CIVIL & URBAN ENGINEERING (CE-GY)

CE-GY 804 Forecasting Urban Travel Demand (3 Credits)
Typically offered Spring
The purpose of this course is to study methods and models used in estimating and forecasting person travel in urban areas. The objective is to understand the fundamental relationships between land use, transportation level of service and travel demand, and to apply methods and state-of-the-practice models for predicting person travel on the transportation system. | Prerequisite/Corequisite: TR-GY 6013 or permission of instructor.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 901X Readings in Civil Engineering (1-6 Credits)
Typically offered occasionally
This individual study of selected civil engineering literature is guided by a faculty adviser. Requirement: An acceptable written report or successful completion of an examination. Only one registration permitted, except with the permission of the department head. | Prerequisite: instructor's permission.
Grading: Grad Poly Graded
Repeatable for additional credit: Yes

CE-GY 997X MS Thesis in Civil & Urban Engineering Dept (3-6 Credits)
Typically offered occasionally
This course is an original investigation or design in the student's principal field of study prepared and closely supervised by a faculty adviser. Candidates must successfully defend theses orally. Registration for a minimum of 6 credits is required.
Grading: Satisfactory/Unsatisfactory
Repeatable for additional credit: Yes
Prerequisites: Graduate Standing.

CE-GY 998X Dissertation Level Research (1-6 Credits)
Typically offered occasionally
This course involves an independent, original investigation that demonstrates creativity and scholarship worthy of publication in a recognized engineering journal. Registration for a minimum of 6 credits is required before registering for CE-GY 9998. Registration for 3-6 credits per semester is permitted before the successful completion of the doctoral qualifying examinations. | Prerequisites: degree status and approval of the dissertation adviser.
Grading: Satisfactory/Unsatisfactory
Repeatable for additional credit: Yes
Prerequisites: Graduate Standing.

CE-GY 999X PHD Diss in Civil Engineering Department (3-12 Credits)
Typically offered occasionally
This independent, original investigation must demonstrate creativity and scholarship worthy of publication in a recognized engineering journal. Candidates must successfully defend dissertations orally. Registration for a minimum of 15 credits is required before the defense. Registration must be continuous (excluding summer semesters), unless a formal leave of absence is requested and approved. Registration for 3 to 12 credits per semester is permitted. In the final semester, registration for 0.5 credits is permitted with department head approval. | Prerequisites: Passing grade RE-GY 9990 PhD Qualifying Examination and approval of the dissertation adviser.
Grading: Satisfactory/Unsatisfactory
Repeatable for additional credit: Yes
Prerequisites: Passing grade in RE-GY 9990 PhD Qualifying Exam.

CE-GY 5223 Waste Management and Resource Recovery (3 Credits)
Typically offered Fall
This course covers engineering aspects of waste collection, transport, disposal and/or reuse and recycling. Special emphasis will be placed on strategies and technologies used for resource recovery from different waste streams, including municipal solid and organic waste; wastewater; and construction, agricultural and industrial waste. Related economic, policy, and climate change considerations will also be covered. This will be a 5000 level course, with expected enrollment of UG seniors and MS students | Prerequisites: Undergraduate: (CE-UY 3223 and senior standing) or permission of undergraduate program advisor; Graduate: Graduate standing.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Undergraduate: (CE-UY 3223 and senior standing) or permission of undergraduate program advisor; Graduate: Graduate standing.

CE-GY 5233 Sustainable Systems Engineering (3 Credits)
Typically offered Spring
This course introduces students to concepts, tools, metrics, and scientific basis for designing sustainable engineered projects and processes, and improving the impact of engineering decisions on the environment. An overview of sustainability (including social, economic, political, cultural, ecological, technological and scientific systems interact) will be followed by topics including models of population growth; water and energy availability and use; current challenges in resource utilization, climate change, and environmental contamination; and systems mapping, life cycle analysis (LCA) and other tools for the design of sustainable engineered systems. Prerequisites: Undergraduate: Senior standing or permission from advisor; Graduate: Graduate standing.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Undergraduate: Senior standing or permission from advisor; Graduate: Graduate standing.

CE-GY 6010 Guided Std in Civil Engineer (1 Credit)
A guided studies course on various topics in Civil Engineering.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate students only.

CE-GY 6013 Theory of Structural Analysis and Design (3 Credits)
Typically offered occasionally
The course discusses theories of structural analysis and their relationship to design. Topics: Classical structural mechanics, matrix procedures and numerical methods in problem-solving; and analysis of statically indeterminate beams, frames and trusses using force and displacement methods. Also considered are elastic supports, movement of supports and temperature effects. | Prerequisite: undergraduate structural analysis.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: undergraduate structural analysis.

CE-GY 6015 Guided Std in Civil Engineer (1.5 Credits)
Typically offered occasionally
A guided studies course on various topics in Civil Engineering.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate students only.

CE-GY 6020 Guided Std in Civil Engineer (2 Credits)
Typically offered occasionally
A guided studies course on various topics in Civil Engineering.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate students only.

CE-GY 6023 Materials for Civil Engineers (3 Credits)
Typically offered occasionally
The course covers: Materials composition and production of cementitious materials; polymeric composites and metals; mechanical properties subject to short-term and long-term loads, impact and fire; fatigue and fracture; transport properties, chemical degradation and long-term durability. | Prerequisite: Graduate Status.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Status.

CE-GY 6053 Monitoring Cities (3 Credits)
Typically offered occasionally
The world's urban population is growing at approximately 60 million people annually; this is equivalent to four cities like New York every year. Characterizing the chronological changes and quantifying key attributes of cities; from the environment, to demographics, and economics, is now possible by the increase and availability of information. The acquisition and analysis of urban data provides insights that will influence the sustainable growth of the urban world, from small cities to megacities. Students completing this course will learn to study cities using the quantitative analysis of urban data. Looking at cities as interdependent networks of physical, natural and human systems, this course provides a perspective on how to obtain relevant information for better understanding of the function and wellbeing of these systems. Students will gain an understanding of needs assessment, planning. and technical approaches for instrumenting a city, while learning approaches for the acquisition and analysis of data, including data obtained through administrative records. Areas of study include energy, waste, land use, infrastructure, ecology, air quality, patterns of activity, mobility, and community engagement. Prerequisites: Open across NYU to graduate and senior year undergraduate students.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 6063 Bridge Engineering (3 Credits)
Typically offered occasionally
The course covers types of bridges; geometric design of bridges; construction materials and techniques; simplified bridge analysis; special problems in the design of steel and reinforced-concrete bridges; bridge inspection policies; bridge rehabilitation procedures; bridge management systems; and the effects of wind and earthquakes on long-span bridges. | Prerequisites: undergraduate structural analysis and steel design.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: undergraduate structural analysis and steel design.

CE-GY 6073 Instrumentation, Monitoring and Condition Assessment of Civil Infrastructure (3 Credits)
Typically offered occasionally
This course covers: A systematic approach to planning and executing instrumentation, monitoring and condition assessment programs; strain measurements; civil engineering sensors (static, dynamic, optical); environmental measurements; mechatronic sensors; signal conditioning, information measurements and error analysis; business aspects; advanced-measurement systems. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 6143 Steel Structures (3 Credits)
Typically offered occasionally
This course explores compression members; elastic and inelastic buckling of columns and plates; lateral support of beams; torsion of open and closed sections; warping; lateral torsional buckling of beams; and bi-axial bending. Other topics include: Plate girders, including stability of webs and flanges; combined bending and axial load; instability analysis; and design of rigid and semi-rigid mechanisms of continuous beams and rigid frames. Both elastic and plastic design criteria are discussed. | Prerequisite: Undergraduate steel design.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Undergraduate steel design.

CE-GY 6163 Finite Element Methods (3 Credits)
Typically offered occasionally
Students study the basic theory of the finite element method and learn how to apply it using widely used engineering programs. The course emphasizes developing finite element models and executing the analysis. Students learn to recognize modeling errors and inconsistencies that could lead to either inaccurate or invalid results.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 6183 Concrete Structures (3 Credits)
Typically offered occasionally
The course covers design principles and construction methods for reinforced and pre-stressed concrete structural elements; response of members subject to axial loading, shear and flexure; design of columns, deep beams and shear walls; design and detailing for connection regions; design of pre-tensioned and post-tensioned beams and slabs; and the effect of short-term and long-term deformations. | Prerequisite: Graduate status.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate status.

CE-GY 6193 Wind and Earthquake Engineering (3 Credits)
Typically offered occasionally
The course examines characteristics of wind and earthquake loads; atmospheric motions and boundary layer theory; response of structures to wind forces; code treatments of wind loads on structures; calculation of lateral forces from seismic events; lateral force-resisting systems; diaphragms and center of rigidity; response spectrum and time-history; ductility; concrete and steel frame structures; braced frames; shear walls; dual systems; story drift; detailing requirements. | Prerequisite: Graduate status.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate status.

CE-GY 6253 Structural Dynamics (3 Credits)
This course covers: Dynamic response of singledegree of freedom systems; theory of vibration of finite degree of freedom systems; influence coefficient method; analytical and numerical solutions to dynamic response problems; and nonlinear analysis of single degree of freedom systems. Emphasis also on computer analysis of large complex systems.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 6263 Analysis and Design of Tall Buildings (3 Credits)
Typically offered Spring
The course includes a broad treatment of tall buildings. Introductory topics cover the historical tall building development, urban planning, energy efficiency and long-term sustainability. Structural topics develop an understanding of foundation systems, analysis methods, and design of structural systems for gravity, wind, and seismic loads. Unique aspects of mechanical, electrical, plumbing, and fire-safety issues. The course finishes with construction topics including steel erection and concrete placement methods, on-site inspection and observation, and economic project delivery. Several case studies will be presented by guest speakers active in design and construction of some of the tallest buildings worldwide. | Prerequisites: Graduate Standing or Department Permission
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 6273 Advanced Computational Mechanics (3 Credits)
Typically offered Fall
This graduate course is offered to graduate students in the: Civil and Urban Engineering Program and Mechanical Engineering Program. In this course, students gain an in-depth knowledge of various advanced computational mechanics topics that are informed from the current state of the art in research and industry. The topics introduced in this course are in the realm of the formulation and implementation of finite element solution of dynamic and non-linear solid mechanics problems. The students are taught to setup the mathematical formulation of these problems, transform the mathematical model into a numerical model, and solve the numerical model using appropriate tools and algorithms. Various sources of non-linearities are discussed including geometric as well as material non-linearities. The course covers different algorithms that were developed to address various mathematical and physical challenges that are associated with the non-linear and dynamic models. | Prerequisites: CE-GY 6163 or Instructor's permission.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: CE-GY 6163 or Instructor's permission.

CE-GY 7223 Hydrology (3 Credits)
Typically offered occasionally
This course covers: Hydraulic cycle; meteorological considerations; analysis of precipitation, runoff, unit hydrographs, flood routing and reservoir storage; principles of groundwater hydrology; and an introduction to frequency analysis of floods and droughts. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 7233 Groundwater Hydrology and Pollution (3 Credits)
Typically offered occasionally
This course looks at the characteristics of confined and unconfined flow of water through porous media; groundwater and well hydraulics; quality of groundwater; environmental influences; groundwater pollution; management aspects of groundwater and groundwater modeling. | Prerequisites: CE-UY 2214 (Fluid Mechanics) or equivalent or instructor's permission.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: CE-UY 2214 (Fluid Mechanics) or equivalent or instructor's permission and graduate standing.

CE-GY 7353 Selected Topics in Water Resources and Hydraulic Engineering I (3 Credits)
This course examines topics of current interest in water resources and hydraulic engineering. Topics vary with each offering and are disseminated before the semester of offering. | Prerequisite: instructor's permission.
Grading: Grad Poly Graded
Repeatable for additional credit: Yes

CE-GY 7373 Environmental Chemistry & Microbiology (3 Credits)
Typically offered occasionally
The course introduces the chemistry and microbiology of polluted and natural waters, including applications of principles developed.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 7423 Water & Wastewater Treatment (3 Credits)
Typically offered occasionally
The course covers the physical, chemical and biological principles of process design and treatment of water and wastewater. Topics include aeration, filtration, softening, chemical treatment, coagulation, occulation, desalination, and taste and odor control. | Co-requisite: CE-GY 7373.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.
Corequisites: CE-GY 7373.

CE-GY 7473 Modeling Fate and Transport of Surface Water Pollution (3 Credits)
Typically offered occasionally
The course covers dispersal and decay of contaminants introduced into lakes, streams, estuaries and oceans, and the effects of pollutants on chemical quality and ecology of receiving waters. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 7523 Air Pollution (3 Credits)
This course discussed the causes and effects of air pollution, methods of sampling, interpretation of data, meteorological aspects, and methods of air-pollution control.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 7573 Detection and Control of Waterborne Pathogens (3 Credits)
Typically offered Spring
Waterborne pathogens are the etiologies of a range of diseases – including gastroenteritis, poliomyelitis, hepatitis, Legionnaire's disease, and intestinal worm infections – and play an important role in the global burden of disease. This course will introduce students to fundamental principles of water-related infectious diseases, including the detection and enumeration of waterborne pathogens and indicator microorganisms; the burden of disease and mode of transmission of different classes of microorganisms; pathogenesis; and engineering controls to reduce transmission. The course will have a global perspective, and include water treatment options in low-resource settings. | Prerequisites: CE-GY 7373 or permission of the instructor.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: CE-GY 7373 or permission of the instructor.

CE-GY 7613 Risk in Built and Natural Environments (3 Credits)
Typically offered Spring
Our built environment is nested within the natural environment. These interacting urban and natural systems are exposed to various anthropogenic and natural stressors, which pose a myriad of risks – leading to, for example, fatalities, structural damage, economic losses, service disruptions, and deterioration of various natural resources. This graduate-level course will delve into the intricate relationship between some of the common stressors and disasters within the context of civil and environmental engineering and their impact on both constructed infrastructure and natural environments. Central to this course is training students in applied probability theory and statistics to equip them with tools for quantitative risk analysis.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 7653 Wetland Design for Water Quality Improvement (3 Credits)
Typically offered Spring
This course will provide the fundamentals for understanding the criteria for identifying a jurisdictional wetland that include the hydrology, hydrophytic vegetation, and hydric soils. You will be able to differentiate between a jurisdictional wetland and treatment pond/wetland. Emphasis will be placed on design experience working with a wetland mitigation project as well understanding the function of a natural wetland system. An in-depth background will be provided for hydrology leading to the development of a water budget/hydrograph. You will work with wetland design components that include the grading plan/microtopographic features; depth, duration, and timing of the site hydrology and water storage as well as the function of draw down. You will develop an understanding for wetlands for water quality improvement and can distinguish between wetland mitigation, restoration, and creation.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 7673 Environmental Impact Assessment (3 Credits)
Typically offered occasionally
The course examines legal and technical requirements in preparing environmental-impact statements. Considerations include legal and technical requirements, the procedure and the interdisciplinary nature of the analysis. Topics include overall impact evaluation, categories of impacts, problem definition, quantification of impact, methods used in analysis, field evaluations, mitigations, hearing procedures and management. Practical examples and case studies are used. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 7703 Solid Waste Management (3 Credits)
The course covers engineering aspects of solid waste collection, transport and disposal, including incineration, sanitary landfill, composting, recovery and reutilization. Also covered is the economic evaluation of factors affecting selection of disposal methods. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 7713 Selected Topics in Environmental and Water Resources Engineering (3 Credits)
This course examines topics of current interest in environmental and water resources engineering. Topics vary with each offering and are disseminated before the semester of offering. | Prerequisite: instructor's permission.
Grading: Grad Poly Graded
Repeatable for additional credit: Yes

CE-GY 7723 Selected Topics in Environmental and Water Resources Engineering I (3 Credits)
Typically offered occasionally
This course examines topics of current interest in environmental and water resources engineering. Topics vary with each offering and are disseminated before the semester of offering.
Grading: Grad Poly Graded
Repeatable for additional credit: Yes

CE-GY 7733 Geomatics and GIS Application in Civil and Environmental Engineering (3 Credits)
Typically offered Spring
The course covers the principles of Geographic Information Systems and the system's applications in Civil and Environmental Engineering. Topics covered include system structure, data capture, data processing, data analysis, presentation and reports. Coordinate systems, map projections, remote sensing, and GPS-GIS integrations will be taught. Infrastructure planning, construction management, earthwork machine control, highway rehabilitations, structure deformation and EIA will be presented. | Prerequisite: Graduate Standing or Departmental Permission
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing or Departmental Permission.

CE-GY 7753 Environmental Systems Management (3 Credits)
Typically offered occasionally
This course provides an overview of information technologies as applied to the remote sensing of environmental infrastructure systems, and includes the development of infrastructure system databases to assist complex decision-making on environmental infrastructures. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 7815 Urban Systems Studio (1.5 Credits)
Typically offered Fall
This is a PhD level course introducing students to critical thinking for the study of cities. Topics used include but not limited to climate and climate action, design of human centric cities. and approaches for the engagement of urban communities in policy design and decision making. Typical urban characteristics such as density, pollution, and energy use are juxtaposed with aspirational characteristics such as parks and walking quarters, in order to critique success stories and failures in modern urban experience. Students use case studies with special attention to the interactions of scientific progress, governance, and finance. The course is designed to prepare the student to engage with their disciplinary dissertation while having a cross disciplinary perspective. | Prerequisite: Urban Systems PhD Program
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: PhD Urban Systems.

CE-GY 7843 Urban Infrastructure Systems Management (3 Credits)
Typically offered occasionally
This course provides a descriptive overview of key infrastructure systems and technologies that must be managed, operated and maintained. Systems treated include buildings and structures, water supply, solid and liquid waste handling and disposal, transportation, power, communications and information systems, health and hospitals, police and preprotection. The course explores the financial, political, administrative, legal and institutional settings of these systems and technologies. A portion of the course features distinguished guest lecturers who are experts in some of the systems and technologies included. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 7853 Infrastructure Asset Management (3 Credits)
Typically offered occasionally
This course reviews state-of-the-art performance monitoring and system condition assessment methodologies as part of infrastructure management systems. Emphasis is on information technologies as applied to remote sensing and database development for urban systems management. Infrastructure tools, such as GIS and dedicated databases for condition assessment are represented in a laboratory environment. Invited experts participate in such areas as transportation, water distribution and utilities. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 7873 Infrastructure Systems Engineering (3 Credits)
Typically offered Spring
Today's infra-systems managers and engineers need to prepare themselves with a better understanding of how network of large-size urban systems are developed-built and managed for sustainability. This foundation level course is included as a core course for the MS in Urban Infra-systems Engineering & Management curriculum to provide broad skill set for various types of urban infrastructures. The concepts of systems engineering are interdisciplinary and can be applied to the development and operations and management of transportation, energy systems, sewage, water supply and other urban infra-systems management. The goal is to allow students to understand the benefits of applying system engineering approaches as a means of developing reliable, efficient, and resilient urban infra-systems. The course covers technical practices such as commonly used models, trade-off analysis and testing, and management practices such as risk assessment and mitigation, which make up "best practices" in the systems engineering arena. This will help engineers to start thinking of SE approach as a tool for urban systems development and management from the beginning of their careers in engineering. See detailed outline in a separate file. Students are also required to read two papers prepared for this course during first week. Course outline may be modified slightly as we move along to adjust time availability and guest lectures. | Prerequisites: Graduate Standing or Department Permission
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 7893 Engineering Application of Deep Learning (3 Credits)
Typically offered Fall
Deep learning techniques are increasingly integral for prediction and estimation in a wide variety of engineering disciplines. We focus on the practice of deep learning, teaching students to efficiently train neural networks from basic feedforward networks to transformers and finetuning of foundation models. The course will cover introductory machine learning, feedforward MLPs, recurrent neural networks, convolutional networks, transformers, diffusion models, a brief overview of foundation model finetuning, and computational considerations such as memory and efficiency of models The course will emphasize the application of these techniques to a wide range of engineering tasks such as travel time prediction, satellite imagery classification, and video analysis. | Prerequisite: Knowledge of Python and Multivariable, Anti-requisite: CS-GY 6953 and ECE-GY 7123
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 7913 Climate Science: Realities & Risks of a Changing Climate (3 Credits)
Typically offered Fall
This course is the first term of a two-term sequence covering climate and energy. The first term will focus on climate science - the basics of the earth system, how it is observed and modeled, how has it changed in the recent and distant past, how it might change in the future under natural and human influences, and what impacts those changes might have on ecosystems and society. The most recent US government and UN assessment reports will serve as texts, supplemented by the original research literature and media coverage. This course should be of interest (and accessible) to students interested in climate science, sustainability, energy technologies, energy businesses, and energy policies. Prerequisites are only numeracy, simple algebra, basic calculus, and general science knowledge. | Prerequisite: Graduate standing or department permission
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 7915 Urban Systems Immersion for Social Good (1.5 Credits)
Typically offered Summer and January terms
The Urban Systems Immersion is one of the experiential learning components of the Urban systems PhD program. It is a 1.5 credit, two-week immersive experience which includes lecture, field work, and computationally intensive exercises. The immersion which will take place either in the summer or winter term allows the students to work on a specific and predefined concern in any urban center around the world, while engaging with requisite urban stakeholders from public or private sectors. The immersion is open to PhD students in any program across NYU, who have passed their qualifying exam and are skilled in data driven analytics. | Prerequisites: CE-GY 6053 or CUSP-GX 6005 or CUSP-GX 8113 (or equivalent) or instructor approval
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: CE-GY 6053 or CUSP-GX 6005 or CUSP-GX 8113 (or equivalent) or instructor approval.

CE-GY 7923 Energy – Technologies, Business, Regulations (3 Credits)
Typically offered Spring
This course will cover energy – the technologies that produce, store, transmit, and use the energy that provides heat, light, and mobility to modern society; the businesses that provide those services; and the regulations that govern energy activities. The state of the world and US energy systems will be described, as well as the drivers to improve their environmental, economic, and security aspects. The abilities of current and nascent technologies and business models to satisfy those drivers will also be discussed. A variety of government and private sector reports will serve as texts, supplemented by the original research literature and media coverage. This course should be of interest (and accessible) to students interested in climate science, sustainability, energy technologies, energy businesses, and energy policies. Prerequisites are only numeracy, simple algebra, basic calculus, and general science knowledge. Graduate standing or departmental permission.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate standing or departmental permission.

CE-GY 7963 Selected Topics in Construction I (3 Credits)
Typically offered Fall, Spring, and Summer terms
This course covers topics of special interest in current areas of construction management. Topics are announced before each semester's offering.
Grading: Grad Poly Graded
Repeatable for additional credit: Yes

CE-GY 7983 Selected Topics in Infrastructure Systems (3 Credits)
Typically offered occasionally
This course examines topics of current interest in infrastructure systems. Topics vary with each offering and are disseminated before the semester of offering. | Prerequisite: Instructor's Permission
Grading: Grad Poly Graded
Repeatable for additional credit: Yes

CE-GY 7993 Selected Topic in Infrastructure Systems (3 Credits)
This course examines topics of current interest in infrastructure systems. Topics vary with each offering and are disseminated before the semester of offering. | Prerequisite: Instructor's permission
Grading: Grad Poly Graded
Repeatable for additional credit: Yes
Prerequisites: Graduate Standing.

CE-GY 8233 Planning, Construction, and Management of Sustainable Energy Systems (3 Credits)
Typically offered Fall
Sustainability in the built environment is more than energy and carbon emissions. There are material selections, water resources, and well-being factors to consider. This course will present a series of topics to enable participants to develop an informed perspective on the planning, construction, and management of sustainable energy systems.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 8243 Construction Modeling Techniques (3 Credits)
Typically offered occasionally
This course deals with various construction-modeling techniques, including the development of two-dimensional (2D) and three-dimensional (3D) design documents. Students are introduced to the development of building information models (BIM) and their associated databases, using state-of-the-art design and management systems. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8253 Project Management for Construction (3 Credits)
Typically offered Fall and Spring
The course covers topics specific to developing and coordinating large projects, including organizational structures, management functions, pricing and estimating project costs, bidding and contracting, risk allocation, scheduling, time and cost control, labor relations, quality management and project life-cycle activities.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8263 Construction Cost Estimating (3 Credits)
Typically offered occasionally
This course covers estimating and cost control from the viewpoint of contractors and construction engineers; details of estimating with emphasis on labor, materials, equipment and overhead. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8273 Contracts and Specifications (3 Credits)
Typically offered occasionally
This course covers principles of contract law as applied to the construction industry and legal problems in preparing and administering construction contracts. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8283 Risk Analysis (3 Credits)
Typically offered occasionally
In this course, students investigate the ever-rising importance of risk analysis in project management. Topics include: analysis of qualitative and quantitative risk; techniques in probability analysis, sensitivity analysis, simulation of risk and utility theory; and computational methods for calculating risk. Students are exposed to real-world problems through case investigations. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8293 Construction Operations Analysis (3 Credits)
Typically offered occasionally
This course examines the evaluation and model development of productivity, safety, quality and materials handling in construction operations. Topics include the principal methods for analysis and pre-planning work activities, including the use of three-dimensional (3D) building information models (BIM), four-dimensional (4D) and fully integrated and automated project processes (FIAPP), logistics animation, Monte Carlo scheduling, stochastic simulation and queuing theory. Students are introduced to the use of financial models for task, activity, project and program analyses. | Prerequisite: CE-GY 8243 or Construction Management Program Director's approval.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: CE-GY 8243 or Construction Management Program Director's approval and graduate standing.

CE-GY 8313 Engineering for Construction I: Methods and Technologies (3 Credits)
Typically offered occasionally
This course covers planning, design and equipment for new construction and for infrastructure rehabilitation; engineering fundamentals of earth moving; soil stabilization and compaction; methods for tunneling through rock and earth and rock blasting; foundation grouting; piles and pile driving equipment; dewatering systems and pumping equipment; factors affecting the selection of construction equipment; review of conventional construction equipment; and trends in robotics. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8333 Marketing for Construction Management and Engineering Services Mktg for Const Mgmt & Engr Serv (3 Credits)
Typically offered occasionally
This course focuses on the process of procurement of construction management and engineering services. It incorporates a hands-on approach to current industry practices. The materials address the following: identifying leads; researching and evaluating competition through various sources; reviewing and critiquing requests for qualifications (RFQ) and requests for proposals (RFP) and responses; developing a marketing resume; developing project profiles; evaluating presentations; and selecting successful candidates. Students will prepare their own proposals and presentations. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8343 Construction Site Safety (3 Credits)
Typically offered occasionally
This course is for individuals who are interested in construction safety and the realities of a construction project and for those seeking certification as a Site Safety Manager from the New York City (NYC) Department of Buildings (DOB). Students learn about the comprehensive Subchapter 19 of the New York City Building Code and the City's Rules and Regulations on construction site safety projects. The course curriculum includes the content approved by the NYC DOB to prepare students for the Site Safety Manager examination. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8353 Construction Scheduling (3 Credits)
Typically offered occasionally
Students will be instructed in advanced Critical Path Method (CPM) construction scheduling techniques including the use of Primavera Project Planner v. 7.0. The course will cover Precedence Diagramming Method (PDM), project resources and resource leveling, schedule updating, schedule impacts of date constraints, project time and cost trade-offs, activity duration estimating, work breakdown structures, differing scheduling requirements on different types of construction projects and an overview of construction contract scheduling specifications. An introduction to other scheduling methodologies and the use of schedules in construction claims will also be addressed. | Prerequisite: Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate Standing.

CE-GY 8373 Construction Accounting and Finance (3 Credits)
Typically offered occasionally
This course introduces students to the uses of accounting and financial analysis in decision making in a construction and development environment. The course will demonstrate to students how the principles of accounting and financial management can be adapted for, and used in the management of construction companies and project management. Students will review accounting concepts, rules, regulations and reporting requirements as they apply to construction and development, and they will use and create accounting and financial models.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate standing.

CE-GY 8383 Building Information Modeling (BIM) and Its Applications in AEC/FM (3 Credits)
Typically offered Fall and Spring
The intent of this course is to strengthen the knowledge of students on the concepts associated with information modeling and analysis. The students will learn the building information modeling applications in the Architecture/ Engineering/ Construction and Facility Management (AEC/FM) industry, fundamentals of object-oriented modeling and techniques to develop information models. At the same time, the students will be exposed to and will have hands-on experiences with some of the existing software systems in the AEC/FM industry that leverage such information models for decision support in construction management tasks. | Prerequisites: CE-GY 8243 and Graduate Standing
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: CE-GY 8243 and Graduate Standing.

CE-GY 8393 Leadership, Ethics and Project Execution (3 Credits)
Typically offered Fall and Spring
This is the capstone course for students earning the MS in Construction Management. The syllabus integrates the application of leadership and ethics to principles introduced in fundamental courses to develop a more advanced understanding of construction management decision making throughout the entire construction project delivery process. | Prerequisites: Completion of eighteen (18) credits, or be in the final semester of enrollment in the program, whichever is sooner.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: 18 Graduate Credits.

CE-GY 8423 Ground Improvement (3 Credits)
Typically offered occasionally
The course discusses foundation engineering practice, foundation rehabilitation, and emerging ground- improvement technologies. Topics covered are the selection, design and analysis of ground-improvement techniques for different foundation problems, as well as the construction, monitoring and performance evaluation of such solutions. | Prerequisites: undergraduate soil mechanics and foundations, CE-UY 4173 or equivalent.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: undergraduate soil mechanics and foundations, CE-UY 4173 or equivalent.

CE-GY 8493 Environmental Geotechnology (3 Credits)
Typically offered occasionally
The course covers: Clay mineralogy; soil-water interaction processes; chemical transport through soils; hydraulic conductivity, diffusion and attenuation mechanisms; water-disposal systems; design of land-fills, seepage barriers and cut-off walls; geo-environmental site characterization techniques; and soil-remediation techniques. | Prerequisite: undergraduate soil mechanics, CE-UY 3153 or equivalent.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: undergraduate soil mechanics, CE-UY 3153 or equivalent.

CE-GY 8603 Selected Topics in Geotechnical Engineering (3 Credits)
The course explores current special interest topics, such as ground improvement, geotechnical earthquake engineering, site characterization and remediation. Topics vary with each offering and are disseminated before registration. | Prerequisites: CE-UY 4173 or equivalent.
Grading: Grad Poly Graded
Repeatable for additional credit: Yes

CE-GY 8663 Advanced Foundation Design (3 Credits)
Topics covered: Advanced analysis of foundations, shallow foundations, bearing capacity, settlement, deep foundations, axial and lateral loading of piles, wave equation analysis, drilled piers, design and construction issues, and case histories. | Prerequisites: undergraduate soil mechanics and foundations, CE-UY 4173 or equivalent.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: undergraduate soil mechanics and foundations, CE-UY 4173 or equivalent and graduate standing.

CE-GY 8673 Excavation Support Systems (3 Credits)
Typically offered occasionally
The course covers design and construction methodologies for excavation support systems, including soldier pile, sheet pile, and secant pile wall systems. Both traditional limit-equilibrium and modern elastoplastic analysis methods will be presented. Students will get the opportunity to utilize industry software to design excavation support systems. Last, for the 1st time this year, students will have the opportunity to also experience excavation support systems in virtual or augmented reality. | Prerequisites: undergraduate Geotechnical Engineering.
Grading: Grad Poly Graded
Repeatable for additional credit: No

CE-GY 8703 Managing and Leading in the 21st Century (3 Credits)
Typically offered occasionally
Today's mega projects require the formation of large multidisciplinary teams including engineers, constructors and financial, legal and business experts. Success in this challenging environment requires up-to-date and proven leadership and management skills. This course covers the basic components of management planning, organizing, directing, controlling and decision-making. It defines the engineering and construction team and discusses leadership styles. This course also addresses the management of change, external factors that shape decisions, the development of personal leadership abilities and, ultimately, 21st century leadership requirements. | Prerequisite: Admission to the Exec 21 Program or permission of a Construction Management Program Director.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Admission to the Exec 21 Program or permission of a Construction Management Program Director.

CE-GY 8713 Construction and the Law (3 Credits)
Construction industry executives need not be legal experts, but they must be aware of the legal issues affecting their industry and their bottom line. This course uses the case study method to lead students through the concepts of design and construction law. The course focuses on the interface of legal, business and technical issues and their resolution. It includes the design and organization of construction documents; the legal aspects of bidding, subcontracting, bonds, insurance, mechanic's liens, etc; and the implication of delays, changes and charged conditions. Alternative dispute resolution (ADR) methods are introduced. | Prerequisite: Admission to the Exec 21 Program or permission of a Construction Management Program Director.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Admission to the Exec 21 Program or permission of a Construction Management Program Director.

CE-GY 8733 Infrastructure Financing: Structuring of a Deal (3 Credits)
Typically offered occasionally
This course examines what it takes to structure a deal from a credit perspective, legally and financially, for domestic and international projects. In the domestic sector, the course focuses on transportation projects, examining the peculiarities and the uniqueness of the capital market. Examples are studied and recent changes are discussed in areas such as financing transportation projects and the dramatically changing nature of financing these projects. In the international sector, the course covers innovative financing techniques. | Prerequisite: Admission to the Exec 21 Program or permission of a Construction Management Program Director.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Admission to the Exec 21 Program or permission of a Construction Management Program Director.

CE-GY 8763 Capital Program Management/Program Development (3 Credits)
Typically offered occasionally
The course examines the process of capital program management and development. Depending upon the instructor and project used for illustration, the course analyses how either the public or private sector views a project and develops it and the internal workings of an organization in determining how a project is selected, funded and managed. The course examines various contracting strategies, as well as the concepts of risk allocation, funding and project finance. | Prerequisite: Admission to Exec 21 Program or permission of a Construction Management Program Director.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Admission to Exec 21 Program or permission of a Construction Management Program Director.

CE-GY 8773 Dispute Avoidance and Resolution (3 Credits)
Typically offered occasionally
This course analyzes the basic causes for construction disputes and introduces methods for dispute avoidance by proper risk allocation, management and control, as well as other techniques, including partnering. It uses the case study method to address litigation and provides an understanding of the process of arbitration and other alternative dispute resolution (ADR) methods such as negotiation, mediation, mini trials and dispute review boards. | Prerequisite: Admission to the Exec 21 Program or permission of a Construction Management Program Director.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Admission to the Exec 21 Program or permission of a Construction Management Program Director and graduate standing.

CE-GY 8803 Infrastructure Planning for Public Works (3 Credits)
Typically offered occasionally
This course deals with the process whereby infrastructure projects are conceived, studied, and implemented. The focus will be on the management and leadership roles of the key players in public works agencies. Lectures, reading assignments, and classroom discussions will deal with both routine procedures and controversial issues. Students will research and report on important public works projects and on special topics in infrastructure planning. | Prerequisite: Admission to the Exec 21 Program or permission of a Construction Management Program Director.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Admission to the Exec 21 Program or permission of a Construction Management Program Director.

CE-GY 9105 Principles of Professional Practice I: Ethics (0.5 Credits)
Typically offered Summer term
Principles of Professional Practice I provides graduate students with a foundation for success in the professional disciplines offered by the Department of Civil and Urban Engineering. This course combines (1) an online educational module related to Ethics, (2) an immersive internship in a civil engineering practice area. | Prerequisite: Graduate students with a minimum of 18 graduate credits and in good academic standing prior to the start of the internship. Permission of CUE Department.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate students with a minimum of 18 graduate credits and in good academic standing prior to the start of the internship.

CE-GY 9205 Principles of Professional Practice II: Management (0.5 Credits)
Typically offered Fall
Principles of Professional Practice II provides graduate students with a foundation for success in the professional disciplines offered by the Department of Civil and Urban Engineering. This course combines (1) an online educational module related to Management of engineering projects , (2) an immersive internship in a civil engineering practice area. | Prerequisite: Graduate students with a minimum of 18 graduate credits and in good academic standing prior to the start of the internship. Permission of CUE Department.
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate students with a minimum of 18 graduate credits and in good academic standing prior to the start of the internship.

CE-GY 9305 Principles of Professional Practice III: Leadership (0.5 Credits)
Typically offered Spring
Principles of Professional Practice III provides graduate students with a foundation for success in the professional disciplines offered by the Department of Civil and Urban Engineering. This course combines (1) an online educational module related to Leadership , (2) an immersive internship in a civil engineering practice area. | Prerequisite: Graduate students with a minimum of 18 graduate credits and in good academic standing prior to the start of the internship. Permission of CUE Department
Grading: Grad Poly Graded
Repeatable for additional credit: No
Prerequisites: Graduate students with a minimum of 18 graduate credits and in good academic standing prior to the start of the internship.

CE-GY 9950 PhD Candidates Research Seminar (0 Credits)
Typically offered Fall and Spring
All PhD candidates (following the successful passage of the PhD Qualifying Examination) register for CE-GY 9950 (0 credits) - Research seminar Course - every semester they are registered in PhD program. The goals of this seminar program are to enhance the intellectual atmosphere of the department, to provide students opportunities to develop skills in publicly presenting research results, and to facilitate faculty monitoring of student research progress.
Grading: Grad Poly Pass/Fail
Repeatable for additional credit: No

CE-GY 9963 MS Project in Civil & Urban Engineering Department (3 Credits)
Typically offered occasionally
This project involves analytical, design or experimental studies in civil engineering guided by a faculty adviser and following departmental guidelines. A written report is required. | Prerequisites: degree status and project adviser's approval.
Grading: Grad Poly Graded
Repeatable for additional credit: Yes