CONSTRUCTION MANAGEMENT (CNST)

CNST 1120 CONSTRUCTION COMMUNICATIONS (3 credits)
Development of construction industry communication skills including the ability to read contract documents. Complete comprehension of working drawings, technical terminology including graphic symbols and abbreviations. Fundamentals of drafting principles, sketching, and dimensioning techniques.

CNST 1310 INTRODUCTION TO THE CONSTRUCTION INDUSTRY (1 credit)
Introduction to basic management principles and practices used in the control of manpower, materials, machinery, and money in the construction of the built environment.

CNST 2250 INTRODUCTION TO BUILDING INFORMATION MODELING (3 credits)
This course will expose students to the fundamentals of Building Information Modeling (BIM), and established a solid foundation for further study in this area. Students will learn about BIM concepts and Modeling Techniques. BIM by its very nature is software driven. This class will make use of Autodesk Revit and Navisworks. Students will use Revit to create 3D models of construction projects. The great number of benefits offered by BIM will be exposed to the students.

CNST 2410 CONSTRUCTION METHODS & EQUIPMENT I (3 credits)
Introduction to earthmoving equipment and methods used in the U.S. construction industry. Labor, productivity, economic aspects of site, excavation, and foundation work utilizing various mixes of manpower and machinery. Introduction to financial principles of equipment operation and ownership.
Prerequisite(s)/Corequisite(s): CNST 1120, GEOL 1170, and MATH 1950. Parallel registration in CNST 2510 is recommended.

CNST 2420 CONSTRUCTION EQUIPMENT AND METHODS II (3 credits)
Continuation of CNST 2410, with emphasis on the structure from grade to topping out. Functions and applications of material handling equipment from simple pulleys to large cranes. Methods of constructing concrete formwork in a variety of applications. Assembly and erection of steel, wood, precast concrete, and masonry structural elements. Material finishing methods and equipment.
Prerequisite(s)/Corequisite(s): CNST 2410.

CNST 2510 CONSTRUCTION MATERIALS AND SPECIFICATIONS (3 credits)
Introduction to construction materials. Physical, mechanical and aesthetic properties of soils, concrete, masonry, metals, plastics and other materials as they relate to in-service conditions and acceptability either individually or in combination with other materials. Proper methods of specifying to achieve design and construction goals, construction safety and inspection, and to meet zoning code and environmental requirements.
Prerequisite(s)/Corequisite(s): CNST 1120 and 1310.

CNST 2520 CONSTRUCTION MATERIALS AND TESTING (3 credits)
Introduction to basic materials used in construction. Laboratory testing and evaluation of material properties. Inspection and quality control of construction material types, including aggregates. Laboratory emphasizes testing of aggregates, soil, and concrete. (Laboratory testing procedures emphasizing testing of aggregates, soil, and concrete.)
Prerequisite(s)/Corequisite(s): CNST 1120, MATH 1950; Parallel registration in CNST 241 is recommended.

CNST 3050 BUILDING ENVIRONMENTAL TECHNICAL SYSTEMS I (3 credits)
Characteristics and performance of buildings with respect to thermal and psychometric environment in buildings related to human comfort, heat gain/heat loss, ventilation, natural energy systems and sustainable design principles, and plumbing and life safety systems in the built environment.
Prerequisite(s)/Corequisite(s): PHYS 1050 and MATH 1950

CNST 3060 BUILDING ENVIRONMENTAL TECHNICAL SYSTEMS II (3 credits)
Prerequisite(s)/Corequisite(s): MATH 1950, PHYS 1050, PHYS 1054.

CNST 3210 STRUCTURAL MECHANICS (3 credits)
Introduction to various external force systems, and their resulting internal forces and deformations, which act on structural elements.
Prerequisite(s)/Corequisite(s): Not open to non-degree graduate students.

CNST 3220 ARCHITECTURAL STRUCTURES II (3 credits)
Analysis and design of structural members in wood, steel, and concrete. Emphasis on columns, walls, footings, soils, trusses, and construction. Comparative building designs.
Prerequisite(s)/Corequisite(s): CNST 3310, not open to non-degree students.

CNST 3250 STRUCTURAL MECHANICS (3 credits)
Introduction to various external force systems, and their resulting internal forces and deformations, which act on structural elements.
Prerequisite(s)/Corequisite(s): Admission to the Construction Management degree program.

CNST 3360 STRUCTURAL OPTIMIZATION (3 credits)
Structural Mechanics Optimization of key properties of elements and systems of building structures: force, geometric, and material.
Prerequisite(s)/Corequisite(s): CNST 3350.

CNST 3780 CONSTRUCTION ESTIMATING (3 credits)
Preparation of detailed cost estimates based on contract documents. Identify and analyze cost components to perform a reliable quantity takeoff. Recap components in their common trade areas for labor, material, and equipment pricing. Introduction to subcontractor bids and assembly of bid proposal. (Cross-listed with CONE 3780)
Prerequisite(s)/Corequisite(s): CNST 2420.

CNST 3790 CONSTRUCTION ESTIMATING II (3 credits)
Continuation of CNST 3780 with emphasis on implementing basic elements of estimating, including; quantity survey, price extension, and bidding. Advanced computer applications of estimating to various construction projects.
Prerequisite(s)/Corequisite(s): CNST 3780

CNST 4050 MECHANICAL ESTIMATING (3 credits)
Application of estimating principles, quantity take-off, bidding strategies, and computerization to the specialty field of mechanical construction.
Prerequisite(s)/Corequisite(s): CNST 3050 and CNST 3060 and CNST 3790

CNST 4060 ELECTRICAL ESTIMATING (3 credits)
Application of estimating principles, quantity take-off, bidding strategies, and computerization to the specialty field of electrical construction.
Prerequisite(s)/Corequisite(s): CNST 3050, CNST 3060 and 3790.
CNST 4110 PROJECT ADMINISTRATION (3 credits)
An introduction to construction project administration. Ownership and organization of construction companies, construction documentation specifications, type of contracts, takeoffs, estimating, bidding, bonds, insurance, project management and administration, scheduling, time and cost management, labor law and labor relations, and project safety. (Cross-listed with CNST 8116.)
Prerequisite(s)/Corequisite(s): CIVE 378 or CNST 3790. Not open to non-degree graduate students.

CNST 4150 MECHANICAL/ELECTRICAL PROJECT MANAGEMENT (3 credits)
Fundamentals of project management within the mechanical and electrical contracting industry. Codes, contract documents, productivity, coordination, project control and administration, scheduling, safety, and project closeout, from a specialty contracting perspective. (Cross-listed with CNST 8156)
Prerequisite(s)/Corequisite(s): CNST 3050, CNST 3060 and CNST 3790. CNST 4050 and CNST 4060 are recommended.

CNST 4200 PROFESSIONAL PRACTICE AND ETHICS (3 credits)
Orientation to professional practice through a study of the designers' and the contractors' relationship to society, specific clients, their professions, and other collaborators in environmental design and construction fields. Ethics, professional communication and responsibility, professional organization, office management, construction management, professional registration, and owner designer-contractor relationships. (Cross-listed with CNST 8206)
Prerequisite(s)/Corequisite(s): CNST 3790; and LAWS 3930

CNST 4340 PROFESSIONAL TRENDS IN DESIGN/BUILD (3 credits)
The organizational, managerial, ethical, and legal principles involved in design/build as a construction project delivery system. Advantages and disadvantages, growth, merits, and criticism of the design-build system. (Cross-listed with CNST 8346)
Prerequisite(s)/Corequisite(s): CNST 3790 or Instructor Permission

CNST 4360 INTENT AND APPLICATION OF INTERNATIONAL BUILDING CODE (3 credits)
This course is designed to provide a fundamental understanding of how to research, interpret and apply building code requirements to the design and construction of new and renovated structures. (Cross-listed with CNST 8366)
Prerequisite(s)/Corequisite(s): CNST 1120 and 2510.

CNST 4400 BUILDING INFORMATION MODELING (BIM) II (3 credits)
Advance topics in building information modeling, including structural and MEP modeling, 4/5 dimensional construction animations and visualization. Good knowledge of Revit Architectural Modeling and knowledge of construction estimating and scheduling is required before registering in this class. (Cross-listed with CNST 8406)
Prerequisite(s)/Corequisite(s): CNST 2250 and CNST 3780.

CNST 4440 CONSTRUCTION SITE SAFETY MANAGEMENT (3 credits)
Provides introductory construction site safety management for project engineers, project managers, safety teams, and company safety officers. Addresses basic accident and injury models, human accident costs, safety behavior, ethical issues in safety, workers' compensation and EMR, job safety analysis (JSA), project site safety audits, safety promotion and training, emergency planning and response, safety management programs and training, and OSHA record-keeping and reporting. Satisfactory completion will partially qualify the individual to be designated by their employer as a construction site "competent person" by successfully completing the OSHA 30-hour Construction Safety Card as well as additional certifications in basic first aid, CPR and AED. (Cross-listed with CNST 8446)
Prerequisite(s)/Corequisite(s): CNST 2420.

CNST 4760 PROJECT BUDGETS AND CONTROLS (3 credits)
The basic systems related to revenue and expenses associated with record keeping of construction contracts. Managerial accounting related to planning and control of construction projects. ACCT 2020 may be substituted toward degree requirements for CONE/CNST 4760. Credit toward degree can be earned in only one of ACCT 2020 and CONE/CNST 4760. (Cross-listed with CONE 4760)
Prerequisite(s)/Corequisite(s): CONE/CNST 3780; and CONE/ISMG 2060

CNST 4800 PRODUCTIVITY AND HUMAN FACTORS IN CONSTRUCTION (3 credits)
Motivation and productivity improvement methods in the management of construction workers in their typical job environments. Methods to improve working environment in the field and in the office. Procedures and mechanisms to implement human behavior concepts and ergonomic concepts for enhanced productivity and safety. (Cross-listed with CNST 8806)
Prerequisite(s)/Corequisite(s): Senior standing; CNST 3780; MGMT 3490

CNST 4820 HEAVY AND/OR CIVIL CONSTRUCTION (3 credits)
Application of management principles to the construction of heavy and/or civil projects. History, theory, and methods of planning and constructing heavy and/or civil projects. Emerging equipment and new equipment capabilities. Economical use of equipment and managing costs associated with production. (Cross-listed with CNST 8826, CONE 4820, CONE 8826)
Prerequisite(s)/Corequisite(s): Senior standing and (ARCH major or AE major or CIVE major or CNST major or CONE major), not open to non-degree students

CNST 4850 CONSTRUCTION PLANNING, SCHEDULING, AND CONTROLS (3 credits)
Planning and scheduling a construction project using the critical path methods (CPM) with computer applications. Project pre-planning, logic networks, network construction, time estimates, critical path, float time, crash programs, scheduling and monitoring project activities. (Cross-listed with CNST 8856, CONE 4850, CONE 8856)
Prerequisite(s)/Corequisite(s): CNST 3780 and CNST 2250.

CNST 4860 CONSTRUCTION MANAGEMENT SYSTEMS (3 credits)
Application of selected topics in systems analysis (operations research) to construction management. Simulation, mathematical optimization, queuing theory, Markov decision processes, econometric modeling, neural networks, data envelopment analysis, decision analysis and analytic hierarchy processes as used in the construction industry. (Cross-listed with CNST 8866)
Prerequisite(s)/Corequisite(s): CNST 3790.

CNST 4880 RESIDENTIAL CONSTRUCTION AND REAL ESTATE DEVELOPMENT (3 credits)
Application of various strategies to real estate development including community and residential design, planning, site selection, land development, marketing and customer service. Methods used by construction companies to analyze, bid, and market their developments to customers through the preconstruction and bidding process. (Cross-listed with CNST 8886)
Prerequisite(s)/Corequisite(s): CNST 3790.

CNST 4890 SENIOR CONSTRUCTION PROJECT (3 credits)
Execution of a construction project involving conceptual design and location, estimating, bidding, site layout, construction organization, planning and scheduling, cost control, records management, and project completion and documentation. Lec: 2 contact, Lab: 6 contact.
Prerequisite(s)/Corequisite(s): CNST 3790; CNST 4200; CNST 4760; CNST 4850. Pre/Coreq: CNST 4800.
**CNST 4930  INTERNSHIP WORKSHOP (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 associated with the business side of the entity between the Construction entity and the intern. General topics include Time Management and Scheduling Work, Business Plans and Structures, Finance and Budgets, Marketing Plans, Contracts, Risk Analysis and Management, Personnel Management, Communication and Leadership. (Cross-listed with CNST 8936).

**Prerequisite(s)/Corequisite(s):** Permission of instructor, Letter of application, Letter of agreement from industry mentor. Not open to non-degree graduate students.

**CNST 4980  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 8986, CONE 4980).

**Prerequisite(s)/Corequisite(s):** Master of engineering in construction management or related discipline and permission