

CIVIL & ENVIRONMENTAL ENGINEERING (CIV ENG)

CIV ENG 150 Builders for Civilization and Environment

3 cr. Undergraduate.

Explores the role of civil engineering in society through the use of case studies, including water and society, bridges, building and transportation.

Prerequisites: none.

General Education Requirements: NS

Last Taught: Fall 2008, Fall 2007, Fall 2006, Fall 2005.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 201 Statics

3 cr. Undergraduate.

Principles of mechanics force systems, equilibrium structures, distributed forces, centroids and friction.

Prerequisites: Math 232(P).

Last Taught: Spring 2021, Fall 2020, Spring 2020, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 202 Dynamics

3 cr. Undergraduate.

Kinematics and kinetics of particles and rigid bodies with applications of Newton's second law and the principles of work-energy and impulse momentum.

Prerequisites: CIV ENG 203(C), MATH 233(C), and PHYSICS 209(P).

Last Taught: Spring 2023, Fall 2022, Summer 2022, Spring 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 203 Introduction to Solid Mechanics

4 cr. Undergraduate.

Topics in statics and strength of materials, including vector mechanics, equilibrium, structural analysis, internal forces, friction, moment of inertia, centroids, stress, strains, torsion, beam bending, shear and moment diagrams, deflection, and stress transformation.

Prerequisites: sophomore standing and MATH 231(C) or (P).

Last Taught: Spring 2023, Fall 2022, Spring 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 250 Engineering Surveying

3 cr. Undergraduate.

Horizontal and vertical distance measurement, angles and direction, traverses, errors, control and construction surveys, coordinate systems, land records, and coordinate geometry. Office and field practice.

Prerequisites: sophomore standing and MATH 231(C) or (P).

Last Taught: Spring 2023, Fall 2022, Spring 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 280 Computer Based Engineering Analysis

3 cr. Undergraduate.

Computer based methods for analysis of data and relationships in engineering practice. Data reliability, experimental design, statistical significance, database systems, curve fitting, interpretation of relationships.

Prerequisites: CompSci 132(P) or one sem H.S. programming; & Math 231(P) or 226(P).

Last Taught: Fall 2020, Spring 2020, Fall 2019, Spring 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 303 Strength of Materials

4 cr. Undergraduate.

Stress and strain, torsion, bending of beams, shearing stress in beams, combined stresses, principal stresses, deflections of beams, statically indeterminate members and columns.

Prerequisites: CIV ENG 201(P) or CIV ENG 203(C); and MATH 233(C) and PHYSICS 209(P).

Course Rules: Lec and lab.

Last Taught: Summer 2021, Spring 2021, Fall 2020, Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 311 Introduction to Energy, Environment and Sustainability

3 cr. Undergraduate.

Energy system and resources, environmental system and resources, global climate change, life cycle assessment, green chemistry and materials, sustainable technologies.

Prerequisites: jr st.

Last Taught: Fall 2022, Fall 2021, Fall 2020, Fall 2019.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 335 Soil Mechanics

3 cr. Undergraduate.

Fundamentals of soil mechanics; soil classification; seepage analysis; principle of effective stress; stress distribution; 1-D consolidation theory; shear strength; laboratory experience.

Prerequisites: junior standing; admis to an Engineering major;

CIV ENG 203(P) or CIV ENG 303(P); or graduate standing.

Last Taught: Spring 2023, Fall 2022, Spring 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 360 Introduction to Structural Analysis

3 cr. Undergraduate.

Elementary structural analysis techniques; beams, trusses, statically determinate frames, influence lines; analysis of indeterminate structures by superposition and computer analysis.

Prerequisites: CIV ENG 203(P) or CIV ENG 303(P); ELECENG 234(C).

Last Taught: Spring 2023, Fall 2022, Spring 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 372 Introduction to Structural Design

4 cr. Undergraduate.

Intro to design of reinforced concrete, steel, and wood structures; material properties; codes; design for flexure, shear and axial loads; connections.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 303(P); Math 233(C).

Last Taught: Spring 2023, Fall 2022, Spring 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 401 Intermediate Strength of Materials

3 cr. Undergraduate/Graduate.

Area moment, conjugate beam, deflection due to shear, bending of unsymmetrical beams, curved beams, shear flow, shear center, stresses in open sections, theories of failure, plastic stress-strain relations, plastic deformation, limit analysis, and energy methods.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 303(P).

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 401G Intermediate Strength of Materials

3 cr. Undergraduate/Graduate.

Area moment, conjugate beam, deflection due to shear, bending of unsymmetrical beams, curved beams, shear flow, shear center, stresses in open sections, theories of failure, plastic stress-strain relations, plastic deformation, limit analysis, and energy methods.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 303(P).

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 411 Engineering Principles of Water Resources Design

3 cr. Undergraduate/Graduate.

Principles of hydraulics; steady and non-steady flow in closed conduits and open channels; hydraulic design of structures, surge tanks; hydraulic model studies.

Prerequisites: jr st & admis to an Eng major or grad st; MechEng 320(P).

Last Taught: Spring 2023, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 411G Engineering Principles of Water Resources Design

3 cr. Undergraduate/Graduate.

Principles of hydraulics; steady and non-steady flow in closed conduits and open channels; hydraulic design of structures, surge tanks; hydraulic model studies.

Prerequisites: jr st & admis to an Eng major or grad st; MechEng 320(P).

Last Taught: Spring 2023, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 412 Applied Hydrology

3 cr. Undergraduate/Graduate.

Applied hydrology with emphasis on analysis of rainfall, runoff and streamflow processes, hydrologic forecasting and simulation, urban hydrology, hydrologic design and modelling.

Prerequisites: jr st; Math 233(P) & MechEng 320(P).

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 412G Applied Hydrology

3 cr. Undergraduate/Graduate.

Applied hydrology with emphasis on analysis of rainfall, runoff and streamflow processes, hydrologic forecasting and simulation, urban hydrology, hydrologic design and modelling.

Prerequisites: jr st; Math 233(P) & MechEng 320(P).

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 413 Environmental Engineering

3 cr. Undergraduate/Graduate.

Water pollution and control; hazardous substances and risk assessment; water and wastewater treatment systems; air-pollution and emission control; solid wastes; design of treatment facilities.

Prerequisites: junior standing and advanced to major in an Engineering major or graduate standing.

Last Taught: Spring 2023, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 413G Environmental Engineering

3 cr. Undergraduate/Graduate.

Water pollution and control; hazardous substances and risk assessment; water and wastewater treatment systems; air-pollution and emission control; solid wastes; design of treatment facilities.

Prerequisites: junior standing and advanced to major in an Engineering major or graduate standing.

Last Taught: Spring 2023, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 431 Materials of Construction

3 cr. Undergraduate/Graduate.

Investigation covering engineering properties of metals, timber, concrete, masonry, plain and reinforced plastics, glues; thermal effects.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 303(P).

Last Taught: Spring 2023, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 431G Materials of Construction

3 cr. Undergraduate/Graduate.

Investigation covering engineering properties of metals, timber, concrete, masonry, plain and reinforced plastics, glues; thermal effects.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 303(P).

Last Taught: Spring 2023, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 455 Construction Planning, Equipment, and Methods

3 cr. Undergraduate/Graduate.

This course introduces students to construction planning, equipment, and selected construction methods. This includes economy, selection, the productivity of common construction equipment, and construction procedures for industrial, heavy civil, and commercial construction projects.

Prerequisites: junior standing or greater and CIV ENG 431(P).

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 456 Foundation Engineering

3 cr. Undergraduate/Graduate.

Site investigation; foundation bearing capacity and settlement; design of spread and combined footings; lateral earth pressures; retaining wall design; slope stability analysis; pile foundations.

Prerequisites: jr st; Civ Eng 335(P).

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 456G Foundation Engineering

3 cr. Undergraduate/Graduate.

Site investigation; foundation bearing capacity and settlement; design of spread and combined footings; lateral earth pressures; retaining wall design; slope stability analysis; pile foundations.

Prerequisites: jr st; Civ Eng 335(P).

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 463 Introduction to Finite Elements

3 cr. Undergraduate/Graduate.

Generation and assembly of finite element matrices in one- and two-dimensional problems. Modeling and practical applications in solid mechanics, heat transfer and fluid flow.

Prerequisites: junior standing; CIV ENG 203(P), CIV ENG 303(P), or ELECENG 234(P); and MECHENG 311(C), MECHENG 320(C), or MECHENG 321(C).

Course Rules: CIV ENG 463 and MECHENG 462 are jointly offered and count as repeats of one another.

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 463G Introduction to Finite Elements

3 cr. Undergraduate/Graduate.

Generation and assembly of finite element matrices in one- and two-dimensional problems. Modeling and practical applications in solid mechanics, heat transfer and fluid flow.

Prerequisites: junior standing; CIV ENG 203(P), CIV ENG 303(P), or ELECENG 234(P); and MECHENG 311(C), MECHENG 320(C), or MECHENG 321(C).

Course Rules: CIV ENG 463 and MECHENG 462 are jointly offered and count as repeats of one another.

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 466 Design of Composite Structures

3 cr. Undergraduate/Graduate.

Hands-on design, analysis, and manufacturing of composite fiber reinforced plastic beams, columns, and plates; failure analysis and damage tolerance design of composite structures; bolted and bonded joints.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 303(P)

Course Rules: CIV ENG 466 and MECHENG 466 are jointly offered and count as repeats of one another.

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 466G Design of Composite Structures

3 cr. Undergraduate/Graduate.

Hands-on design, analysis, and manufacturing of composite fiber reinforced plastic beams, columns, and plates; failure analysis and damage tolerance design of composite structures; bolted and bonded joints.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 303(P)

Course Rules: CIV ENG 466 and MECHENG 466 are jointly offered and count as repeats of one another.

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 469 Introduction to Biomechanical Engineering

3 cr. Undergraduate/Graduate.

Mathematical modeling of human body; dynamics of human motion; neuromuscular control human movement; stress analysis of bones and joints; concurrent mechanical problems in medicine.

Prerequisites: Civ Eng 202(P) & 303 (P); or cons instr.

Course Rules: MechEng 469 & Civ Eng 469 are jointly offered and count as repeats of one another.

Last Taught: Fall 2012.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 469G Introduction to Biomechanical Engineering

3 cr. Undergraduate/Graduate.

Mathematical modeling of human body; dynamics of human motion; neuromuscular control human movement; stress analysis of bones and joints; concurrent mechanical problems in medicine.

Prerequisites: Civ Eng 202(P) & 303 (P); or cons instr.

Course Rules: MechEng 469 & Civ Eng 469 are jointly offered and count as repeats of one another.

Last Taught: Fall 2012.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 480 Software Applications for Civil Engineering

3 cr. Undergraduate.

General knowledge and techniques in using computer software in civil engineering design/ Software packages include Autodesk Civil 3D and Revit Structure.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 303(P).

Last Taught: Spring 2023, Spring 2022, Spring 2021, Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 490 Transportation Engineering

3 cr. Undergraduate/Graduate.

Technological and common elements of all modes of transportation; their effect on performance, demand, and outputs of a transportation system. Development of new transportation systems.

Prerequisites: junior standing or higher, admis to an Engineering major, and CIV ENG 250(P); or graduate standing.

Last Taught: Spring 2023, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 490G Transportation Engineering

3 cr. Undergraduate/Graduate.

Technological and common elements of all modes of transportation; their effect on performance, demand, and outputs of a transportation system. Development of new transportation systems.

Prerequisites: junior standing or higher, admis to an Engineering major, and CIV ENG 250(P); or graduate standing.

Last Taught: Spring 2023, Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 492 Environmental Impact Assessment

3 cr. Undergraduate/Graduate.

Study and evaluation of the impacts of large scale projects on the quality of the environment with emphasis on the assessment of physical and community impacts. Impact statement preparation.

Prerequisites: sr st.

Last Taught: Spring 2018, Spring 2016.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 492G Environmental Impact Assessment

3 cr. Undergraduate/Graduate.

Study and evaluation of the impacts of large scale projects on the quality of the environment with emphasis on the assessment of physical and community impacts. Impact statement preparation.

Prerequisites: sr st.

Last Taught: Spring 2018, Spring 2016.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 494 Principles of Civil Engineering Design

1 cr. Undergraduate.

Project identification and planning for senior design project; proposals, project management and team procedures. Technical communications. Professional engineering responsibilities. Intended for first semester seniors.

Prerequisites: sr st in Civ Eng: Civ Eng 335(C), 372(C), 411(C), 413(C), & 490(C).

Last Taught: Spring 2023, Fall 2022, Spring 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 495 Senior Design

3 cr. Undergraduate.

Team design project involving application of fundamental civil engineering concepts. Discussion of specifications, contracts and implementation. Written and oral presentations. Intended for second semester seniors.

Prerequisites: CIV ENG 411(P), CIV ENG 413(P), and CIV ENG 494(P); and CIV ENG 335(P), CIV ENG 372(P), and CIV ENG 490(P) for Civil Engineering students; or CIV ENG 311(P), CIV ENG 412(P), and CIV ENG 521(P) for Environmental Engineering students; or consent of instructor.

Last Taught: Spring 2023, Fall 2022, Spring 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 496 Fundamentals of Engineering Exam Seminar

0 cr. Undergraduate.

Review of topics on the Fundamentals of Engineering (FE) exam and presents problems from the various sub-areas. The (FE) exam is the first of the two exams engineers for the professional license.

Prerequisites: senior standing; Civil Engineering or Environmental Engineering major.

Course Rules: Fee for 1 cr assessed. Satisfactory/Unsatisfactory only.

Counts as a repeat of CIV ENG 691 with similar topic.

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 499 Ad Hoc:

1-12 cr. Undergraduate.

Course created expressly for offering in a specified enrollment period.

Requires only dept & assoc dean approval. In exceptional circumstances, can be offered in one add'l sem.

Prerequisites: none; add'l prereqs may be assigned to specific topic.

Course Rules: May be retaken w/chg in topic.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 502 Experimental Stress Analysis

3 cr. Undergraduate/Graduate.

Basic stress strain relations; demonstration of experimental methods of determining stresses and strains; use of mechanical strain, electric strain, and strain gages, optical photoelastic equipment, brittle lacquers, models.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 203(P).

Last Taught: Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 502G Experimental Stress Analysis

3 cr. Undergraduate/Graduate.

Basic stress strain relations; demonstration of experimental methods of determining stresses and strains; use of mechanical strain, electric strain, and strain gages, optical photoelastic equipment, brittle lacquers, models.

Prerequisites: junior standing and CIV ENG 203(P) or CIV ENG 203(P).

Last Taught: Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 511 Water Supply and Sewerage

3 cr. Undergraduate/Graduate.

Resources of water supply quality and quantity requirements. Principles of hydraulic design of water supply and sewerage systems; pumping stations. Principles of sewage disposal. Problems of management involving hydrological, engineering, institutional, legal and economic aspects. Design project.

Prerequisites: jr st; Civ Eng 411(P).

Last Taught: Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 511G Water Supply and Sewerage

3 cr. Undergraduate/Graduate.

Resources of water supply quality and quantity requirements. Principles of hydraulic design of water supply and sewerage systems; pumping stations. Principles of sewage disposal. Problems of management involving hydrological, engineering, institutional, legal and economic aspects. Design project.

Prerequisites: jr st; Civ Eng 411(P).

Last Taught: Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 521 Water Quality Assessment

3 cr. Undergraduate/Graduate.

Laboratory techniques for detecting and measuring physical, chemical and biological characteristics of water and wastewater. Water quality requirements. Design of sampling programs.

Prerequisites: sr st; Civ Eng 411(P).

Last Taught: Fall 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 521G Water Quality Assessment

3 cr. Undergraduate/Graduate.

Laboratory techniques for detecting and measuring physical, chemical and biological characteristics of water and wastewater. Water quality requirements. Design of sampling programs.

Prerequisites: sr st; Civ Eng 411(P).

Last Taught: Fall 2022, Fall 2021.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 555 Sustainable Construction Materials and Technologies

3 cr. Undergraduate/Graduate.

Sustainable construction materials and methodologies related to commercial construction, LEED/Green certifications, material selection.

Prerequisites: jr st.

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 555G Sustainable Construction Materials and Technologies

3 cr. Undergraduate/Graduate.

Sustainable construction materials and methodologies related to commercial construction, LEED/Green certifications, material selection.

Prerequisites: jr st.**Last Taught:** Spring 2023.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 560 Intermediate Structural Analysis**

3 cr. Undergraduate/Graduate.

Topics in traditional analysis methods; indeterminate structures, load & load paths, moment distribution, approximate methods, elementary plate analysis.

Prerequisites: jr st; Civ Eng 360(P), 372(P).**Last Taught:** Fall 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 560G Intermediate Structural Analysis**

3 cr. Undergraduate/Graduate.

Topics in traditional analysis methods; indeterminate structures, load & load paths, moment distribution, approximate methods, elementary plate analysis.

Prerequisites: jr st; Civ Eng 360(P), 372(P).**Last Taught:** Fall 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 571 Design of Concrete Structures**

3 cr. Undergraduate/Graduate.

Topics in reinforced concrete design; indeterminate reinforced concrete beams and frames; length effect in columns; torsion; two way floor systems; yield line theory.

Prerequisites: junior standing; CIV ENG 360(C), CIV ENG 401(C), and CIV ENG 372(P).**Last Taught:** Fall 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 571G Design of Concrete Structures**

3 cr. Undergraduate/Graduate.

Topics in reinforced concrete design; indeterminate reinforced concrete beams and frames; length effect in columns; torsion; two way floor systems; yield line theory.

Prerequisites: junior standing; CIV ENG 360(C), CIV ENG 401(C), and CIV ENG 372(P).**Last Taught:** Fall 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 572 Design of Steel Structures**

3 cr. Undergraduate/Graduate.

Topics in design of steel structures; tension, compression, and beam members; combined axial and bending; connections; frames; serviceability.

Prerequisites: junior standing; CIV ENG 360(C), CIV ENG 401(C), and CIV ENG 372(P).**Last Taught:** Spring 2023.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 572G Design of Steel Structures**

3 cr. Undergraduate/Graduate.

Topics in design of steel structures; tension, compression, and beam members; combined axial and bending; connections; frames; serviceability.

Prerequisites: junior standing; CIV ENG 360(C), CIV ENG 401(C), and CIV ENG 372(P).**Last Taught:** Spring 2023.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 573 Design of Masonry and Wood Structures**

3 cr. Undergraduate/Graduate.

Properties of masonry materials, loads, design codes, reinforced & unreinforced members, composite & cavity walls, shear walls. Properties of wood, design of wood structural members by LRFD including beams, columns and connections.

Prerequisites: junior standing; CIV ENG 360(C) and CIV ENG 372(P).**Last Taught:** Fall 2018, Fall 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 573G Design of Masonry and Wood Structures**

3 cr. Undergraduate/Graduate.

Properties of masonry materials, loads, design codes, reinforced & unreinforced members, composite & cavity walls, shear walls. Properties of wood, design of wood structural members by LRFD including beams, columns and connections.

Prerequisites: junior standing; CIV ENG 360(C) and CIV ENG 372(P).**Last Taught:** Fall 2018, Fall 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 574 Design of Prestressed Concrete Structures**

3 cr. Undergraduate/Graduate.

Design of prestressed concrete structures; methods of prestressing; loss of prestress; design for flexure, shear, torsion; camber and deflections; continuity; connections; fire rating; circular prestressing.

Prerequisites: jr st; Civ Eng 360(C), 372(P).**Last Taught:** Spring 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 574G Design of Prestressed Concrete Structures**

3 cr. Undergraduate/Graduate.

Design of prestressed concrete structures; methods of prestressing; loss of prestress; design for flexure, shear, torsion; camber and deflections; continuity; connections; fire rating; circular prestressing.

Prerequisites: jr st; Civ Eng 360(C), 372(P).**Last Taught:** Spring 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 579 Earthquake Engineering**

3 cr. Undergraduate/Graduate.

Earthquake mechanics and effects, structural dynamics, seismic hazard analysis, design guidelines, design of steel and concrete buildings for earthquake loads.

Prerequisites: sr st; Civ Eng 571(P) or 572(P); or cons instr; or grad st.**Course Rules:** Counts as repeat of Civ Eng 891 w/same subtitle.**Last Taught:** Spring 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

CIV ENG 579G Earthquake Engineering

3 cr. Undergraduate/Graduate.

Earthquake mechanics and effects, structural dynamics, seismic hazard analysis, design guidelines, design of steel and concrete buildings for earthquake loads.

Prerequisites: sr st; Civ Eng 571(P) or 572(P); or cons instr; or grad st.

Course Rules: Counts as repeat of Civ Eng 891 w/same subtitle.

Last Taught: Spring 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 580 Engineering Analysis in Applied Mechanics

3 cr. Undergraduate/Graduate.

Engineering analysis of initial and boundary value problems in applied mechanics. Application of various methods to investigate a variety of engineering situations.

Prerequisites: jr st; ElecEng 234(P).

Course Rules: Not open to students with cr in MechEng 580, which is identical to Civ Eng 580.

Last Taught: Fall 1998, Fall 1996.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 580G Engineering Analysis in Applied Mechanics

3 cr. Undergraduate/Graduate.

Engineering analysis of initial and boundary value problems in applied mechanics. Application of various methods to investigate a variety of engineering situations.

Prerequisites: jr st; ElecEng 234(P).

Course Rules: Not open to students with cr in MechEng 580, which is identical to Civ Eng 580.

Last Taught: Fall 1998, Fall 1996.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 590 Urban Transportation Planning

3 cr. Undergraduate/Graduate.

Techniques used to plan urban transportation systems; data collection, trip generation, trip distribution, factors underlying the choice of mode, traffic assignment, modeling and evaluation techniques.

Prerequisites: sr st.

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 590G Urban Transportation Planning

3 cr. Undergraduate/Graduate.

Techniques used to plan urban transportation systems; data collection, trip generation, trip distribution, factors underlying the choice of mode, traffic assignment, modeling and evaluation techniques.

Prerequisites: sr st.

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 592 Traffic Control

3 cr. Undergraduate/Graduate.

Control of transportation systems with emphasis on traffic engineering principles. Data collection, capacity analysis, traffic improvements, signalization, signs and markings, channelization, intersection, speeds and safety considerations.

Prerequisites: sr st.

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 592G Traffic Control

3 cr. Undergraduate/Graduate.

Control of transportation systems with emphasis on traffic engineering principles. Data collection, capacity analysis, traffic improvements, signalization, signs and markings, channelization, intersection, speeds and safety considerations.

Prerequisites: sr st.

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 594 Physical Planning and Municipal Engineering

3 cr. Undergraduate/Graduate.

Organization and structure of local government, zoning and planning, subdivision layout, street design, transit service, urban drainage, storm and sanitary sewer, water supply and other public works activities.

Prerequisites: sr st.

Last Taught: Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 594G Physical Planning and Municipal Engineering

3 cr. Undergraduate/Graduate.

Organization and structure of local government, zoning and planning, subdivision layout, street design, transit service, urban drainage, storm and sanitary sewer, water supply and other public works activities.

Prerequisites: sr st.

Last Taught: Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 596 Transportation Facilities Design

3 cr. Undergraduate/Graduate.

Physical design of transportation facilities including geometric design and terminals for highway, rail, air and water transportation. Student project work will be required.

Prerequisites: jr st; Civ Eng 490(P).

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 596G Transportation Facilities Design

3 cr. Undergraduate/Graduate.

Physical design of transportation facilities including geometric design and terminals for highway, rail, air and water transportation. Student project work will be required.

Prerequisites: jr st; Civ Eng 490(P).

Last Taught: Spring 2023.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 598 Pavement Analysis and Design

3 cr. Undergraduate/Graduate.

Pavement types, design factors, traffic loading and volume, materials characterization, drainage design, flexible and rigid pavements design, stresses and deflections, overlay design, pavement rehabilitation.

Prerequisites: jr st & Civ Eng 335(P); or grad st.

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 598G Pavement Analysis and Design

3 cr. Undergraduate/Graduate.

Pavement types, design factors, traffic loading and volume, materials characterization, drainage design, flexible and rigid pavements design, stresses and deflections, overlay design, pavement rehabilitation.

Prerequisites: jr st & Civ Eng 335(P); or grad st.

Last Taught: Fall 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 610 Introduction to Water and Sewage Treatment

3 cr. Undergraduate/Graduate.

Characteristics of water and sewage. Principles of physical, chemical and biological processes for water and sewage treatment. Design project.

Prerequisites: sr st; Civ Eng 413(P).**Last Taught:** Spring 2023, Spring 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 610G Introduction to Water and Sewage Treatment**

3 cr. Undergraduate/Graduate.

Characteristics of water and sewage. Principles of physical, chemical and biological processes for water and sewage treatment. Design project.

Prerequisites: sr st; Civ Eng 413(P).**Last Taught:** Spring 2023, Spring 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 614 Hazardous Waste Management**

3 cr. Undergraduate/Graduate.

Hazardous waste; regulatory process; fate and transport of contaminants; treatment and disposal methods; site remediation; quantitative risk assessment; design project.

Prerequisites: jr st; Civ Eng 413(P).**Last Taught:** Fall 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 614G Hazardous Waste Management**

3 cr. Undergraduate/Graduate.

Hazardous waste; regulatory process; fate and transport of contaminants; treatment and disposal methods; site remediation; quantitative risk assessment; design project.

Prerequisites: jr st; Civ Eng 413(P).**Last Taught:** Fall 2021.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 616 Computational Hydraulics and Environmental Flows**

3 cr. Undergraduate/Graduate.

Numerical analysis applied to fluid flows and transport phenomena. Applications in environmental flows, water quality models, transport of pollutant, long wave propagation, etc.

Prerequisites: jr sr, Civ Eng 411(P).**Course Rules:** Counts as repeat of Civ Eng 691 w/same topic.**Last Taught:** Spring 2018, Fall 2015.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 616G Computational Hydraulics and Environmental Flows**

3 cr. Undergraduate/Graduate.

Numerical analysis applied to fluid flows and transport phenomena. Applications in environmental flows, water quality models, transport of pollutant, long wave propagation, etc.

Prerequisites: jr sr, Civ Eng 411(P).**Course Rules:** Counts as repeat of Civ Eng 691 w/same topic.**Last Taught:** Spring 2018, Fall 2015.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 691 Topics in Civil Engineering:**

1-3 cr. Undergraduate/Graduate.

Topics vary. Study of topics in theory and practice of civil engineering. Specific topics and any additional prerequisites will be announced in Schedule of Classes each time the course is offered.

Prerequisites: jr st.**Course Rules:** May be retaken to a max of 6 cr.**Last Taught:** Spring 2023, Fall 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 691G Topics in Civil Engineering:**

1-3 cr. Undergraduate/Graduate.

Topics vary. Study of topics in theory and practice of civil engineering. Specific topics and any additional prerequisites will be announced in Schedule of Classes each time the course is offered.

Prerequisites: jr st.**Course Rules:** May be retaken to a max of 6 cr.**Last Taught:** Spring 2023, Fall 2022.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 699 Independent Study**

1-3 cr. Undergraduate/Graduate.

Prerequisites: jr st; cons instr.**Course Rules:** May be retaken to max of 6 cr toward the undergraduate degree.**Last Taught:** Spring 2023, Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 699G Independent Study**

1-3 cr. Undergraduate/Graduate.

Prerequisites: jr st; cons instr.**Course Rules:** May be retaken to max of 6 cr toward the undergraduate degree.**Last Taught:** Spring 2023, Fall 2020.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 700 CEAS Graduate Seminar**

1-3 cr. Graduate.

Seminar in professional ethics, oral and written communication, contemporary social issues, career development, time management, and laboratory safety.

Prerequisites: grad st**Course Rules:** Civ Eng 700, CompSci 700, ElecEng 700, Ind Eng 700, MatlEng 700 & MechEng 700 are jointly offered and count as repeats of one another**Last Taught:** Fall 2020, Spring 2020, Fall 2019, Spring 2019.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 701 Advanced Strength of Materials**

3 cr. Graduate.

Beams of elastic foundations; advanced energy methods; thick walled cylinders; torsion of non-circular sections; approximate methods for stresses in plates, stress concentrations, contact stresses, interaction curves, elastic and inelastic buckling, introduction to elasticity. Some laboratory, matrix, and tensor applications.

Prerequisites: grad st; Civ eng 303(P) & 401(C) or cons instr.**Last Taught:** Spring 2021, Spring 2018, Fall 2016, Fall 2014.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 702 Elastic Stability**

3 cr. Graduate.

Sending of bars under simultaneous action of axial and lateral loads; buckling of compressed bars, rings, and tubes; lateral buckling of beams; torsion of i-beams; buckling of thin plates.

Prerequisites: grad st. Civ Eng 401(P) ElecEng 234(P).**Last Taught:** Fall 2006, Spring 1988, Spring 1986, Spring 1984.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

CIV ENG 708 Fate and Transport of Micro and Nano Particles in the Environment

3 cr. Graduate.

Fundamentals governing fate and transport of micro and nano particles, e.g. inorganic particles, bacteria, viruses and protozoan in aquatic environment and porous media including soil, sand and filtration system.

Prerequisites: grad st; Civ Eng 411(P) or 413(P) or cons instr**Last Taught:** Spring 2021, Spring 2019, Spring 2015.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 710 Industrial Waste Treatment**

3 cr. Graduate.

Principles and theories of treating industrial wastes. Characterization of industries and their wastes. Treatment processes including tertiary and advanced wastewater separation techniques. Hazardous wastes management. Administration of industrial waste control. Programs.

Prerequisites: grad st; Civ Eng 521(P) & 610(P) or cons instr.**Last Taught:** Spring 2010, Fall 2004, Fall 1995, Fall 1986.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 712 Ground Water Flow and Seepage**

3 cr. Graduate.

Linear and non-linear seepage laws; theoretical models; electro-osmosis in soils; analytical solution to steady state problems; numerical solutions to transient problems; analytical solutions to transient problems; experimental methods and models; design of dewatering systems.

Prerequisites: grad st; Civ Eng 411.**Last Taught:** Fall 2017, Spring 2015, Spring 2011, Spring 2009.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 714 Unit Operations in Environmental Engineering**

3 cr. Graduate.

Unit operations of physicochemical and biological aspects employed in water and wastewater treatments. In-situ treatment of contaminated groundwater. Theory and development of design criteria.

Prerequisites: grad st; Civ Eng 610(P); cons instr.**Last Taught:** Spring 2009, Fall 2005, Fall 2003, Spring 2001.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 716 Sediment Transport**

3 cr. Graduate.

Physical properties of sediment; incipient motion, bed forms, suspended load, bed load, total load, natural river processes.

Prerequisites: grad st; Civ Eng 411(P).**Last Taught:** Fall 2019, Spring 2018, Spring 2016, Spring 2012.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 717 Open Channel Flow**

3 cr. Graduate.

Basic equations of continuity, mechanical energy and momentum; uniform, gradually varied, and spatially varied flows; hydraulic structures; governing equations of unsteady flow and numerical solutions.

Prerequisites: grad st; Civ Eng 411(P) or equiv.**Last Taught:** Fall 2020, Fall 2016, Spring 2010, Fall 2007.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 718 Biological Processes for Water and Wastewater Treatment**

3 cr. Graduate.

Biological and engineering principles related to trickling filters, activated sludge plants, lagoons, rotating biological contactors, aerobic and anaerobic digesters, nutrient removal and bioremediation.

Prerequisites: grad st; Civ Eng 413(R) or 610(R)**Last Taught:** Spring 2022, Spring 2020, Spring 2017, Fall 2011.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 719 Pollutant Dispersion Process**

3 cr. Graduate.

Classical diffusion theories; longitudinal dispersion, vertical and transverse mixing in free-surface turbulent flow, application to natural channels.

Prerequisites: grad st; Civ Eng 411(P).**Last Taught:** Fall 2021, Fall 2018, Spring 2017, Fall 2014.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 721 Advanced Water Analysis**

3 cr. Graduate.

Advanced analytical methods for evaluating sources, distribution patterns, concentrations, and biological effects of pollutants in natural waters. Tracers, nuclear techniques, organics, metals, bioassays. Lecture and laboratory.

Prerequisites: grad st; Civ Eng 521(P) or cons instr.**Last Taught:** Fall 2008, Fall 2002, Fall 1998, Spring 1995.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 725 Finite Element Methods in Engineering**

3 cr. Graduate.

Formulation and assembly of finite elements. Tools in numerical analysis, interpolation, integration. Trusses, beams, plates, two-dimensional problems. Generalized field problems: heat transfer, fluid flow. Emphasis on practical application.

Prerequisites: grad st.**Last Taught:** Spring 2023, Spring 2020, Fall 2018, Fall 2017.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 726 Mechanical Vibrations**

3 cr. Graduate.

Free and forced vibrations of multiple degree of freedom systems using modern matrix methods.

Prerequisites: grad st; MechEng 475 or equiv.**Course Rules:** Not open to students who have cr in MechEng 726, which is identical to Civ Eng 726.**Last Taught:** Spring 2000, Spring 1999, Spring 1996, Spring 1995.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 731 Properties of Concrete**

3 cr. Graduate.

Advanced course in portland cement concrete; proportioning methods, theories of hardening and setting, properties, prefabricated concrete, precast concrete, construction methods, light-weight aggregates and concrete, causes of disintegration, protective treatments, specifications, cost estimates.

Prerequisites: grad st; cons instr.**Last Taught:** Fall 2022, Fall 2019, Fall 2017, Fall 2015.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

CIV ENG 732 Fatigue in Engineering Materials

3 cr. Graduate.

Influence of repeated stress in engineering design, fatigue testing machines, and procedures, factors influencing fatigue properties, theories of fatigue failure.

Prerequisites: Civ Eng 401(P) or cons instr.**Last Taught:** Spring 2015, Fall 2012, Fall 2010, Fall 2008.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 735 Advanced Soil Mechanics**

3 cr. Graduate.

Advanced treatment and application of theories and principles of soil mechanics; permeability and seepage; elastic theories of stress distribution; consolidation theories; shearing strength and failure criteria; plastic equilibrium.

Prerequisites: grad st; Civ Eng 335(P).**Last Taught:** Spring 2020, Fall 2016, Fall 2014, Fall 2011.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 756 Advanced Foundation Engineering**

3 cr. Graduate.

Critical study of actual engineering projects; introduction to existing design procedures and the basis for foundation recommendations.

Prerequisites: grad st; Civ Eng 456(P).**Last Taught:** Spring 2021, Fall 2019, Spring 2018, Spring 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 761 Advanced Structural Analysis**

3 cr. Graduate.

Analysis of structures utilizing matrix stiffness techniques; material and geometric nonlinearities, volume changes, extreme loadings.

Prerequisites: grad st; Civ Eng 360(P); Civ Eng 463(P).**Last Taught:** Spring 2019, Spring 1997, Fall 1995, Spring 1994.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 771 Advanced Concrete Design**

3 cr. Graduate.

Advanced topics in design of concrete structures; structural systems & bracing, two-way slab, walls, construction phase assessment, joints & ductility, design for fire, seismic design.

Prerequisites: grad st; Civ Eng 571(P).**Last Taught:** Spring 2023, Spring 2019, Spring 2017, Spring 2015.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 772 Advanced Steel Design**

3 cr. Graduate.

Advanced topics in design of steel structures; plate girders, moment resisting frames, stability & bracing, connections, torsion, seismic design, fatigue & fracture. Prereq: grad st; Civ Eng 572(P).

Last Taught: Fall 2021, Fall 2019, Fall 2017, Fall 2015.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 773 Advanced Dynamics**

3 cr. Graduate.

General theory of dynamic behavior from the viewpoint of Lagrangian and Hamiltonian mechanics. Application of energy principles to dynamical analysis of mechanical systems.

Prerequisites: grad st; MechEng(580) or Civ Eng 580(P); or cons instr.**Course Rules:** Not open to students who have cr in MechEng 773, which is identical.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 774 Shock and Vibration Analysis**

3 cr. Graduate.

Dynamic response of mechanical systems to complex shock and vibration conditions; application of the eigenvalue and transform methods of analysis to the solution of engineering problems.

Prerequisites: grad st; MechEng 475(P) & 580(P).**Course Rules:** Not open to students who have cr in MechEng 774, which is identical to Civ Eng 774.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 775 Analysis and Design of Bridges**

3 cr. Graduate.

Bridge types; loads and AASHTO specifications; analysis and design of superstructures; substructure design; computer applications.

Prerequisites: grad st; Civ Eng 463(P); 571(P); 572(P) or cons instr.**Last Taught:** Spring 2021, Spring 2018, Spring 2016, Spring 2014.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 777 Design of Multistory Buildings**

3 cr. Graduate.

Topics in design of multistory building systems; planning & environmental criteria, loading, analysis, design, construction, lateral systems, foundation, cladding, building service & management.

Prerequisites: grad st; Civ Eng 463(P), 571(P), 572(P).**Last Taught:** Fall 2022, Fall 2020, Fall 2018, Fall 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 785 Dynamics of Structures**

3 cr. Graduate.

Analysis and design of structures subjected to dynamic loads; effects of damping and inelastic action; multi-degree of freedom and continuous systems; numerical techniques; seismic design.

Prerequisites: grad st; Civ Eng 463(P) or cons instr.**Last Taught:** Spring 2017, Spring 2013, Spring 2011, Spring 2009.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 790 Transportation Systems Design**

3 cr. Graduate.

Principles of systems analysis as they relate to the planning, design and operation of transportation systems. Model building, evaluation, systems management.

Prerequisites: grad st; Civ Eng 590(P).**Last Taught:** Spring 2019, Fall 2013, Fall 2011, Spring 2006.**Current Offerings:** <https://catalog.uwm.edu/course-search/>**CIV ENG 792 Methods of Transportation Analysis**

3 cr. Graduate.

Mathematical tools useful in analysis of transportation systems. Process of modeling and simulation, matrix techniques, network analysis, statistical analysis, etc. As related to transportation. Use of standard packaged computer programs. Class project may be utilized to develop these skills.

Prerequisites: grad st; CompSci 151(P) or equiv. Civ Eng 590(P).**Last Taught:** Fall 2019, Fall 2018, Fall 2017, Fall 2016.**Current Offerings:** <https://catalog.uwm.edu/course-search/>

CIV ENG 794 Traffic Planning and Operations

3 cr. Graduate.

Planning and design of traffic systems, delay and capacity of signalized intersections, freeway controls, traffic system management and optimization, queues, traffic assignment and simulation.

Prerequisites: grad st; Civ Eng 592(C).

Last Taught: Spring 2021, Spring 2018, Spring 2017, Spring 2016.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 801 Applied Elasticity

3 cr. Graduate.

Equations of elasticity in two and three dimensions; two dimensional problems in rectangular polar and curvilinear coordinates; torsion of noncircular shafts; bending of prismatic bars.

Prerequisites: grad st; Civ Eng 401(P) or cons instr.

Last Taught: Fall 2001, Fall 1999, Fall 1997, Fall 1995.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 804 Theory of Plasticity

3 cr. Graduate.

Yield conditions, stress strain relations; plastic potential, hardening theories, torsion, bending, thick walled spherical and cylindrical shells under internal pressure; plane strain of perfectly plastic material.

Prerequisites: Civ Eng 805(P).

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 880 Bioengineering Seminar

1 cr. Graduate.

Presentations by bioengineering affiliated faculty, invited speakers, and graduate students.

Prerequisites: grad st

Course Rules: MechEng 880, ElecEng 880, CompSci 880, MatlEng 880, IndEng 880 & Civ Eng 880 are jointly offered and count as repeats of one another. May be repeated to 3 cr. max.

Last Taught: Spring 2018, Fall 2015, Spring 2015, Fall 2014.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 888 Candidate for Degree

0 cr. Graduate.

Available for graduate students who must meet minimum credit load requirements.

Prerequisites: graduate standing.

Course Rules: Fee for 1 cr assessed; unit does not count towards credit load for Fin Aid. Repeatable. Satisfactory/Unsatisfactory only.

Last Taught: Spring 2022, Fall 2019, Spring 2019, Fall 2016.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 891 Advanced Topics in Civil Engineering:

1-3 cr. Graduate.

Topics vary. Study of advanced topics of theory and practice of structural engineering. Specific topic and any additional prerequisites will be announced in the schedule of classes each time the course is offered.

Prerequisites: grad st.

Course Rules: Retakeable with change in topic to max of 9 cr.

Last Taught: Spring 2023, Spring 2022, Fall 2020, Spring 2020.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 940 Topics in Transportation:

1-3 cr. Graduate.

Topics vary. Topics and problems of current interest in transportation; readings and review of

Prerequisites: grad st.

Course Rules: recent literature and development of a critical analysis or paper. Subject matter may be student initiated. Specific topic and any additional prerequisites will be announced in the schedule of classes each time the course is offered. Retakeable with change in topic to max of 9 cr.

Last Taught: Fall 2019, Spring 2012, Spring 2005, Spring 2000.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 990 Masters Thesis

1-9 cr. Graduate.

Prerequisites: grad st; cons instr.

Last Taught: Spring 2023, Fall 2022, Summer 2022, Spring 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 998 Doctoral Thesis

1-12 cr. Graduate.

Prerequisites: grad st; cons instr & grad prog Comm.

Last Taught: Spring 2023, Fall 2022, Summer 2022, Spring 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>

CIV ENG 999 Advanced Independent Study

1-3 cr. Graduate.

Prerequisites: grad st; cons instr & grad prog committee.

Last Taught: Spring 2023, Fall 2022, Summer 2022, Spring 2022.

Current Offerings: <https://catalog.uwm.edu/course-search/>