

Civil & Environmental Engineer (CEEN)

CEEN 1200 Introduction to Infrastructure (3 credits)

Introduction to civil, construction and environmental engineering with emphasis on civilian infrastructure and the built environment. Introduction to the natural environment and environmental infrastructure, structural infrastructure and construction, transportation infrastructure, civil engineering history and heritage and civil infrastructure systems. Discussion of planning and energy, sustainability, environmental, economic, ethics and security considerations in relation to civilian infrastructure. Introduction to analysis and design as they pertain to infrastructure and the built environment.

Prerequisite: Enrollment in the Opus College of Engineering.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%201200>)

CEEN 1210 Introduction to Computing, Analysis, Design and Communication (3 credits)

Introduction to computational tools, graphical communication tools and economic analysis principles as they relate to civil, construction and environmental engineering. Introduction to sketching as a means with which to convey and communication of ideas and workflow. Algorithm development and graphical display of engineering ideas and information in commercially available programs and programming environments. Implementation of infrastructure engineering analysis and design concepts and procedures from CEEN 1200 using commercially available programs and programming environments.

Prerequisite: BIEN 1100, CEEN 1200, EECE 1200, or GEEN 1200; enrollment in the Opus College of Engineering.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%201210>)

CEEN 2320 Introduction to Civil Infrastructure, Geo-Spatial and Environmental Modeling (3 credits)

Introduction of parametric and geo-spatial modeling and its uses in civil, construction and environmental engineering applications to civilian infrastructure. Activities will focus on Geospatial Information Systems (GIS), civil site modeling, road infrastructure modeling, bridge modeling, watershed modeling/mapping and the use of surveying data in the layout of civil infrastructure. Students learn construction sequencing, infrastructure systems terminology and modeling principles as they relate to civil infrastructure.

Prerequisite: CEEN 1210.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%202320>)

CEEN 3160 Geotechnical Engineering (3 credits)

Fundamental properties and engineering characteristics of soil as a particulate mass aggregate are studied. The formation and the development of soil deposits, the physical and hydraulic properties and the methods of predicting the stress-strain behavior of soils for engineering applications are examined. Laboratory experiments are conducted and reports are required. 2 hrs. lec., 1.25 hrs. lab.

Prerequisite: Jr. stndg. and CIEN, ENEN or CNEN major.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%203160>)

CEEN 3210 Hydraulic Engineering (3 credits)

Fundamentals and applications of hydrostatics and hydrodynamics including pressurized pipe flow and pipeline network design, open channel flow, and sewer design, pump selection and flow measurement. Laboratory assignments and demonstrations. 2 hrs. lec., 1.25 hrs. lab.

Prerequisite: MEEN 3320 which, may be taken concurrently.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%203210>)

CEEN 3320 Civil Engineering Materials (3 credits)

Introduction to the properties and fundamental behavior materials used by civil engineers with emphasis on concrete, asphalt and steel. Lab experiments are used to demonstrate the behavior of materials subjected to various load levels and orientations. Use of spreadsheets and statistical analysis of experimental data are required. 2 hrs. lec; 1.25 hrs. lab.

Prerequisite: Soph. stndg. and CIEN, ENEN or CNEN major.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%203320>)

CEEN 3410 Structural Analysis (3 credits)

Determining the loads that act on structures and load combinations. Basic concepts in structural analysis of determinate beams, trusses, and frames. Deflections of determinate beams by moment area and conjugate beam methods. Development of basic virtual work concept to obtain deformations in determinate trusses, beams, and frames. Introduction to the solution of indeterminate structures by using the method of superposition. Influence lines for determinate beams.

Prerequisite: GEEN 2130.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%203410>)

CEEN 3430 Structural Steel Design (3 credits)

Introduction to building codes, design standards and design specifications as they relate to the physical behavior and design of steel structures. Design of structural steel members subjected to tensile loading; compression loading (columns); and bending (beams). Design of mechanical fasteners, welds and connecting elements. Analysis and design of members subjected to combined loading (beam-columns). Emphasis on AISC Specifications.

Prerequisite: CEEN 3320 and CEEN 3410.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%203430>)

CEEN 3440 Reinforced Concrete Design (3 credits)

Fundamental concepts of reinforced concrete theory and design. Use of current design code for the analysis and design of basic structural members; strength design for flexure, shear and development of reinforcement.

Prerequisite: CEEN 3410 and CEEN 3320.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%203440>)

CEEN 3510 Environmental Engineering (3 credits)

Introduction to environmental engineering with a focus on the water environment. Topics include water quality, water resources, water supply, municipal water and wastewater systems, air quality, and solid and hazardous waste management.

Prerequisite: Jr. stndg. and CIEN, ENEN or CNEN major.

Level of Study: Undergraduate

Interdisciplinary Studies: Environmental Ethics, Environmental Studies

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%203510>)

CEEN 3610 Transportation Engineering (3 credits)

Airport airside systems based on FAA guidelines. Road user and vehicle characteristics, applications of equations of motion, geometric design of roadways including horizontal and vertical alignment and cross-sectional elements. Also includes traffic calming, signalized intersections, parking lot design and traffic flow models. Emphasis on explaining technical details in writing.

Prerequisite: Jr. stndg. and CIEN, ENEN or CNEN major.

Level of Study: Undergraduate

Marquette Core Curriculum: NSM Basic Needs & Justice

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%203610>)

CEEN 4145 Advanced Strength and Applied Stress Analysis (3 credits)

Basic concepts of mechanics of deformable bodies. Two- and three-dimensional stress-strain relationships and theories of failure. Unsymmetrical bending analyses. Shear flow and shear center. Torsion of thin-walled sections (tubular and non-tubular). Composite beams. Stress concentration. Energy principles: strain and complementary energy. Castigliano's theorem.

Prerequisite: GEEN 2130.

Level of Study: Undergraduate

Last four terms offered: 2021 Fall Term, 2011 Fall Term, 2009 Fall Term, 2007 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204145>)

CEEN 4230 Urban Hydrology and Stormwater Management (3 credits)

Distribution and properties of water on the earth. Concept of the hydrologic cycle and basic principles governing water movement in the environment: precipitation, evapotranspiration, infiltration, runoff generation, streamflow and groundwater flow. Engineering methods of design of flood protection, stormwater management and stormwater pollution abatement systems.

Prerequisite: CEEN 3510 or MEEN 3320.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204230>)

CEEN 4310 Geographical Information Systems in Engineering and Planning (3 credits)

Fundamentals of GIS, databases, data management, map projections, representations of spatial attributes, GIS analysis and GIS software systems such as ARC Info, ARC View, Grass. GIS use and expanded capabilities are taught. Case studies including environmental, transportation and economic applications are discussed.

Prerequisite: Sr. stndg. and CIEN, ENEN or CEMA major.

Level of Study: Undergraduate

Last four terms offered: 2013 Spring Term, 2012 Spring Term, 2011 Spring Term, 2010 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204310>)

CEEN 4340 Urban Planning for Civil Engineers (3 credits)

Concepts and principles underlying urban planning and development. Land use, transportation, utility, community facility planning problems, procedures, and techniques. The master plan and implementation devices such as zoning, subdivision control, official mapping, capital budgeting, and urban renewal.

Prerequisite: Sr. stndg. and CIEN, ENEN or CNEN major.

Level of Study: Undergraduate

Interdisciplinary Studies: Urban Affairs

Last four terms offered: 2021 Fall Term, 2020 Fall Term, 2019 Fall Term, 2018 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204340>)

CEEN 4350 Law for Engineers (3 credits)

Basic legal principles and awareness of typical legal questions that arise when engineers and law interact. Topics include: American judicial system, law of contracts, forms of association, construction contracts, professional liabilities of engineers and torts.

Prerequisite: Sr standing and CIEN major or ENEN major; or Jr standing and CNEN major.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204350>)

CEEN 4411 Matrix Structural Analysis (3 credits)

Introduction to symbolic and numerical linear algebra computations using commercial software. Modeling axial, bending, and torsion deformations in structural members using polynomials. Application of the principle of virtual work to compute deflections for statically determinate and indeterminate problems. Formulation of the matrix stiffness method via the principle of virtual displacements and the matrix flexibility method via the principle of virtual forces. Application of the matrix stiffness method for solving statically indeterminate structural analysis problems. Use of approximate methods of structural analysis (cantilever and portal methods) for critical evaluation of software-generated solutions. Use of commercial software for structural analysis.

Prerequisite: CEEN 3410.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2020 Fall Term, 2019 Fall Term, 2018 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204411>)

CEEN 4431 Advanced Structural Steel Design (3 credits)

Continuation of CEEN 3430. Design of plate girders, composite beam and slab systems, composite columns and composite beam-columns, simple connections, moment connections, hollow structural shape (HSS) connections, bracing systems and single and multi-story steel framed building systems. Emphasis on AISC Specifications

Prerequisite: CEEN 3430.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2021 Spring Term, 2020 Spring Term, 2019 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204431>)

CEEN 4441 Advanced Reinforced Concrete Design (3 credits)

Presents advanced concrete design applications to reinforced concrete statically indeterminate systems, two-way slabs, short and slender columns, footings, and walls. Emphasis on ACI code requirements.

Prerequisite: CEEN 3440.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204441>)

CEEN 4443 Prestressed Concrete Design (3 credits)

Introduction to basic principles and procedures for the design and analysis of prestressed concrete members, including calculations of prestress loss, flexural analysis and design, shear, bond and anchorage requirements, member deflections and cable layouts. Emphasis on ACI and PCI code requirements.

Prerequisite: CEEN 3440 or equiv.

Level of Study: Undergraduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204443>)

CEEN 4450 Bridge Design (3 credits)

Introduction to bridge engineering and construction including: an abbreviated history of bridge construction; bridge types; bridge nomenclature; lessons from failures; design philosophies; and the construction process. Analysis of single- and multi-span bridge superstructures using classical techniques and commercial software. Design of single-span reinforced concrete slab bridges; reinforced concrete bridge decks; and single-span slab-bridges in prestressed concrete.

Prerequisite: CEEN 3430 and CEEN 3440.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204450>)

CEEN 4505 Air Quality Engineering (3 credits)

Applies engineering principles to identify, quantify and mitigate sources of air pollution. Takes a systems approach to quantify sources of air pollution, model fate and transport in the environment, identify public health and welfare aspects, develop monitoring and measuring programs, interpret regulatory framework, and design engineering solutions. Atmospheric physics and chemistry are applied in air dispersion modeling to predict air quality impacts. Air pollution control technologies are evaluated to design practical and economic solutions.

Level of Study: Undergraduate

Last four terms offered: 2022 Spring Term, 2021 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204505>)

CEEN 4515 Environmental Chemistry (3 credits)

Chemical stoichiometry, equilibrium, and kinetics relating to natural and engineered environmental systems. Basic concepts from organic and inorganic chemistry including oxidation-reduction reactions, acid-base chemistry, the carbonate system, alkalinity and acidity. Equilibrium and kinetic theories of chemical partitioning among gas, liquid and solid phases governing chemical fate and transport in the environment. Coordination chemistry describing metal-ligand interactions, precipitation and bioavailability of materials.

Prerequisite: CEEN 3510 and CHEM 1002.

Level of Study: Undergraduate

Marquette Core Curriculum: NSM Basic Needs & Justice

Interdisciplinary Studies: Environmental Studies

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2021 Summer Term, 2020 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204515>)

CEEN 4520 Industrial Wastewater Management (3 credits)

Review of federal legislation and state regulations with regard to industrial wastewater management practices. Consideration of industrial process modifications and wastewater treatment options with respect to their effect on industrial user fees. Pretreatment standards and discharge permit requirements. Case studies of specific industrial applications.

Prerequisite: CEEN 3510.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2021 Spring Term, 2019 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204520>)

CEEN 4525 Treatment Plant Design and Operation (3 credits)

Review of water and wastewater characteristics, drinking water, receiving water and effluent standards. Basic design methodology and operational features of common physical, chemical and biological processes for the treatment of waters and wastewaters. Introduction to the processing and disposal of sludges and other treatment plant residuals.

Prerequisite: CEEN 3510.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204525>)

CEEN 4530 Hazardous and Industrial Waste Management (3 credits)

Overview of hazardous waste management, disposal and soil and ground water remediation. Review of RCRA, CERCLA-SARA, TSCA and Wisconsin's NR 700 and other regulations. Definition of hazardous wastes and characterization of industrial waste stream. Chemical, physical and biological properties of hazardous wastes. Introduction to hazardous waste remediation/treatment methods and technologies. Landfills and the RCRA Land Ban regulations. Site assessments, field investigations and laboratory analytical techniques. Environmental risk assessments, cleanup objectives and waste minimization.; CIEN or ENEN major.

Prerequisite: Sr. stndg.

Level of Study: Undergraduate

Last four terms offered: 2022 Spring Term, 2020 Spring Term, 2018 Spring Term, 2016 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204530>)

CEEN 4535 Environmental Engineering Microbiology (3 credits)

Includes microbiological and biochemical properties of microorganisms important in environmental engineering practice. General fundamentals of environmental microbiology and their application to drinking water treatment and distribution, water pollution control and natural systems.

Prerequisite: CEEN 3510.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204535>)

CEEN 4550 Water Resources Planning and Management (3 credits)

Planning and management of water resources. Institutional frameworks for water resources engineering. Comprehensive integration of the engineering economic, social and legal aspects of water resources planning and management. Case studies of water use and environmental resources are studied.

Level of Study: Undergraduate

Interdisciplinary Studies: Environmental Studies

Last four terms offered: 2021 Fall Term, 2019 Fall Term, 2018 Fall Term, 2017 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204550>)

CEEN 4595 GIS Applications in Water Resources (3 credits)

Use of Geographical Information Systems (GIS) concepts and methods to solve water resources problems. GIS fundamentals such as databases, map projections, spatial analysis and raster analysis. Applications for water resources engineering including terrain analysis, watershed characterization and hydrologic analysis and modeling. Approaches to GIS integration with modeling software and online tools.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204595>)

CEEN 4615 Highway Planning and Design (3 credits)

Emphasis on highway planning, alternate highway alignments and alternate evaluation. Geometric design of highways including horizontal and vertical alignment, cross-section design. Projects on detailed design of reverse curves (plan and profile views); intersection design; cross-section and earthwork quantities. Legal aspects of engineering. Use of American Association of State Highway and Transportation Officials design guidelines.

Prerequisite: CEEN 3610.

Level of Study: Undergraduate

Last four terms offered: 2022 Spring Term, 2021 Spring Term, 2019 Spring Term, 2018 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204615>)

CEEN 4640 Traffic Characteristics and Design (3 credits)

Components of the traffic system: vehicle and road user characteristics, geometric design and traffic controls. Intersection types, cross-section design elements and typical dimensions. Basic variables of traffic flow, observed traffic flow values. Freeway operations. Signalized intersections: flow, capacity, level of service. Projects addressing: intersection existing conditions (traffic, geometry, signalization); approach delay; safety performance; capacity; suggestions for improvements. Use of the Highway Capacity Manual and the Highway Capacity Software. Emphasis on technical report-writing and presentation.

Prerequisite: CEEN 3610.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204640>)

CEEN 4650 Pavement Design (3 credits)

Study of the behavior and properties of highway pavements with emphasis on hot mix asphalt and jointed Portland cement concrete pavement. Pavement thickness designs are developed using current design methods and incorporating subgrade soil properties, traffic forecasts and pavement performance expectations. Use of spreadsheets and computer programs are required.

Prerequisite: CEEN 3160 and CEEN 3610.

Level of Study: Undergraduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2016 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204650>)

CEEN 4660 Pavement Management (3 credits)

Study of the performance of pavement systems based on design, traffic and maintenance activities. Methods for evaluating in-service pavements including distress surveys and nondestructive testing are examined. Maintenance strategies are developed and life-cycle cost analysis of these strategies are studied.

Prerequisite: CEEN 3610.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204660>)

CEEN 4670 Advanced Transportation Materials (3 credits)

Advanced study of materials used for constructing transportation facilities, with particular emphasis on subgrade soils, bound and unbound aggregates, hot mix asphalt and Portland cement concrete. Laboratory tests are conducted and analytical models used for characterizing transportation materials are examined.

Prerequisite: CEEN 3320 and CEEN 3160.

Level of Study: Undergraduate

Last four terms offered: 2016 Spring Term, 2005 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204670>)

CEEN 4710 Engineering Fundamentals Review (1 credits)

Review of basic science, mathematics, engineering science and economics. S/U grade assessment.

Prerequisite: Sr. stndg. and CIEN or ENEN major.

Level of Study: Undergraduate

Last four terms offered: 2017 Spring Term, 2016 Fall Term, 2016 Spring Term, 2015 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204710>)

CEEN 4715 Sustainable Engineering (3 credits)

Provides a framework for the theory and practice of sustainable engineering. Introduces the importance and role of technological, social and sustainable systems in the modern world, which is increasingly characterized by integrated human/natural/built complex adaptive systems at local, regional and global scales. Develops critical problem solving approaches, including life-cycle assessment, global awareness, consciousness of patterns in technological evolution, and strategies for addressing environmental, economic and social equity issues in engineering design. in College of Engineering

Prerequisite: Sr. stndg.

Level of Study: Undergraduate

Interdisciplinary Studies: Environmental Studies

Last four terms offered: 2020 Spring Term, 2019 Spring Term, 2017 Spring Term, 2016 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204715>)

CEEN 4720 Probabilities Concepts in Engineering (3 credits)

Applications of probability theory, statistics and decision analysis to engineering problems. Emphasis is placed on probabilistic modeling and analysis of engineering problems, and Bayesian statistics.

Prerequisite: Sr. stndg. and Engineering major.

Level of Study: Undergraduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204720>)

CEEN 4850 FRP in Civil Engineering Infrastructure (3 credits)

Introduces Fiber Reinforced Polymer (FRP) material properties, FRP reinforced concrete, FRP prestressed concrete, FRP repaired and retrofitted structures and pure FRP structures.

Prerequisite: CEEN 3440.

Level of Study: Undergraduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204850>)

CEEN 4931 Topics in Civil Engineering (1-3 credits)

Course content announced each term. Potential topics include: probability concepts in engineering, advanced roadway facility design, engineering economy, highway bridge analysis and design, structural engineering of sports facilities.

Prerequisite: Cons. of instr.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2021 Spring Term, 2020 Spring Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204931>)

CEEN 4953 Environmental Seminar (0 credits)

Topics related to environmental engineering, including subjects such as air pollution, urban hydrology and stormwater management, wastewater treatment and hazardous waste management. SNC/UNC grade assessment.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204953>)

CEEN 4995 Independent Study in Civil and Environmental Engineering (1-3 credits)

Undergraduate independent study project of either a theoretical or experimental nature., 3.000 GPA, cons. of instr., and cons. of dept. ch.

Prerequisite: Jr. stndg.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2019 Spring Term, 2018 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204995>)

CEEN 4998 Senior Design Project (4 credits)

Design of selected civil engineering projects including planning, preliminary analysis and final design. Different projects are selected each year. Students are assigned to project teams with specific tasks under the direction of a faculty course coordinator. Professional engineers from local firms propose projects and act as consultants to each design team. Emphasis is placed on student initiative, responsibility and resourcefulness in an open-ended project. A final written design report and oral presentation are required for each design team. Emphasis on technical communications, professional ethics and engineering practices. 1 hr. lec., 3 hrs. disc. CNEN 3810, CNEN 4830 and CNEN 4845 for CNEN majors.

Prerequisite: CEEN 3430 or CEEN 3440; CEEN 3510, CEEN 3610, and CNEN 3810 for CIEN and ENEN majors.

Level of Study: Undergraduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%204998>)

CEEN 5145 Advanced Strength and Applied Stress Analysis (3 credits)

Basic concepts of mechanics of deformable bodies. Two- and three-dimensional stress-strain relationships and theories of failure. Unsymmetrical bending analyses. Shear flow and shear center. Torsion of thin-walled sections (tubular and non-tubular). Composite beams. Stress concentration. Energy principles: strain and complementary energy. Castigliano's theorem.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2011 Fall Term, 2009 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205145>)

CEEN 5230 Urban Hydrology and Stormwater Management (3 credits)

Distribution and properties of water on the earth. Concept of the hydrologic cycle and basic principles governing water movement in the environment: precipitation, evapotranspiration, infiltration, runoff generation, streamflow and groundwater flow. Engineering methods of design of flood protection, stormwater management and stormwater pollution abatement systems.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205230>)

CEEN 5310 Geographical Information Systems in Engineering and Planning (3 credits)

Fundamentals of GIS, databases, data management, map projections, representations of spatial attributes, GIS analysis and GIS software systems such as ARC Info, ARC View, Grass. GIS use and expanded capabilities are taught. Case studies including environmental, transportation and economic applications are discussed.

Level of Study: Graduate

Last four terms offered: 2013 Spring Term, 2012 Spring Term, 2011 Spring Term, 2010 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205310>)

CEEN 5340 Urban Planning for Civil Engineers (3 credits)

Concepts and principles underlying urban planning and development. Land use, transportation, utility, community facility planning problems, procedures, and techniques. The master plan and implementation devices such as zoning, subdivision control, official mapping, capital budgeting, and urban renewal.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2020 Fall Term, 2019 Fall Term, 2018 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205340>)

CEEN 5350 Law for Engineers (3 credits)

Basic legal principles and awareness of typical legal questions that arise when engineers and law interact. Topics include: American judicial system, law of contracts, forms of association, construction contracts, professional liabilities of engineers and torts.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205350>)

CEEN 5411 Matrix Structural Analysis (3 credits)

Introduction to symbolic and numerical linear algebra computations using commercial software. Modeling axial, bending, and torsion deformations in structural members using polynomials. Application of the principle of virtual work to compute deflections for statically determinate and indeterminate problems. Formulation of the matrix stiffness method via the principle of virtual displacements and the matrix flexibility method via the principle of virtual forces. Application of the matrix stiffness method for solving statically indeterminate structural analysis problems. Use of approximate methods of structural analysis (cantilever and portal methods) for critical evaluation of software-generated solutions. Use of commercial software for structural analysis.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2020 Fall Term, 2019 Fall Term, 2018 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205411>)

CEEN 5431 Advanced Structural Steel Design (3 credits)

Continuation of CEEN 3430. Design of plate girders, composite beam and slab systems, composite columns and composite beam-columns, simple connections, moment connections, hollow structural shape (HSS) connections, bracing systems and single and multi-story steel framed building systems. Emphasis on AISC Specifications

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2021 Spring Term, 2020 Spring Term, 2019 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205431>)

CEEN 5441 Advanced Reinforced Concrete Design (3 credits)

Presents advanced concrete design applications to reinforced concrete statically indeterminate systems, two-way slabs, short and slender columns, footings, and walls. Emphasis on ACI code requirements.

Prerequisite: Prior course work in reinforced concrete design.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205441>)

CEEN 5443 Prestressed Concrete Design (3 credits)

Introduction to basic principles and procedures for the design and analysis of prestressed concrete members, including calculations of prestress loss, flexural analysis and design, shear, bond and anchorage requirements, member deflections and cable layouts. Emphasis on ACI and PCI code requirements.

Level of Study: Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205443>)

CEEN 5450 Bridge Design (3 credits)

Introduction to bridge engineering and construction including: an abbreviated history of bridge construction; bridge types; bridge nomenclature; lessons from failures; design philosophies; and the construction process. Analysis of single- and multi-span bridge superstructures using classical techniques and commercial software. Design of single-span reinforced concrete slab bridges; reinforced concrete bridge decks; and single-span slab-bridges in prestressed concrete..

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205450>)

CEEN 5505 Air Quality Engineering (3 credits)

Applies engineering principles to identify, quantify and mitigate sources of air pollution. Takes a systems approach to quantify sources of air pollution, model fate and transport in the environment, identify public health and welfare aspects, develop monitoring and measuring programs, interpret regulatory framework, and design engineering solutions. Atmospheric physics and chemistry are applied in air dispersion modeling to predict air quality impacts. Air pollution control technologies are evaluated to design practical and economic solutions.

Level of Study: Graduate

Last four terms offered: 2022 Spring Term, 2021 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205505>)

CEEN 5515 Environmental Chemistry (3 credits)

Chemical stoichiometry, equilibrium, and kinetics relating to natural and engineered environmental systems. Basic concepts from organic and inorganic chemistry including oxidation-reduction reactions, acid-base chemistry, the carbonate system, alkalinity and acidity. Equilibrium and kinetic theories of chemical partitioning among gas, liquid and solid phases governing chemical fate and transport in the environment. Coordination chemistry describing metal-ligand interactions, precipitation and bioavailability of materials.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2021 Summer Term, 2020 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205515>)

CEEN 5520 Industrial Wastewater Management (3 credits)

Review of federal legislation and state regulations with regard to industrial wastewater management practices. Consideration of industrial process modifications and wastewater treatment options with respect to their effect on industrial user fees. Pretreatment standards and discharge permit requirements. Case studies of specific industrial applications.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2021 Spring Term, 2019 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205520>)

CEEN 5525 Treatment Plant Design and Operation (3 credits)

Review of water and wastewater characteristics, drinking water, receiving water and effluent standards. Basic design methodology and operational features of common physical, chemical and biological processes for the treatment of waters and wastewaters. Introduction to the processing and disposal of sludges and other treatment plant residuals.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205525>)

CEEN 5530 Hazardous and Industrial Waste Management (3 credits)

Overview of hazardous waste management, disposal and soil and ground water remediation. Review of RCRA, CERCLA-SARA, TSCA and Wisconsin's NR 700 and other regulations. Definition of hazardous wastes and characterization of industrial waste stream. Chemical, physical and biological properties of hazardous wastes. Introduction to hazardous waste remediation/treatment methods and technologies. Landfills and the RCRA Land Ban regulations. Site assessments, field investigations and laboratory analytical techniques. Environmental risk assessments, cleanup objectives and waste minimization.

Level of Study: Graduate

Last four terms offered: 2022 Spring Term, 2020 Spring Term, 2018 Spring Term, 2016 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205530>)

CEEN 5535 Environmental Engineering Microbiology (3 credits)

Includes microbiological and biochemical properties of microorganisms important in environmental engineering practice. General fundamentals of environmental microbiology and their application to drinking water treatment and distribution, water pollution control and natural systems.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205535>)

CEEN 5550 Water Resources Planning and Management (3 credits)

Planning and management of water resources. Institutional frameworks for water resources engineering. Comprehensive integration of the engineering economic, social and legal aspects of water resources planning and management. Case studies of water use and environmental resources are studied.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2019 Fall Term, 2018 Fall Term, 2017 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205550>)

CEEN 5595 GIS Applications in Water Resources (3 credits)

Use of Geographical Information Systems (GIS) concepts and methods to solve water resources problems. GIS fundamentals such as databases, map projections, spatial analysis and raster analysis. Applications for water resources engineering including terrain analysis, watershed characterization and hydrologic analysis and modeling. Approaches to GIS integration with modeling software and online tools.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205595>)

CEEN 5615 Highway Planning and Design (3 credits)

Emphasis on highway planning, alternate highway alignments and alternate evaluation. Geometric design of highways including horizontal and vertical alignment, cross-section design. Projects on detailed design of reverse curves (plan and profile views); intersection design; cross-section and earthwork quantities. Legal aspects of engineering. Use of American Association of State Highway and Transportation Officials design guidelines.

Level of Study: Graduate

Last four terms offered: 2022 Spring Term, 2021 Spring Term, 2019 Spring Term, 2018 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205615>)

CEEN 5640 Traffic Characteristics and Design (3 credits)

Components of the traffic system: vehicle and road user characteristics, geometric design and traffic controls. Intersection types, cross-section design elements and typical dimensions. Basic variables of traffic flow, observed traffic flow values. Freeway operations. Signalized intersections: flow, capacity, level of service. Projects addressing: intersection existing conditions (traffic, geometry, signalization); approach delay; safety performance; capacity; suggestions for improvements. Use of the Highway Capacity Manual and the Highway Capacity Software. Emphasis on technical report-writing and presentation.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205640>)

CEEN 5650 Pavement Design (3 credits)

Study of the behavior and properties of highway pavements with emphasis on hot mix asphalt and jointed Portland cement concrete pavement. Pavement thickness designs are developed using current design methods and incorporating subgrade soil properties, traffic forecasts and pavement performance expectations. Use of spreadsheets and computer programs are required.

Prerequisite: CEEN 3160 and CEEN 3610; or equiv.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2016 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205650>)

CEEN 5660 Pavement Management (3 credits)

Study of the performance of pavement systems based on design, traffic and maintenance activities. Methods for evaluating in-service pavements including distress surveys and nondestructive testing are examined. Maintenance strategies are developed and life-cycle cost analysis of these strategies are studied.

Prerequisite: CEEN 3610 or equiv.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205660>)

CEEN 5670 Advanced Transportation Materials (3 credits)

Advanced study of materials used for constructing transportation facilities, with particular emphasis on subgrade soils, bound and unbound aggregates, hot mix asphalt and Portland cement concrete. Laboratory test are conducted and analytical models used for characterizing transportation materials are examined.

Level of Study: Graduate

Last four terms offered: 2016 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205670>)

CEEN 5715 Sustainable Engineering (3 credits)

Provides a framework for the theory and practice of sustainable engineering. Introduces the importance and role of technological, social and sustainable systems in the modern world, which is increasingly characterized by integrated human/natural/built complex adaptive systems at local, regional and global scales. Develops critical problem solving approaches, including life-cycle assessment, global awareness, consciousness of patterns in technological evolution, and strategies for addressing environmental, economic and social equity issues in engineering design.

Level of Study: Graduate

Last four terms offered: 2020 Spring Term, 2019 Spring Term, 2017 Spring Term, 2016 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205715>)

CEEN 5815 Mechanical and Electrical Systems for Buildings (3 credits)

Provides basic knowledge of electrical, plumbing and HVAC systems used in residential, commercial and industrial buildings. Studies the advantages and disadvantages of various systems, and how their design and installation integrates into the management of the building process. Particular attention is given to soliciting and managing mechanical and electrical subcontractors.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205815>)

CEEN 5830 Construction Planning, Scheduling, and Control (3 credits)

A study of principles and techniques used to plan, schedule and control costs on building construction projects. Network and linear scheduling models, resource allocation and time-cost analysis. Develops an appreciation of the resources required in a project and their limitations and introduces the techniques for analyzing and improving their use. Develops an understanding of the correlation between project planning and control and cost estimating and scheduling.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205830>)

CEEN 5840 Construction Cost Analysis and Estimating (3 credits)

Study of various cost estimating methods and their applications. Topics include: labor, material, equipment and indirect costs; quantity takeoff; analysis of historical cost data; forecasting and computerized estimating methods.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Spring Term, 2021 Spring Term, 2020 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205840>)

CEEN 5845 Construction Equipment and Methods (3 credits)

Construction equipment and productivity analysis. Design of equipment fleet operations. Design of temporary structures used during construction such as earth retaining structures and concrete formwork systems. Construction equipment safety and safety standards related to earthwork and concrete forming operations.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2021 Fall Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205845>)

CEEN 5850 FRP in Civil Engineering Infrastructure (3 credits)

Introduces Fiber Reinforced Polymer (FRP) material properties, FRP reinforced concrete, FRP prestressed concrete, FRP repaired and retrofitted structures and pure FRP structures.

Level of Study: Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205850>)

CEEN 5931 Topics in Civil Engineering (1-3 credits)

Course content announced each term. Potential topics include: probability concepts in engineering, advanced roadway facility design, engineering economy, highway bridge analysis and design, structural engineering of sports facilities.

Prerequisite: Cons. of instr.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2021 Spring Term, 2020 Spring Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%205931>)

CEEN 6110 Theory of Elasticity (3 credits)

Mathematical preliminaries (index notation, vectors, Cartesian tensors, coordinate transformations, eigenvalue problems, divergence theorem); kinematic relations (strain-displacement and compatibility); stress tensor and traction vector; differential and virtual work expressions of equilibrium; constitutive relations; stored energy functions; formulation of elastostatics boundary value problems; uniqueness theorems; theorem of minimum potential energy; Saint-Venant's principle; Saint-Venant beam theory; plane stress and plane strain.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2019 Fall Term, 2017 Fall Term, 2015 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206110>)

CEEN 6120 Introduction to the Finite Element Method (3 credits)

Theoretical development of the finite element method (FEM) of analysis, with particular emphasis on problems of solid mechanics; development of element stiffness matrices for axial, beam, plane stress, plane strain, plate, shell, and solid elements; synthesis of global stiffness matrix, solution of the finite element equations; introduction to numerical implementation of FEM and general purpose FEM software.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2020 Fall Term, 2018 Fall Term, 2016 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206120>)

CEEN 6121 Applied Finite Element Analysis and Modeling (3 credits)

Review of linear elastic finite element analysis (FEA) theory in solid/structural mechanics; review of commercial FEA code use (ANSYS®) in linear elastic applications; introduction to advanced theories, including theories of vibration, material nonlinearities, geometric nonlinearities, structural instabilities, and/or time-dependent deformations (creep); use of ANSYS® to simulate complex structural behavior; model development, verification, and improvement.

Prerequisite: CEEN 6120 or equiv.

Level of Study: Graduate

Last four terms offered: 2021 Spring Term, 2019 Spring Term, 2017 Spring Term, 2015 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206121>)

CEEN 6210 River Engineering (3 credits)

Offers a solid background in the basic principles of open-channel hydraulics, gradually-varied flow, rapidly-varied flow, hydrologic and hydraulic flood routing, and river restoration/naturalization. Hand calculations of numerous open-channel flow problems, and application of the HEC-RAS program for backwater analysis and for flood routing in combination with HEC-1. Includes concepts for stream restoration/naturalization.

Level of Study: Graduate

Last four terms offered: 2013 Spring Term, 2011 Spring Term, 2009 Spring Term, 2007 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206210>)

CEEN 6340 Advanced Hydrology (3 credits)

Measurement of hydrologic phenomena including precipitation and streamflow. Applications of statistics to hydrology, floods and droughts. Hydrologic design of water resources development and management projects. State-of-the-art computer models for watershed management and urban hydrology.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2020 Spring Term, 2019 Spring Term, 2018 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206340>)

CEEN 6350 Introduction to Environmental Systems Modeling (3 credits)

Introduction to hydraulic and hydrologic models with applications to water resources engineering. Continuity equations. Analytical and numerical methods for linear, nonlinear and coupled systems. Model applications include calibration and validation, parameter estimation and optimization methods. Model systems include surface and subsurface waters, storm water and combined sewer collection systems and water distribution systems.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2019 Fall Term, 2017 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206350>)

CEEN 6410 Numerical Analysis with Structural Application (3 credits)

Interpolation polynomials; numerical integration and differentiation; Taylor series, Fourier, cubic spline, and least-squares polynomial approximations; numerical solution of initial-value problems by Prediction-Correction and Runge-Kutta methods; numerical solution of boundary-value problems by finite difference method; numerical solution of integral equations; approximate solution of ordinary differential equations by weighted residuals and Galerkin methods; approximate solution of variational problems by Rayleigh-Ritz method.

Level of Study: Graduate

Last four terms offered: 2020 Spring Term, 2018 Spring Term, 2014 Spring Term, 2012 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206410>)

CEEN 6420 Nonlinear Structural Analysis (3 credits)

Application of the principle of virtual displacements in the formulation of element stiffness equations that include geometric and material nonlinearity. Determination of critical (buckling) loads of structural systems using eigenvalue analysis. Formulation and application of algorithms for nonlinear structural analysis. Application of commercial software in geometrically nonlinear analysis, materially nonlinear analysis, and critical load (buckling) analysis.

Prerequisite: CEEN 5411.

Level of Study: Graduate

Last four terms offered: 2012 Spring Term, 2010 Spring Term, 2008 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206420>)

CEEN 6425 Earthquake Engineering (3 credits)

Introduction to the mechanics of ground motion (earthquake) and its effects on building and bridge structures. Application of structural dynamics principles in relation to structural analysis for earthquake-generated forces. Response to simulation of single degree of freedom and multi-degree of freedom linear structural systems to earthquake-induced ground accelerations using Newmark response history analysis (RHA), modal response history analysis (mRHA) and response spectrum analysis (RSA). Discussion of philosophies upon which building-code IBC, NEHRP mandated earthquake analysis and design procedures are based.

Prerequisite: CEEN 3430, CEEN 3440, CEEN 5411, CEEN 6435.

Level of Study: Graduate

Last four terms offered: 2022 Spring Term, 2016 Spring Term, 2013 Spring Term, 2011 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206425>)

CEEN 6435 Structural Dynamics (3 credits)

Formulation of single-degree-of-freedom (SDOF) equation of motion; generalized SDOF systems; free-vibration response; harmonic excitation; periodic loading and Fourier series; impulsive loads; response (shock) spectra; general response by Duhamel and Fourier integrals; non-linear dynamic analysis; Rayleigh's method; formulation of multiple-degree-of-freedom (MDOF) equations of motion; structural property matrices and load vectors; eigenvalue problem for natural frequencies and mode shapes; orthogonality of mode shapes; mode superposition.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2020 Fall Term, 2016 Fall Term, 2014 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206435>)

CEEN 6445 Advanced Materials for Civil Infrastructures (3 credits)

Introduction to advanced materials developed in recent decades for civil infrastructures, such as high-performance concrete, self-healing concrete, high strength steel, composites, recycled materials, green materials, nanomaterials, etc. Emphasis on fundamentals of material science, mechanics and application of these materials.

Level of Study: Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206445>)

CEEN 6460 Engineering Reliability (3 credits)

Introduces concepts and applications of engineering reliability. Presents how to formulate a reliability question to solve engineering problems of interest; compute first- and second-order estimates of failure probabilities of engineered systems; compute sensitivities of failure probabilities to assumed parameter values; measure the relative importance of the random variables associated with a system; identify the relative advantages and disadvantages of various analytical reliability methods as well as Monte Carlo simulation; update reliability estimates based on new observational data; and compute system reliability for series and parallel systems. Knowledge of basic Matlab programming helpful.

Prerequisite: Requires basic knowledge of probability and statistics, descriptions of random variables, probability distributions, functions of random variables, estimation of model parameters, model selection and verification, covered by MSCS 6010 or equivalent; EECE 6020, CEEN 4320/5320, MATH 4700/5700, 4710/5710, 4720/5720; linear algebra, systems of equations, matrix operations, transformations; calculus and differential equations, differentiation, integration, ordinary and partial differential equations.

Level of Study: Graduate

Last four terms offered: 2022 Spring Term, 2018 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206460>)

CEEN 6470 Performance-Based Engineering (3 credits)

Provides an opportunity to utilize and master the framework of performance-based engineering to aid decision making via useful applications. Presents how to estimate the hazard at the site and system of interest, in order to assess system response, predict damage extent, and evaluate system performance in terms of expected loss. Topics include: analyses of hazard, response, damage and loss; synthesis of recent advancement in research and practice with case studies; emphasis on the impact of earthquakes on buildings, with extension to other hazards and systems. Knowledge of basic Matlab programming helpful.

Prerequisite: Requires basic knowledge of probability and statistics, equivalent to MATH 4700/5700, 4710/5710, 4720/5720, or CEEN 4320.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2017 Fall Term, 2016 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206470>)

CEEN 6510 Biotechnology for Wastewater Management (3 credits)

Study of biologically catalyzed chemical transformations in engineered systems. Presentation of microbiology, biologically important oxidation-reduction reactions, bioenergetic principles, kinetics and toxicity considerations relating to wastewater treatment and nutrient management. Aerobic processes for biochemical oxygen demand reduction and ammonia oxidation, anoxic processes for denitrification as well as processes for anammox and nitrification/denitrification reactions. Anaerobic processes for biomethane and renewable energy production.

Prerequisite: CEEN 5525 or equiv.

Level of Study: Graduate

Last four terms offered: 2022 Spring Term, 2019 Fall Term, 2017 Fall Term, 2015 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206510>)

CEEN 6520 Environmental Laboratory 1 - Analyses (3 credits)

Physical, chemical and biological analyses for the characterization of waters, wastewaters, solid wastes, sludges and leachates. Use of modern instrumentation in laboratory analysis. Applicability of analytical results to the environmental field.

Prerequisite: CEEN 3510 and CEEN 5515.

Level of Study: Graduate

Last four terms offered: 2020 Fall Term, 2018 Fall Term, 2016 Fall Term, 2014 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206520>)

CEEN 6521 Environmental Laboratory 2 - Processes (3 credits)

Theoretical principles and laboratory experimentation governing the processes of settling, coagulation, adsorption, flotation, disinfection, oxygen transfer, biological treatment and sludge conditioning, thickening and dewatering.

Prerequisite: CEEN 5525 and CEEN 6520.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2019 Fall Term, 2017 Fall Term, 2015 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206521>)

CEEN 6540 Physical and Chemical Processes of Environmental Engineering (3 credits)

Theory and design of unit operations and processes utilized for the treatment of water and wastewater, including coagulation, flocculation, sedimentation, filtration, adsorption, ion exchange and aeration.

Prerequisite: CEEN 5515 and CEEN 5525.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2021 Spring Term, 2019 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206540>)

CEEN 6560 Fate of Micropollutants (3 credits)

Presents how to predict what a compound will do in an environment, based on the structure of the molecule. Discusses publications in peer-reviewed literature. Develops skills including critical thinking, public speaking via oral presentations, and technical writing.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2018 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206560>)

CEEN 6610 Advanced Traffic Operations Analysis and Design (3 credits)

Traffic stream characteristics-volume, flow rate, speed, density. Facility characteristics-level of service, capacity. Uninterrupted flow facility operations analysis: basic freeway segments, freeway weaving areas, merge and diverge areas, two-lane highways. Interrupted flow facility operations analysis: two-way and all-way stop controlled intersections; roundabouts. Non-highway facility operations analysis: pedestrian paths, bicycle paths and transit routes. Safety performance of highway facilities. Use of the Highway Capacity Manual and the Highway Capacity Software. Existing facility conditions, design upgrades.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2020 Fall Term, 2010 Fall Term, 2008 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206610>)

CEEN 6620 Urban Facility Design (3 credits)

Design controls overview. Access management location, spacing and design. Intersection design elements and traffic control devices. Local street design; Collector street design; Arterial street design. Roadside design-roadside obstacles. Bus and rail transit design for on- and off-street operation.

Level of Study: Graduate

Last four terms offered: 2009 Fall Term, 2005 Fall Term, 2003 Fall Term, 2001 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206620>)

CEEN 6635 Highway Interchange Design (3 credits)

Planning, analysis, design and operational analysis of highway interchanges. Determination and adaptability of interchange types for freeway-to-freeway and service interchanges.

Level of Study: Graduate

Last four terms offered: 2005 Spring Term, 2004 Spring Term, 2003 Spring Term, 2002 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206635>)

CEEN 6650 Bituminous Materials (3 credits)

Study of the behavior and properties of asphalt binders and hot mix asphalt pavement materials. The chemistry and rheological properties of asphalt binders with and without additives as well as the physical properties of aggregates are examined. Hot mix asphalt mix design methods are analyzed and laboratory testing of asphalt binders is conducted.

Level of Study: Graduate

Last four terms offered: 2016 Spring Term, 2006 Spring Term, 2003 Fall Term, 2001 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206650>)

CEEN 6655 Transportation Soils (3 credits)

Advanced study of surficial soils, soils variability, subgrade evaluation procedures, repeated loading behavior or soils and subgrade stability as used for constructing transportation facilities.

Prerequisite: CEEN 3320 and CEEN 3160 or equiv.

Level of Study: Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206655>)

CEEN 6660 Advanced Pavement Design (3 credits)

Advanced study of behavior and properties of highway and airfield pavements with emphasis on computer analysis of the stress-strain behavior under loading. Distress-specific performance expectations are developed for design pavement structures.

Prerequisite: CEEN 3160 and CEEN 3610; or equiv.

Level of Study: Graduate

Last four terms offered: 2016 Fall Term, 2008 Fall Term, 2007 Fall Term, 2006 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206660>)

CEEN 6675 Data Analysis and Visualization (3 credits)

Introduces analysis and visualization of engineering data sets, with a particular emphasis on transportation engineering data. Exploratory and explanatory analysis, data literacy, chart and color selection and storytelling with data. Tools covered include advanced Excel techniques, R and Python, and SQL. No prior computer programming experience required.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206675>)

CEEN 6840 Infrastructure Information Modeling (3 credits)

Infrastructure project lifecycle information generated during various stages of a project lifecycle. Computer modeling technologies used for managing project information. Relational data models. Relational representation of building information. Designing relational databases for efficient storage and management of infrastructure information. Object-created data models. Object-created analysis and design. Object-oriented representation of building information. Involves a project that accesses and integrates information from several sources such as a BIM model and other project resource databases for problem solving. Homework problems and course project are implemented in C# programming language.

Level of Study: Graduate

Last four terms offered: 2019 Spring Term, 2018 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206840>)

CEEN 6850 Temporary Structures in Construction (3 credits)

Investigates the design, safety analysis and economic considerations related to temporary structures used during construction. Topics covered include: construction and environmental loads, temporary earth retaining structures, cofferdams, construction dewatering, construction ramps and platforms, construction formwork, shoring and re-shoring in multistory concrete construction, scaffolding, bracing and guying for stability during construction.

Level of Study: Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206850>)

CEEN 6865 Biotechnology - Microbial Communities (3 credits)

Development of molecular methods with a focus on genomic approaches to characterize microbial community structure. Bioprocesses for waste management including anaerobic digestion, nitrification, denitrification, enhanced biological phosphorus removal, anammox and others. Concepts linking microbial community structure to process function, including functional resistance and resilience.

Level of Study: Graduate

Last four terms offered: 2022 Fall Term, 2020 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206865>)

CEEN 6932 Advanced Topics in Civil Engineering (1-3 credits)

Course content announced each term. Topics may include: structural optimization, design of structures for random loads, transportation systems analysis and design, water and wastewater systems analysis and design, and soil-structure interaction.

Level of Study: Graduate

Last four terms offered: 2021 Summer Term, 2021 Spring Term, 2018 Fall Term, 2016 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206932>)

CEEN 6953 Graduate Seminar in Civil Engineering (0-3 credits)

Review of current literature. Group discussion of recent work and current research by students and staff. 0 credit will be SNC/UNC grade assessment; 1-3 credits will be graded.

Level of Study: Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206953>)

CEEN 6995 Independent Study in Civil Engineering (1-3 credits)

Faculty-supervised, independent study/research of a specific area or topic in Civil Engineering.

Prerequisite: Cons. of instr. and cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Summer Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206995>)

CEEN 6999 Master's Thesis (1-6 credits)

S/U grade assessment.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%206999>)

CEEN 8953 Doctoral Seminar in Civil Engineering (0-3 credits)

0 credit will be SNC/UNC grade assessment; 1-3 credits will be graded.

Level of Study: Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%208953>)

CEEN 8995 Independent Study in Civil Engineering (1-3 credits)

Faculty-supervised, independent study/research of a specific area or topic in Civil Engineering.

Level of Study: Graduate

Last four terms offered: 2023 Summer Term, 2023 Spring Term, 2022 Fall Term, 2022 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%208995>)

CEEN 8999 Doctoral Dissertation (1-12 credits)

S/U grade assessment.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Summer Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%208999>)

CEEN 9970 Graduate Standing Continuation: Less than Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Designated as less than half-time status only, cannot be used in conjunction with other courses, and does not qualify students for financial aid or loan deferment.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2022 Spring Term, 2021 Spring Term, 2020 Fall Term, 2019 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209970>)

CEEN 9974 Graduate Fellowship: Full-Time (0 credits)

Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2021 Fall Term, 2021 Spring Term, 2020 Fall Term, 2017 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209974>)

CEEN 9975 Graduate Assistant Teaching: Full-Time (0 credits)

Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209975>)

CEEN 9976 Graduate Assistant Research: Full-Time (0 credits)

Fee. SNC/UNC grade assessment. Designated as full-time status. If a student is already registered in other courses full time, this continuation course is not needed.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Spring Term, 2021 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209976>)

CEEN 9984 Master's Comprehensive Examination Preparation: Less than Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week toward their master's comprehensive exam.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2018 Summer Term, 2015 Summer Term, 2015 Spring Term, 2012 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209984>)

CEEN 9985 Master's Comprehensive Examination Preparation: Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week toward their master's comprehensive exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2018 Summer Term, 2012 Spring Term, 2009 Fall Term, 2009 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209985>)

CEEN 9986 Master's Comprehensive Examination Preparation: Full-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week toward their master's comprehensive exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2018 Summer Term, 2016 Spring Term, 2015 Fall Term, 2013 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209986>)

CEEN 9987 Doctoral Qualifying Examination Preparation: Less than Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week toward their doctoral qualifying exam.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2018 Summer Term, 2012 Spring Term, 2009 Fall Term, 2009 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209987>)

CEEN 9988 Doctoral Qualifying Examination Preparation: Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week toward their doctoral qualifying exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2012 Spring Term, 2009 Fall Term, 2009 Summer Term, 2008 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209988>)

CEEN 9989 Doctoral Qualifying Examination Preparation: Full-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week toward their doctoral qualifying exam. May be taken in conjunction with credit-bearing or other non-credit courses to result in the status indicated, as deemed appropriate by the department.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2019 Spring Term, 2018 Fall Term, 2018 Summer Term, 2016 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209989>)

CEEN 9994 Master's Thesis Continuation: Less than Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2022 Spring Term, 2021 Spring Term, 2020 Spring Term, 2018 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209994>)

CEEN 9995 Master's Thesis Continuation: Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2022 Summer Term, 2018 Summer Term, 2018 Spring Term, 2017 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209995>)

CEEN 9996 Master's Thesis Continuation: Full-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their master's thesis. All six thesis credits required for the degree should be completed before registering for non-credit Master's Thesis Continuation.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2023 Summer Term, 2023 Spring Term, 2022 Fall Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209996>)

CEEN 9997 Doctoral Dissertation Continuation: Less than Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of less than half-time status. Requires that the student is working less than 12 hours per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2022 Summer Term, 2022 Spring Term, 2018 Summer Term, 2012 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209997>)

CEEN 9998 Doctoral Dissertation Continuation: Half-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of half-time status. Requires that the student is working more than 12 to less than 20 hours per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2020 Fall Term, 2018 Summer Term, 2012 Spring Term, 2010 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209998>)

CEEN 9999 Doctoral Dissertation Continuation: Full-Time (0 credits)

Fee. SNC/UNC grade assessment. Allows a student to be considered the equivalent of full-time status. Requires that the student is working 20 hours or more per week on their doctoral dissertation. All 12 dissertation credits required for the degree should be completed before registering for non-credit Doctoral Dissertation Continuation.

Prerequisite: Cons. of dept. ch.

Level of Study: Graduate

Last four terms offered: 2023 Spring Term, 2022 Fall Term, 2022 Summer Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=CEEN%209999>)