, hydraulic or transportation systems, as well as development of innovative and functional construction materials. It may be continuation of the Capstone Design I or a completely new project in a different area of civil engineering. At the end of the semester, teams present their design and solutions to a panel of judges and invited guests from the construction industry.

Code	**CE 431**
Name	**Construction Project Management**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	Project Management focuses on the management and implementation of construction projects. This course will cover the basic tools, skills, and knowledge necessary to successfully manage a project throughout its life cycle including its inception, design, planning, construction, and close-out and exit phases. There may be also some guest lectures discussing different types of projects. The students are aimed to gain knowledge and understanding of the theories, concepts, principles, techniques, and intellectual and practical skills needed for the project management of construction projects. In the course, project organizations, planning, execution, monitoring and controlling are explained in details by covering integration, scope, time, cost, procurement, communication, human resources, stakeholders, risk, QA/QC management knowledge areas.

Code	**CE 441**
Name	**Materials for Sustainable Built Environment**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	This course introduces the basics of sustainability concept and the importance of resource efficient civilization. Approaches that apply the concept for development of sustainable construction materials and implementation of ecological wisdom into the built environment are discussed. Materials that are at pilot scale development stage, such as self-healing concrete, self-cleaning concrete, bio-based concrete admixtures, green walls, bio-based insulation materials and bio-bricks among the others are introduced to the students and the ecological wisdom behind the development of each of these materials are discussed.

Code	**CE 442**
Name	**Construction Waste Management**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	-
Content	This course covers the impacts of construction waste on environment, legislations, the classification of construction wastes and conventional waste management applications , creative thinking to improve resource efficiency and waste minimization, and effective waste handling methods applicable on site.

Code	**CE 443**
Name	**Introduction to Environmental Microbiology**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	This course covers the diverse roles of microorganisms in natural and man-made environments. Course content includes: cellular structure, microbial diversity, metabolism; evolution and microbial ecology; population and community dynamics; water and soil microbiology; biogeochemical cycles; microorganisms in biodeterioration and bioremediation, and methods to identify and enumarate bacteria in the environment.

Code	**CE 444**
Name	**The Natural and Built Environment**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	-
Content	This course discovers the interaction between the natural environment and the built environment. The impact of the living organisms on built environment is discussed. Comprehensive discussions focuses on biodeterioration of construction materials and biobased solutions for remediation and repair of the construction materials. Natural solutions for the wastes generated in the built environment are covered in detail.

Code	**CE 445**
Name	**Sustainable Concrete Technology**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	The course aims to give understanding of sustainability facts and environmental impacts of concrete as the most-widely used material of construction. The course also introduces innovative materials and practice in order to improve performance and durability of concrete mixtures while decreasing the carbon-footprint and other environmental impacts of concrete. More specifically, it covers the tailoring of concrete mixtures with a sustainable approach, recycling of concrete, innovative practices in ready-mix concrete plants for sustainability and life-cycle assessment of concrete mixtures. The teaching-learning method of the course consists of lectures, individual literature and practice research and laboratory group works.

Code	**CE 446**
Name	**Laboratory Tests on Civil Engineering Materials**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	-
Content	The course aims to give skills for testing of most-widely used materials of construction such as Portland cement, Portland cement concrete, reinforcement steel, and concrete admixtures. The course also provides knowledge on national and international standard specifications and test methods for quality control of the civil engineering materials. More specifically, it covers the physical and mechanical characterization tests of the materials above and durability tests of hardened concrete such as freezing-thawing, alkali-silica reaction, porosity and capillarity tests. The teaching-learning methods of the course consist of lectures, individual literature research and laboratory group works.

Code	**CE 447**
Name	**Admixtures for Concrete**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	The course focuses on the concrete admixtures as materials other than water, aggregate and hydraulic cement. It provides fundamental knowledge on the properties of air-entraining agents, chemical and mineral admixtures for concrete as well as their mechanisms of action. More specifically, the course covers the air-entraining agents; water reducers; set retarders and accelerators; natural pozzolans, fly ashes, silica fumes, ground granulated blast furnace slags as mineral admixtures; corrosion inhibitors, permeability –reducing admixtures and coloring admixtures. The teaching-learning method of the course consists of lectures, individual literature/practice research and laboratory group works.

Code	**CE 448**
Name	**Durability of Concrete**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	-
Content	The course focuses on the durability of concrete, which is the ability of concrete to resist weathering action, chemical attack, abrasion, or any other process of deterioration. The course covers discussions of important aspects of durability of concrete such as salt crystallization, frost action, effect of fire, deterioration of concrete by chemical reactions (sulfate attack, alkali-aggregate reaction, corrosion of embedded steel in concrete, sea water attack). The teaching-learning methods of the course consist of lectures, individual literature research and group works/presentations on case studies.

Code	**CE 451**
Name	**Railway Engineering**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	Railway Engineering is an active-learning based course, which is the technical elective in the department of civil engineering at AGU, supported by KAYSERİ ULAŞIM. Throughout this course, the facilities of KAYSERİ ULAŞIM will be visited frequently, and there, the technical staffs will share their knowledge and experience on railway engineering. By this way, it is aimed that students learn the elements (rail, sleeper, switch, etc.) in a railway line and the fundamental design subjects for a railway engineering project via learning-by-designing and learning-by-doing. This course, briefly, contains the following topics: 1) Railway superstructure and infrastructure, 2) railway line elements (rail, traverse, switch, etc.), 3) geometric design of railroads, 4) railway deformations, 5) maintenance of railroads, 6) types of railway transport and 6) KAYSERAY as a case study.

Code	**CE 452**
Name	**Railway Design**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	CE 451 – Railway Engineering
Content	CE 452 Railway Design is a learning-by-designing, learning-by-doing and real-world-learning based course, which is the technical elective in the department of civil engineering at AGU. KAYSERİ ULAŞIM will support this course by sharing their knowledge, experience and real data needed for designing a railway project. By this course, it is aimed that students design a real railway project (completed and/or implemented) using commercial softwares and real data.

Code	**CE 461**
Name	**Foundation Engineering II**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	CE 366 – Foundation Engineering
Content	This course emphasize pile foundation design and teach the state of the art concepts of behavior and design of single piles and pile groups.

Code	**CE 462**
Name	**Introduction to GIS**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	This course, briefly, consist of the introduction to Geographic Information Systems (GIS), basic GIS components, GIS technology, data acquisition, data structures, databases, database systems and concepts, vector and raster GIS systems, GIS applications, error and uncertainty.

Code	**CE 463**
Name	**Use of In-situ Tests in Geotechnical Engineering**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	CE 363 – Soil Mechanics
Content	This course, briefly, consist of the methods used in geotechnical investigations and laboratory techniques, standard procedures of in-situ tests including standard penetration test, cone penetration test, pressuremeter test, field vane test and field permeability test. Geotechnical site characterization using in-situ tests.

Code	**CE 464**
Name	**Ground Improvement**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	CE 363 – Soil Mechanics, CE 366 – Foundation Engineering
Content	This course covers preloading, vertical drains, deep compaction of cohesionless soils: vibrofloatation, vibratory probes, compaction piles, dynamic compaction, blasting, grouting: permeating grouting, compaction grouting, chemical grouting, jet grouting, deep mixing. In addition it also give information about soil nailing, micro piles, reinforced earth, stone columns, lime columns, geotextiles, freezing, electro-osmosis.

Code	**CE 473**
Name	**Sustainable Energy Resources**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	Energy issues, fossil fuels and renewable sources, policy for the use of clean and renewable energy technologies, available and future technologies and potential of renewable energy sources wind, solar, biomass, hydro-energy. Technical and economic viability of renewable energy sources, Integration of renewable energy sources in an energy system, with a civil engineering approach.

Code	**CE 474**
Name	**Engineering for Sustainability**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	-
Content	Definition of sustainability and sustainability issues in engineering, life cycle assessment (LCA) and Leadership in Energy and Environmental Design (LEED) methodologies will be used to examine fundamentally-based analyses and approaches for civil engineering with a focus on sustainable use of energy and materials, sustainable infrastructure solutions.

Code	**CE 475**
Name	**Water and Wastewater Treatment Engineering**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	Sustainability of water, conservation and efficient use of water resources, introduction to water and wastewater treatment, water quality and quantity estimations with an emphasis on engineering approaches. Principles of design of wastewater and drinking water treatment processes. Physical, chemical, and biological processes for water and wastewater treatment.

Code	**CE 476**
Name	**Environmental Policy and Politics**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	-
Content	National and international environmental politics and environmental agreements. Environmental policy in Turkey and the World. Coordination, cooperation, and conflict relations between state and non-state actors. Policy making processes and behavior of interest groups. EU environmental policies and regulations during the nomination process of Turkey. Significant environmental policies on pollution control, climate change, conservation and biodiversity.

Code	**CE 481**
Name	**Fundamentals of Steel Design**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Compulsory
Prerequisites	CE 222 – Strength of Materials
Content	This course, briefly, consist of general knowledge about building codes and structural steel mechanical properties, and also Load and Resistance Factor based design of tension members, bolted and welded connections, compression members, laterally supported beams, lateral-torsional buckling beams, and flexural and axially loaded members in steel structures.

Code	**CE 482**
Name	**Computational Structural Analysis and Design**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	CE383 - Structural Analysis
Content	This course, briefly, consist of 1) fundamentals of software and computer programs corresponding to structural engineering problems including design of buildings, 2) review of concepts of structural analysis, 3) stiffness methods in structural analysis for both trusses and beams, 4) utilization of commercial package programs in modeling of structures, such as for beams, trusses, and frames in 2D and 3D, and 5) fundamentals and application of nonlinear analyses of structures including geometric and material nonlinearity.

Code	**CE 484**
Name	**Aseismic Design of Structures**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall
Type	Elective
Prerequisites	-
Content	This course, briefly, consist of 1) review of aseismic design specifications (especially ASCE-7 and TBDY-2007), 2) discussion on the main philosophies in earthquake design principles, 3) concept and applications of analysis types (static analysis with equivalent earthquake force, modal analysis, dynamic time history analysis, and etc.) on earthquake design principles and regulations for structures, and 4) introduction to earthquake design regulations in the application of reinforced concrete and steel structures.

Code	**CE 488**
Name	**Introduction to Vibrating Systems**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	MATH203 - Linear Algebra, MATH205 - Differential Equations
Content	This course, briefly, consist of 1) fundamentals of vibration, 2) free vibration of single degree of freedom systems, 3) harmonically excited vibration, 3) vibration under forces, 4) vibration for two degree of freedom systems, 5) vibration for multi-degree of freedom systems, 6) determination of natural frequencies and mode shapes for structural systems, and 7) numerical integration methods in vibration analysis.

Code	**CE 489**
Name	**Matrix Theory of Structural Analysis**
Hour per week	3 (3 + 0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Spring
Type	Elective
Prerequisites	MATH203 - Linear Algebra
Content	This course, briefly, consist of 1) introduction to matrix analysis of structures, 2) development of stiffness matrix methods for one and two dimensional structures, 3) application of tangent stiffness matrices for bars, plane trusses, beams, and plane frames, 3) Superposition of loads and elements, and 4) comparison of hand calculations with computer based software results for one or two dimensional structures.