CE Course List

AM 196A-Z. Experimental Topics Courses in Applied Mechanics (1-4)

AM 296A-Z. Experimental Topics Courses in Applied Mechanics (1-4)

AM 316. Engineering Dynamics (3)

Prerequisites: CE 240; MATH 280. Corequisite: AM 317.Vector calculus and kinematics, force, equations of motion, energy and momentum principles applied to the dynamic behavior of rigid and deformable solids. Design considerations. (Design units: 0.5)

AM 317. Mechanics Lab (1)

Prerequisites: CE 340. Corequisite: AM 316. Experimental analysis of the responses of various configurations of deformable solids to static and dynamic forces. Design of mechanics experiments. One three-hour lab per week. (Design units: 0.5)

AM 396A-Z. Experimental Topics Courses in Applied Mechanics (1-4)

AM 400A. Applied Mechanics Design Clinic I (1-3)

Prerequisite: Senior or graduate standing in Applied Mechanics or related discipline with senior or graduate program on file, acceptable academic record, and written approvals from faculty sponsor and Department Chair. Design units vary.

AM 400B. Applied Mechanics Design Clinic II (1-3)

Prerequisite: AM 400A. Continuation of AM 400A. Design units vary.

AM 410. Vibration Analysis (3)

Prerequisite: AM 316; CE 340. Study of the vibratory motion of linear single degree of freedom systems. Equation of motion, free vibration response and transient and steady state excitation. Introduction to multi-degree-of-freedom systems. (Design units: 0)

AM 496A-Z. Experimental Topics Courses in Applied Mechanics (1-4)

AM 499A-C. Independent Study (1-3)

Prerequisites: Senior or graduate standing in Applied Mechanics with senior or graduate program on file, and written approvals of faculty sponsor and Department Chair. Admission is based on evidence of ability to pursue Independent Study in depth and approval of a proposal submitted prior to registration in the course. Design units vary.

Graduate Level Courses

Note that 300-level courses in Applied Mechanics do not carry credit for a Master's degree in Engineering.

AM 509. Methods of Applied Mechanics (3)

Prerequisites: AM 316; MATH 280. Survey of methods used in Applied Mechanics. Emphasis on the formulation and solution of problems by the application of appropriate mathematical tools. Application of differential equations, matrix techniques, Fourier series, Laplace Transforms and energy methods to vibration, stability, elasticity and structures problems. (Design units: 0)

AM 610. Advanced Mechanical Vibrations (3)

Prerequisite: AM 410; CE 436. Vibration of multi-degree of freedom lumped parameter systems; formulation of equations of motion using the Newton's 2nd law and analytical mechanics, determination of natural modes, response by the normal mode method. Emphasis on matrix formulation and computer applications. Exact solutions for continuous systems.

AM 618. Theory of Elastic Stability (3)

Prerequisite: Instructor consent. Treatment of stability problems and the stability criteria. Elastic and inelastic buckling of bars, lateral buckling of beams, the stability of frameworks, buckling of rings, curved bars, arches, buckling of thin plates and thin shells, general theory of cylindrical shells, shells having the form of a surface of revolution.

AM 619. Theory of Plates and Shells (3)

Prerequisite: Instructor consent. Cylindrical bending of uniformly loaded plates, symmetrical bending of circular plates, rectangular plates with various edge conditions, plates of various shapes, membrane theory of shells, general theory of cylindrical shells, shells having the form of a surface of revolution.

AM 621. Aerostructure II (3)

Prerequisite: AM 421. Analysis of semimonocoque aircraft structures. Stress, deflection and stability are considered for linear and nonlinear material behavior. Finite element methods are applied to continuous systems. Discussion of structural vibration loads and flutter.

AM 637. Optimum Structural Design (3)

Synthesis of structural components and systems employing parametric computer solutions. Applications to weight, cost, and trade-off criteria, including practical constraints on geometry. Least weight design of cable, column and beam elements and

system of elements. Introduction to computer automated design and design space concepts. Examples from aerospace and civil engineering fields.

AM 640. Energy and Approximate Methods in Elastomechanics (3)

Prerequisite: Instructor consent. Theory and application of energy methods in continuous systems using the calculus of variations approach. Derivation of the total potential and complementary energy expressions via virtual work principles. The study of stability configurations of mechanical systems. Development and application of Castigliano's and Engesser's theorems. Approximate methods using Rayleigh-Ritz, Galerkin, and Kantorovich formulations. Hamilton's principle and its applications.

AM 644. Advanced Finite Element Methods (3)

Prerequisites: AM 642, Instructor consent. Includes a brief review of the fundamentals of the finite element method; potential energy basis of finite elements; and isoparametric formulations. Applications of general civil and aerospace structures are considered, especially plates, general shells, vibration and stability analyses, and nonlinear problems in structural mechanics.

AM 645. Nonlinear Mechanics (3)

Prerequisite: AM 610. Introduction to nonlinear problems. Analytic approaches to some closed form solutions of nonlinear differential equations. Vibrations of systems subjected to nonlinear restoring forces. Nonlinear constitutive relations in elasticity. Poincare's method and Phase Plane plots for stable and unstable singular points. Routh Hurwitz Crieria, Conservative systems. Limit cycles, Lyapunov's direct method. Survey of perturbation techniques with time dependent coefficients. Mathieu's Equation, etc.

AM 649. Seminar in Applied Mechanics (3)

Advanced studies of topics of current interest in the field of applied mechanics. Consists, in part, of an intensive study of selected papers from current literature.

AM 695A-Z. Experimental Topics Courses in Applied Mechanics (1- 4)

AM 696A-C. Directed Graduate Research (3)

Prerequisite: AM 698; approvals of faculty advisor and either Department Graduate Coordinator or Department Chair.

AM 699A-C. Independent Study (1-3)

Prerequisite: Classified status in the MS program and written approvals from faculty sponsor and Department Graduate Coordinator or Department Chair. Admission is based in part on evidence of the ability to pursue Independent Study or research in depth and approval of a proposal submitted prior to the time of registration.

Civil Engineering Course List

CE 101/L. Introduction to Civil Engineering and Lab (1/1)

Freshman orientation course for the civil engineering program, the profession, and an introduction to the University. Introduction to the tools for civil engineering studies: internet, word processing, spreadsheet. Development of communication skills and ability to work in teams. Development of learning skills in civil engineering studies. One hours lecture-discussion and three hours lab per week.

CE 196A-Z. Experimental Topics Courses in Civil Engineering (1-4)

CE 208. Architecture and Structures (2)

Not available for credit towards an engineering degree. Non-technical treatment of the inter-relationships between form, strength, and stability. Fundamental concepts of structures and aesthetic aspects of structures. (Available for General Education: Lifelong Learning)

CE 240. Engineering Statics (3)

Prerequisite: PHYS 220A/L. Corequisite: MATH 150B. Analysis of the distribution of forces on and within bodies in static equilibrium. Free body diagrams, equilibrium equations and the method of sections. Includes a limited introduction to the subject of strength of materials. (Design units: 0)

CE 280/L. Computer Applications in Civil Engineering and Lab (1/1)

Prerequisite: CE 240. Development of computer skills related to the field of Civil Engineering. Introduction of Windows, email and internet usage. Introduction to Office suite, word processing, spreadsheets with VBA applications, presentation and publishing softwares. Development of programming skills. Application of CAD to the development of structural and architectural drawings, dimensioning, grading plans, contour lines, sections. Analysis and design of structural systems using structural engineering packages. Development of algorithms and computer codes for the solution of Civil Engineering problems. One hour of lecture and three hours of lab per week.

CE 296A-Z. Experimental Topics Courses in Civil Engineering (1-4)

CE 308/L. Surveying and Lab (2/1)

Corequisite: 308L. Fundamentals of plane and geodetic surveying. Concepts of linear and angular measurements, precision, errors and corrections. Field problems in chaining, differential and profile leveling, triangulation and highway curves. Two hours lecture; one three-hour lab. (Design units: 0)

CE 315/L. Construction Engineering and Lab (2/1)

Prerequisite: CE 308 and MATH 250. This course introduces the basics of construction engineering including planning, scheduling, estimating, and project control techniques for construction projects. Two (2) hours of lecture per week and three (3) hours laboratory per week.

CE 335/L. Structures I and Computational Lab (3/1)

Prerequisite: CE 340. Corequisite: CE 335L. Determination of the force distribution and deflections in statically determinant and indeterminant structures using the classical, non-matrix methods of structural analysis. Three hours of lecture per week. Lab: Structural analysis problem solving session. Computer applications of structural analysis and design. Three hours of laboratory per week. (Design units: 0)

CE 340. Strength of Materials (3)

Prerequisite: CE 240; MATH 280. Analysis of the stresses and deflections in members and basic structural systems. Axial, torsional, bending and shear stresses and deflections. Introduction to structural stability. Design of structural components. (Design units: 0.5)

CE 396A-Z. Experimental Topics Courses in Civil Engineering (1-4)

CE 400A. Civil Engineering Design Clinic I (1-3)

Prerequisite: Senior or graduate standing in Civil Engineering or related discipline with senior or graduate program on file, acceptable academic record, and written approvals from faculty sponsor and Department Chair. Design units vary.

CE 400B. Civil Engineering Design Clinic II (1- 3)

Prerequisite: CE 400A. Continuation of CE 400A. Design units vary.

CE 408/L. Surveying with GPS Applications and Lab (1/1)

Prerequisites: CE 308/L. Corequisite: 408L. Surveying with Global Positioning Systems (GPS): point positioning, differential positioning, differencing techniques, survey planning, real-time kinematic (RTK) surveys, vertical positioning, random errors and survey specifications, horizontal curves, vertical curves, horizontal control and vertical control. One hour lecture; three hours lab per week. (Design Units: 0)

CE 426/L. Soil Mechanics and Lab (3/1)

Corequisite 426L. Soil as a foundation for structures and as a material of construction. Lab experiments to be performed to obtain data to determine soil physical properties. Three hours lecture; three hours lab per week. (Design units: 1)

CE 438. Reinforced Concrete Design (3)

Prerequisite: CE 335. Basic concepts in the design of reinforced concrete structures. Applications to beams, columns, slabs, shear walls, footing, and composite construction. (Design units: 3)

CE 439. Structural Steel Design (3)

Prerequisite: CE 335. Basic concepts in the design of steel structures. Design in steel of tension and compression members, beams, columns, welded and bolted connections; eccentrically loaded and moment resistant joints; plate girders. Introduction to computer-aided design. (Design units: 3)

CE 460/L. Engineering Hydrology and Lab (2/1)

Prerequisite: ME 390. Corequisite 460L. Surface Hydrology for the design of drainage, flood control, water storage and distribution systems. Topics include hydrologic cycle, meteorology, surface and ground water movement, interrelation between precipitation and runoff; hydrograph analysis, flood routing, risk assessment. Hydrologic model development and analysis using computers emphasized for design of storm drainage systems, flood protection, water storage and reservoir operations. Two lecture hours; one three-hour lab. (Design units: 1)

CE 488A/L. Civil Engineering Senior Design I and Lab (1/1)

Prerequisites: CE 335/L and senior class standing with senior program on file. Corequisites: CE 488AL and either CE 438 or CE 439. 1st semester of a 2-semester sequence capstone design experience simulating professional practice in civil engineering. (CE 488A and CE 488B must be completed within the same academic year.) Undertakes the preliminary design of a complex engineering project. Addresses ethics of engineering practice, professional lifelong learning requirements, written and oral engineering design project presentations, and methods of technical problem solving. (Offered fall semester.) 1 hour lecture; three hours lab per week. (Design units: 1)

CE 488B. Civil Engineering Senior Design II (2)

Prerequisites: CE 488A/L. Corequisites: Second major civil design course either CE 438, CE 439, or CE 526. Continuation of CE 488A. (CE 488A and CE 488B must be completed within the same academic year.) Final design stage of the project initiated in CE 488A is undertaken, with emphasis on working in project teams. (Offered spring semester.) six hours of lab per week. (Design units: 2)

CE 496A-Z. Experimental Topics Courses in Civil Engineering (1-4)

CE 499A-C. Independent Study (1-3)

Prerequisite: Senior or graduate standing in Civil Engineering with senior or graduate program on file, and written approvals of faculty sponsor and Department Chair.

Admission based on evidence of ability to pursue Independent Study in depth and approval of a proposal submitted prior to registration in the course. (Design units vary)

Graduate Courses

Note that 300-level courses in Civil Engineering do not carry credit for a Master's degree in Engineering.

CE 526. Geotechnical Foundation Design (3)

Prerequisite: CE 426. Soil mechanics aspects of foundation design. Shear strength and compressibility of soil. Lateral pressures and retaining structures. Strength and deformation laws for spread footings, piers, piles and caissons. Analysis of mat foundations. Eccentric and inclined foundation loads. (Design units: 1.0)

CE 536/L. Structures II and Lab (3/1)

Prerequisite: CE 335. Corequisite CE 536L. Study of structural analysis and design problems using matrix methods. Complete development of the flexibility and stiffness methods of analysis. Computer applications to structural analysis and design. Three hours lecture; three hours lab per week. (Design units: 1.5)

CE 537. Timber and Masonry Design (4)

Prerequisite: CE 335. Study of vertical and lateral loading on structures. Elements of timber design. Timber beams, tension members, compression members, tension and bending and compression and bending members. Design of horizontal diaphragms and shearwalls. Design of connections. Elements of masonry design. Design of masonry in bending, shear and axial members. Fourhours of lecture. (Design units: 4)

CE 636. Structural Dynamics (3)

Prerequisite: AM 610. Vibration of structural systems with emphasis on approximate solutions to continuous systems; assumed modes, Rayleigh-Ritz, Finite Element Applications, nonlinear vibrations. Numerical techniques for computer application. Response spectra for multi-degree-of-freedom systems. Advanced topics.

CE 638. Advanced Reinforced Concrete Design (3)

Prerequisite: CE 438. Advanced topics in concrete design, including frames and slabs.

CE 639. Advanced Structural Steel Design (3)

Prerequisite: CE 439. Advanced topics in structural steel design such as frames, bridges, and buildings.

CE 640 Advanced Analysis Methods (3)

Prerequisite: CE536. Analytical methods for calculation of stress deflection and stability of structures. Unsymmetrical bending, torsion, plates, treatment of the buckling characteristics of various structural elements. Applications of energy methods.

Fundamentals of applied Elasticity. Consideration given to modern structural materials. (Design units: 1)

CE 641. Earthquake Engineering (3)

Prerequisites: AM 410; CE 335. Study of the earthquake problem. Topics covered include plate tectonics, seismology, dynamic response of structures, dynamics of sites, and design for earthquakes.

CE 642/L Finite Element Analysis (3/1)

Prerequisites: AM 410; CE 536. Corequisite: CE 642L. Study of structural mechanics problems by use of finite element method. Formulation of the basic elements, assemblage of elements and application of the method to selected topics in structural mechanics.

CE 643. Foundation Design (3)

Prerequisite: CE 438. Design of foundations for structures. Topics include pile foundations, grade beams, continuous and mat footings and retaining walls.

CE 648. Prestressed Concrete Design (3)

Prerequisite: CE 638. Prestressed concrete design and analysis for gravity and lateral loading. Design of reinforced and prestressed structural elements. Safety and economy. Connection design for earthquake and wind loadings. Design projects using professional practice standards including latest codes. Three hours of lecture. (Design units: 3)

CE 649. Seminar in Civil Engineering (3)

Advanced studies of topics of current interest in the field of civil engineering. The course will consist in part of an intensive study of selected papers from current literature.

CE 695A-Z. Experimental Topics Courses in Civil Engineering (1-4)

CE 696. Directed Graduate Research (3)

Prerequisite: CE 698 and approvals of faculty advisor and either Department Graduate Coordinator or Department Chair.

CE 697. Directed Comprehensive Studies (3)

(Credit/No Credit Only)

CE 698. Thesis (6) or Graduate Project (3)

Prerequisite: Advancement to candidacy for the MS degree and written approvals of faculty advisor and Department Graduate Coordinator or Department Chair.

CE 699A-C. Independent Study (1-3)

Prerequisite: Classified status in the MS program and written approvals from faculty sponsor and Department Graduate Coordinator or Department Chair. Admission is based

in part on evidence of the ability to pursue Independent Study or research in depth and approval of a proposal submitted prior to the time of registration.