CIVIL AND CONSTRUCTION ENGR (CCE)

CCE 101, CIVIL AND CONSTRUCTION ENGINEERING ORIENTATION, 2 Credits
Introduction to civil and construction engineering professions; problem solving, communication skills. This course is required by the CE, CEM and FE programs.
Equivalent to: CE 101
Recommended: MTH 111 and completion or concurrent enrollment in MTH 112 or MTH 251

CCE 102, CIVIL AND CONSTRUCTION ENGINEERING: PROBLEM-SOLVING AND TECHNOLOGY, 3 Credits
A skills-based course that focuses on introducing freshman students to the use of hand calculation and computer technology in solving civil engineering and construction engineering problems. Topics to be covered include structured approach to problem solving, use of Excel for engineering applications, internet tools and data bases, homework professionalism. Opportunities for involvement with ASCE and AGC student chapters. Lec/lab.
Equivalent to: CE 102
Recommended: Completion or concurrent enrollment in MTH 112 or MTH 251

CCE 201, CIVIL AND CONSTRUCTION ENGINEERING GRAPHICS AND DESIGN, 3 Credits
Introduces the engineering design process and graphic skills that are used by civil and construction engineers. Topics include design process, geometric construction, multiviews, auxiliary views, sections, dimensioning, tolerances and engineering drawing standards. Students participate in team design projects and presentations. Graphic and design projects from the areas of civil and construction engineering. Lec/lab.
Equivalent to: CE 201

CCE 203, INTRODUCTION TO VIRTUAL DESIGN AND CONSTRUCTION, 3 Credits
Basic principles of virtual design and construction (VDC) focusing on skills required for generating design and construction information models. Parametric modeling and design constraints are introduced. Students will utilize construction drawings and documentation to create accurate 3D models. Use of design and construction information models for making estimates of quantities and cost, and for determination of constructability problems. Lec/lab.
Prerequisite: CCE 201 with C or better or ENGR 248 with C or better

CCE 207, CCE SEMINAR, 1 Credit
Professional practices of civil and construction engineering.
Prerequisite: CCE 102 with C or better or ENGR 112 with C or better or CBEE 102 with C or better or NSE 115 with C or better or CS 162 with C or better or BEE 102 with C or better
Recommended: Sophomore standing

CCE 321, CIVIL AND CONSTRUCTION ENGINEERING MATERIALS, 4 Credits
Highway materials; aggregate, concrete and asphalt. Standard test methods.
Prerequisite: (ENGR 213 with C or better or ENGR 213H with C or better) and (ST 314 [C] or BA 276 [C])
Equivalent to: CCE 321H, CE 321

CCE 321H, CIVIL AND CONSTRUCTION ENGINEERING MATERIALS, 4 Credits
Highway materials; aggregate, concrete and asphalt. Standard test methods.
Attributes: HNRS – Honors Course Designator
Prerequisite: (ENGR 213 with C or better or ENGR 213H with C or better) and (ST 314 [C] or BA 276 [C])
Equivalent to: CCE 321

CCE 422, GREEN BUILDING MATERIALS, 3 Credits
Introduces concepts of construction with green building materials. Specific concepts include evaluation of what truly makes a material "green", long-term performance (e.g., durability) of materials, material production and life cycle cost analysis. Concepts of green building programs, guidelines and specifications will be introduced.
Prerequisite: CE 321 with C or better or CCE 321 with C or better
Recommended: (ECON 201 or ECON 201H or ECON 202 or ECON 202H) and ST 314

CCE 423, CONCRETE FUNDAMENTALS, 4 Credits
Portland cement hydration, microstructural development, fresh and hardened properties, testing standards, durability, alternative cements.
Recommended: CCE 321

CCE 424, ASPHALT FUNDAMENTALS, 3 Credits
Focuses on characterization of asphalt materials and mixtures, current laboratory testing technology for asphalt binders and mixes, engineering of asphalt mixes to meet design requirements, asphalt recycling process, environmental impacts of asphalt pavements, and recent developments in asphalt technology.
Prerequisite: CCE 321 with C or better

CCE 520, SELECTED TOPICS IN INFRASTRUCTURE MATERIALS, 0-4 Credits
A critical examination of in-depth topics selected by the instructor from among topics not covered in other infrastructure materials courses. This course is repeatable for 16 credits.
CCE 522, GREEN BUILDING MATERIALS, 3 Credits
Introduces concepts of construction with green building materials. Specific concepts include evaluation of what truly makes a material "green", long-term performance (e.g., durability) of materials, material production and life cycle cost analysis. Concepts of green building programs, guidelines and specifications will be introduced. Recommended: (CE 321 or CCE 321) and (ECON 201 or ECON 201H or ECON 202 or ECON 202H) and ST 314

CCE 523, CONCRETE FUNDAMENTALS, 4 Credits
Portland cement hydration, microstructural development, fresh and hardened properties, testing standards, durability, alternative cements. Recommended: CCE 321 or similar introductory materials course or CCE 421

CCE 524, ASPHALT FUNDAMENTALS, 3 Credits
Focuses on characterization of asphalt materials and mixtures, current laboratory testing technology for asphalt binders and mixes, engineering of asphalt mixes to meet design requirements, asphalt recycling process, environmental impacts of asphalt pavements, and recent developments in asphalt technology.

CCE 525, CONSTRUCTION SITE SYSTEMS ENGINEERING, 3 Credits
Design and planning of construction site field operations and engineered systems. Systems analysis and design as it applies to civil engineering projects. Design of construction systems: blasting; rock crushing and conveying; dewatering; cranes, pile driving, and rigging; and concrete pumping and placement. Construction site design and process design.

CCE 526, DESIGN FOR SAFETY, 3 Credits
Theoretical concepts and industry practices used to model, evaluate, and improve construction worker safety through the design of the project features, construction operations, and site safety program elements. Causes of construction site accidents, hazard recognition and comprehension, safety risk valuation and mitigation, and the true costs of injuries and fatalities.

CCE 528, ADVANCED VIRTUAL DESIGN AND CONSTRUCTION, 4 Credits
Focusing on the skills and information needed to effectively use an existing Building Information Model (BIM) in plan execution for a building construction project. This is a project based course where students gain knowledge on the implementation of BIM concepts throughout the lifecycle of a building, from planning and design, to construction and operations. Recommended: CCE 203 [D-]

CCE 529, LEAN CONSTRUCTION, 3 Credits
Introduction to the basics of lean production management, especially about how they are applied to the AEC industry to improve the operation management and product development. Class topics include theory of manufacturing science, principles of the lean production system, application of production management to project management, variability management in design and construction, improving project performance in the AEC industry, data gathering and process evaluation for productivity improvement.

CCE 552, PROJECT RISK MANAGEMENT, 4 Credits
An introduction to the concept of project risk in producing constructed engineering projects. Course content includes project baselining, risk definition and identification, risk assessment and management techniques, risk control, risk response, and risk management. CROSSLISTED as CCE 552/IE 586. Equivalent to: IE 586

CCE 554, PROFESSIONAL RESPONSIBILITY AND ETHICS, 3 Credits
An in-depth exploration of professional engineering ethics. Course content includes conceptual theoretical basis of ethics, ethics among professional organizations, ethical consideration of design, critical analysis of ethical situations, ethics in the workplace, and ethical considerations regarding the broader environment. CROSSLISTED as CCE 554/IE 589. Equivalent to: IE 589

CCE 561, HYDROGRAPHIC SURVEYING, 3 Credits
Covers the fundamentals of hydrographic surveys performed to measure the depth and bottom configuration of water bodies in support of nautical charting and other areas of marine geomatics, as well as marine construction, benthic habitat mapping, marine spatial planning, and bathymetric mapping of rivers and lakes. Topics include underwater acoustics, sound velocity, the sonar equation, types of sonar systems (e.g., single-beam, multibeam, side scan sonar), water levels and tidal datums, positioning and motion sensing for hydrographic surveying, bathymetric lidar, and applications of hydrographic surveying.

CCE 599, SPECIAL TOPICS, 1-16 Credits
This course is repeatable for 16 credits.

CCE 621, DURABILITY AND CONDITION ASSESSMENT OF REINFORCED CONCRETE, 4 Credits
Concrete durability including freeze-thaw attack, sulfate attack, corrosion, alkali-silica reaction, long-term performance, durability modeling, durability of alternative cements. Non-destructive condition assessment; model-assisted testing; corrosion detection and monitoring; multi-scale assessment; service/remaining life predictions. Prerequisite: CCE 523 with C or better Recommended: CCE 321
CCE 623, CORROSION OF METALS AND CORROSION CONTROL, 4 Credits
Recommended: CH 202 or CH 231 or CH 231H or CCE 321

CCE 624, SERVICE LIFE MODELING OF INFRASTRUCTURE MATERIALS, 4 Credits
Recommended: Undergraduate level calculus and chemistry courses