

Civil Engineering (CIVE)

CIVE 502 Wind Engineering 3 Credits (3,0)

Effects of wind loading on civil infrastructure; characterization of wind fields; pressure development on building envelopes; dynamic response of structures; design of wind force resisting systems; demonstration labs using the wind tunnel.

Course Offered at: Daytona Beach

CIVE 504 Bridge Engineering 3 Credits (3,0)

Design and load capacity evaluation of highway bridges; LRFD philosophy; bridge loads; influence lines; grillage analysis; reinforced and prestressed concrete bridges; composite steel bridges; bridge substructures; load rating; health monitoring concepts.

Course Offered at: Daytona Beach

CIVE 506 Transportation Systems Engineering 3 Credits (3,0)

Overview of transportation systems; planning; design; maintenance; operational issues; human factors; transportation modes; traffic flow theory; capacity analysis; traffic safety; transportation planning.

Course Offered at: Daytona Beach

CIVE 508 Environmental Engineering 3 Credits (3,0)

Physicochemical processes in engineered and natural systems; water quality management; drinking water treatment; waste treatment; air pollution; solid and hazardous waste management; mass and energy balance; mass transport; reaction kinetics.

Course Offered at: Daytona Beach

CIVE 510 Design and Analysis of Airfield and Highway Pavement 3 Credits (3,0)

Structural design of highway and airfield pavements; design of rigid and flexible pavements; construction and maintenance procedures; mechanistic pavement design concepts.

Course Offered at: Daytona Beach

CIVE 512 Intelligent Transportation Systems 3 Credits (3,0)

Concepts, architectures, and infrastructure of Intelligent Transportation Systems (ITS); application of ITS in transportation operation and management; automation of transportation systems; safety, efficiency, and effectiveness of the network.

Course Offered at: Daytona Beach

CIVE 514 Advanced Concrete Analysis and Design 3 Credits (3,0)

Advanced topics in reinforced concrete behavior and design; slender columns; two-way slab systems; strut and tie modeling; behavior of reinforced concrete structures; ductility and detailing; seismic load detailing; ACI specifications.

Course Offered at: Daytona Beach

CIVE 516 Advanced Steel Analysis and Design 3 Credits (3,0)

Behavior and design of advanced steel structure components; flexural members with slender webs; composite beams and columns; beam-to-column connections; application of AISC construction manual and LRFD in design.

Course Offered at: Daytona Beach

CIVE 518 Structural Reliability 3 Credits (3,0)

Concepts and applications of structural reliability; probability theory; random processes; reliability analysis; component and system reliability; Bayesian reliability analysis methods; probabilistic design codes.

Course Offered at: Daytona Beach

CIVE 520 Railroad Engineering and High Speed Rail 3 Credits (3,0)

Basic understanding of railroad and High Speed Rail (HSR) design, construction, operation, and maintenance; government policies supporting rail and HSR development; design fundamentals and terminology in railroad and HSR.

Course Offered at: Daytona Beach

CIVE 522 Advanced Geometric Design of Highways and Streets 3 Credits (3,0)

Highway design process; cross section elements; vertical and horizontal alignment; super elevation; intersection design; latest policy on geometric design; tools and concepts for civil engineering highway design.

Course Offered at: Daytona Beach

CIVE 523 Transportation Planning 3 Credits (3,0)

Methodologies of urban and regional transportation planning; transportation in society; urban passenger transport modes; planning process; travel demand forecasting models; transportation network analysis.

Course Offered at: Daytona Beach

CIVE 524 Access Management 3 Credits (3,0)

Concepts, issues, and technologies in controlling and managing accesses; driveways; street connections; median openings; auxiliary lanes; interchanges; signalized and unsignalized intersections.

Course Offered at: Daytona Beach

CIVE 526 Advanced Foundation Engineering 3 Credits (3,0)

Advanced topics in foundation engineering; design of piles, pile groups, anchors, soil nails, mat foundations, braced excavation, and ground improvement.

Course Offered at: Daytona Beach

CIVE 528 Structural Health Monitoring in Civil Infrastructure 3 Credits (3,0)

Structural health monitoring and nondestructive evaluation techniques; passive and active damage analysis; signal processing techniques; sustainable maintenance schemes; structural integrity assessment; MATLAB programming for data analysis.

Course Offered at: Daytona Beach

CIVE 530 Composites in Civil Infrastructure 3 Credits (3,0)

Engineering mechanics and structural applications of composite materials; fiber-reinforced composites; viscoelastic response; fracture, fatigue, impact behavior; durability; structural composite materials characterization; strength and stiffness criteria; structural strengthening.

Course Offered at: Daytona Beach

CIVE 534 Transportation Simulation and Modeling 3 Credits (3,0)

Theories and applications of transportation models; simulation techniques; traffic simulation models; demand modeling methods; analytical techniques; effect of driving behavior; traffic congestion; traffic flow models; simulation methods (microscopic, mesoscopic, macroscopic).

Course Offered at: Daytona Beach

CIVE 536 Advanced Flood Modeling 3 Credits (3,0)

Numerical computer models for simulating hydrologic and coastal flooding; geospatial framework; hurricane storm surge flooding; sea level rise; numerical flow computations.

Course Offered at: Daytona Beach

CIVE 538 Air Pollution Control 3 Credits (3,0)

Application of chemistry, thermodynamics, and fluid mechanics in air pollution control; estimation of potential pollutants; chemical characterization of gas streams; design and costing of control technologies; systems for reducing particulate matter, VOC, nitrogen oxide, and sulfur dioxide emissions.

Course Offered at: Daytona Beach

CIVE 540 Drainage Engineering 3 Credits (3,0)

Engineering calculations for drainage, treatment, and attenuation of stormwater runoff from civil infrastructure; permitting issues; engineering report preparation.

Prerequisites: Students from outside Civil Engineering require instructor permission

Course Offered at: Daytona Beach

CIVE 544 Environmental Sustainability and Resilience 3 Credits (3,0)

Overview of sustainability and resilience concepts; regulatory strategies for risk assessment and management; designing and retrofitting infrastructure for sustainability and resilience; challenges in implementing sustainable and resilient systems.

Course Offered at: Daytona Beach

CIVE 546 Designing with Geosynthetics 3 Credits (3,0)

Behavior and design of geosynthetic materials; design-by-function approach; material selection for specific applications.

Course Offered at: Daytona Beach

CIVE 548 Numerical Methods in Geotechnical Engineering 3 Credits (3,0)

Modeling and computing in geotechnical engineering; finite difference and finite element methods; applications in seepage and deformation analysis.

Course Offered at: Daytona Beach

CIVE 550 Unsaturated Soil Mechanics 3 Credits (3,0)

State of stress, shear strength, and hydraulic conductivity in unsaturated soils; soil water characteristic curve estimation and measurement methods.

Course Offered at: Daytona Beach

CIVE 552 Advanced Soil Mechanics 3 Credits (3,0)

Advanced soil constitutive models; relevance to geotechnical engineering and design.

Course Offered at: Daytona Beach

CIVE 554 Soil Dynamics and Earthquake Engineering 3 Credits (3,0)

Basic seismology; wave propagation in soils; soil dynamics; dynamic soil-structure interaction; application to geotechnical earthquake design.

Course Offered at: Daytona Beach

CIVE 556 Risk and Reliability in Geotechnical Engineering 3 Credits (3,0)

Probability theory in civil engineering; risk and reliability assessment with emphasis on geotechnical applications.

Course Offered at: Daytona Beach

CIVE 560 Applied Data Science and Numerical Methods in Civil Engineering 3 Credits (3,0)

Application of data science and numerical methods to civil engineering analysis and design; data acquisition, cleaning, analysis, and visualization; numerical modeling and simulation of civil engineering systems; optimization techniques; machine learning applications in civil engineering; data ethics and professional responsibility.

Course Offered at: Daytona Beach

CIVE 599 Special Topics in Civil Engineering 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in civil engineering.

Course Offered at: Daytona Beach, Prescott

CIVE 602 Transportation Safety 3 Credits (3,0)

Fundamental concepts of traffic safety; systematic approaches to quantitative safety analysis; human factors; crash characteristics; safety management; predictive methods for crash frequency and severity; safety performance functions; crash modification factors.

Course Offered at: Daytona Beach

CIVE 604 Advanced Signal Control and Design 3 Credits (3,0)

Traffic control theories; signal timing concepts; design, operation, and management of traffic signals; unsignalized intersection control; MUTCD review; advanced signal timing design; interchange control; adaptive signal system control.

Course Offered at: Daytona Beach

CIVE 699 Special Topics in Civil Engineering 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in civil engineering.

Course Offered at: Daytona Beach, Prescott

CIVE 700 Graduate Thesis 1-9 Credit (1-9,0)

Master-level research project in Civil Engineering; supervised by advisor and thesis committee; final report submission; oral defense required for thesis credits.

Course Offered at: Daytona Beach

CIVE 799 Special Topics in Civil Engineering 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in civil engineering.

Course Offered at: Daytona Beach, Prescott