# CONSTRUCTION ENGINEERING (CONE)

## Construction Engineering Undergraduate Courses

**CONE 103 INTRODUCTION TO CONSTRUCTION ENGINEERING (1 credit)**
Introduction to the organization and terminology of construction engineering. Overview of technical and management skills required to succeed in the construction engineering profession.

**CONE 206 ENGINEERING ECONOMICS (3 credits)**
Introduction to methods of economics comparisons of engineering alternatives: time value of money, depreciation, taxes, concepts of accounting, activity-based costing, ethical principles, civics and stewardship, and the importance to society.
**Prerequisite(s):** Sophomore Standing.

**CONE 211 CONSTRUCTION BUSINESS METHODS (3 credits)**
Business concepts and practices used by construction contractors. The construction industry, management principles, forms of business ownership, company organization, construction contracts, estimating and bidding, business ethics, bonds and insurance, financial statements, cost accounting, equipment management, planning and scheduling, labor relations and personnel management.
**Prerequisite(s):** CONE 103 or CNST 131 or AREN 1010

**CONE 221 GEOMETRIC CONTROL SYSTEMS (3 credits)**
Introduction to the theory and application of mensuration and geometric information processing in civil engineering. Measurement of distance, direction, elevation and location using mechanical, electronic and satellite systems. Collection of field data and error propagation. Elementary geometric data bases for design, construction, operation and control of civil works.
**Prerequisite(s):** MATH 1950

**CONE 319 CONSTRUCTION METHODS AND EQUIPMENT (3 credits)**
Characteristics, capabilities and selection of equipment and methods used in the building construction industry. Estimating job production, equipment production rates, machine operating costs, earth-moving equipment, hoisting equipment, operations analysis, and use of various other construction methods and equipment.
**Prerequisite(s):** CONE 206

**CONE 378 CONSTRUCTION ESTIMATING I (3 credits)**
Preparation of detailed cost estimates based on contract documents. Identify and analyze cost components of building and site scopes of work to perform detailed quantity take-offs. Apply labor, material, and equipment pricing from RS Means. Use production rates and quantity takeoffs to prepare a preliminary construction schedule. Complete quantity takeoffs from 2D plans and from 3D BIM software models. (Cross-listed with CNST 378).
**Prerequisite(s):** CNST 112.

**CONE 414 ACCIDENT PREVENTION IN CONSTRUCTION (3 credits)**
Safety practices in the construction industry and the national safety and health standards of the Occupational Safety and Health Administration (OSHA). The theory of accidents; personal attitudes; statistics and environment; accident occurrence; prevention and inspection in connection with the construction of buildings, highways, and associated heavy facilities. Nationally accepted safety codes and their relationship to accepted practices in the industry.
**Prerequisite(s):** Senior standing and CONE 211 and CONE 319

**CONE 416 WOOD/CONTEMPORARY MATERIALS DESIGN (3 credits)**
Design of structural timber, beams, columns, and connections. Introduction to applicable design philosophies and codes. Overview of materials design. Masonry, aluminum, and contemporary materials such as plastics and fiber reinforced systems and composite material groups. Design considerations, cost and constructability analysis. (Cross-listed with CONE 816)
**Prerequisite(s):** CIVE 341

**CONE 417 FORMWORK SYSTEMS (3 credits)**
Design of structural timber, beams, columns, and connections. Introduction to applicable design philosophies and codes. Overview of materials design, masonry, aluminum, and contemporary materials such as plastics and fiber reinforced systems and composite material groups. Design considerations, cost and constructability analysis. (Cross-listed with CONE 817)
**Prerequisite(s):** CONE 416; Pre/Co-req.: CIVE 441

**CONE 450 SUSTAINABLE CONSTRUCTION (3 credits)**
Sustainable construction and its application to the green building industry. Topics include: the LEED certification process, sustainable building site management, efficient wastewater applications, optimizing energy performance, indoor environmental issues, performance measurement/verification, recycled content and certified renewable materials. (Cross-listed with CONE 850)
**Prerequisite(s):** Senior standing

**CONE 459 INTRODUCTION TO BUILDING INFORMATION MODELING (3 credits)**
This course instructs CAD users on the effective use of Building Information Model (BIM) for integration of design, document and construction estimate. Topics include: model-based 3D design, file formats, interoperability, and MEP modeling. (Cross-listed with CONE 859)
**Prerequisite(s):** CNST 112, or Graduate standing in AREN, CIVE, CNST or CONE.

**CONE 466 HEAVY AND/OR CIVIL ESTIMATING (3 credits)**
Estimating techniques and strategies for heavy and/or civil construction. Unit pricing, heavy and civil construction takeoffs and estimating, equipment analysis, overhead cost and allocations, estimating software and government contracts. (Cross-listed with CONE 866).
**Prerequisite(s):** CONE 319 and CONE 378 and CONE 485

**CONE 476 PROJECT BUDGETS AND CONTROLS (3 credits)**
The basic systems related to revenues and expenses associated with record keeping of construction contracts. Managerial accounting related to planning and control of construction projects. (Cross-listed with CNST 476, CONE 876).
**Prerequisite(s):** CNST 378 and CONE 206.

**CONE 481 HIGHWAY & BRIDGE CONSTRUCTION (3 credits)**
The methods and equipment required in the construction of roads and bridges. Methods and equipment necessary for roads and bridges. Substructure and superstructures, precast and cast-in-place segments, and standard and specialized equipment. (Cross-listed with CONE 881)
**Prerequisite(s):** CONE 319 or CNST 241

**CONE 482 HEAVY AND/OR CIVIL CONSTRUCTION (3 credits)**
History, theory, methods, and management principles of planning and executing heavy and/or civil projects. Emerging and new equipment capabilities. Economical use of equipment and management of costs associated with production. (Cross-listed with CNST 482, CNST 882, CONE 882).
**Prerequisite(s):** CNST 379. Not open to non-degree graduate students.

**CONE 483 SUPPORT OF EXCAVATION (3 credits)**
The design and placement of excavation supports according to OSHA requirements and industry standards. A variety of routine to moderately complex support systems. Open excavations, heet piling and cofferdams. Soil mechanics, lateral loads, hydrology, and pumping methods. (Cross-listed with CONE 883)
**Prerequisite(s):** CET 2180 and CET 3290

**CONE 485 CONSTRUCTION PLANNING, SCHEDULING, AND CONTROLS (3 credits)**
Planning and scheduling a project using the critical path methods (CPM) with computer applications. Project pre-planning, logic networks, precedence diagrams, time estimates, critical path, float time, crash programs, scheduling, short interval schedules, pull planning, and monitoring project activities. (Cross-listed with CNST 485, CNST 885, CONE 885)
**Prerequisite(s):** CNST 378. Not open to non-degree graduate students.

**CONE 489 CONSTRUCTION ENGINEERING CAPSTONE (3 credits)**
CONE 4890 embodies the cumulative CONE experience in a project format and uses teams to simulate actual construction enterprises operating in cooperative and competitive situations which replicate the construction industry. An integrated, comprehensive project; to be taken in the term prior to graduation.
**Prerequisite(s):** Senior standing

**CONE 495 INTERNSHIP (3 credits)**
Participation in a full-time summer internship associated with a construction-related entity. Includes weekly assignments and a final presentation designed to foster interactions between the intern and the business side of the entity. General topics include personnel and time management, structuring business plans, scheduling work, finance and budgets, marketing plans, contracts, risk analysis, and communication and leadership. (Cross-listed with CNST 495).
**Prerequisite(s):** Permission of instructor, Letter of application, Letter of agreement from industry mentor. Not open to non-degree graduate students.

**CONE 498 SPECIAL TOPICS IN CONSTRUCTION MANAGEMENT (1-6 credits)**
Individual or small group study of special topics in construction management. Topic varies. A signed student-instructor learning contract is required. (Cross-listed with CNST 498, CNST 898)