

# CONSTRUCTION MANAGEMENT (CNST)

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## CNST 112 Construction Communications

**Description:** Development of communication skills including understanding of contract documents, working drawings, technical terminology, graphic symbols, and abbreviations. Fundamentals of drafting principles, sketching, and dimensioning techniques.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** CNST 225; CNST 378, CONE 378

## CNST 131 Introduction to the Construction Industry

**Description:** Introduction to basic management principles and practices for labor, materials, machinery, and budgets.

**Credit Hours:** 1

**Max credits per semester:** 1

**Max credits per degree:** 1

**Grading Option:** Graded

**Prerequisite for:** CONE 211

**Experiential Learning:** Fieldwork

## CNST 225 Introduction to Building Information Modeling (BIM)

**Prerequisites:** CNST 112

**Description:** Introduction to Building Information Modeling (BIM) concepts and techniques. Explore the use of the Revit Architecture platform to create detailed 3D models of construction projects and other BIM-related topics such as clash detection and point-cloud models.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** CNST 440

## CNST 241 Horizontal Construction

**Prerequisites:** MATH 106

**Description:** Introduction to earthmoving equipment and methods, labor, productivity, and economic aspects of excavation, material transportation, and fill work. Introduction to the financial principles of equipment ownership and operation.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Offered:** FALL

## CNST 242 Vertical Construction

**Prerequisites:** MATH 106

**Description:** Focus on vertical structures, from grade to topping out, with an emphasis on materials and material handling equipment. Includes the assembly process for a variety of applications including cast-in-place concrete, steel erection, wood framing, precast concrete, masonry structural elements, and material finishing.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

## CNST 251 Construction Materials and Specifications

**Prerequisites:** MATH 106

**Description:** Introduction to construction materials and proper methods of specifying to achieve design and construction goals, safety and inspection, and to meet zoning code and environmental requirements. Physical, mechanical and aesthetic properties of soils, concrete, masonry, metals, plastics and other materials will be studied as they relate to in-service conditions, acceptability, and performance.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

## CNST 252 Construction Materials and Testing

**Prerequisites:** MATH 106

**Notes:** Parallel registration in CNST 241 is recommended. Laboratory testing procedures emphasizing testing of aggregates, soil, and concrete.

**Description:** Introduction to basic materials used in construction.

Laboratory testing and evaluation of material properties of soil, aggregate, and concrete.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

## CNST 305 Building Environmental Technical Systems I

**Crosslisted with:** ARCH 333

**Prerequisites:** PHYS 151.

**Description:** Characteristics and performance of buildings with respect to thermal and psychrometric 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.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** ARCH 430, ARCH 430H; CNST 405

## CNST 306 Electrical Systems

**Prerequisites:** MATH 106, PHYS 151

**Description:** Fundamentals of electric power generation and distribution, service, and circuits in buildings with an emphasis on electrical equipment and systems, lighting principles and applications, and fire protection systems. Review of National Electric Code.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** CNST 405; CNST 406

## CNST 331 Structural Mechanics

**Crosslisted with:** ARCH 331

**Prerequisites:** ARCH 232 or admission into the Construction Management degree program

**Description:** Introduction to various external force systems, and their resulting internal forces and deformations, which act on structural elements.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** ARCH 332, CNST 332

### **CNST 332 Structural Optimization**

**Crosslisted with:** ARCH 332

**Prerequisites:** ARCH 331

**Description:** Optimization of key properties of elemental components and systems of building structures: force, geometric, and material.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** ARCH 430, ARCH 430H

### **CNST 378 Construction Estimating I**

**Crosslisted with:** CONE 378

**Prerequisites:** CNST 112

**Description:** 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.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** CNST 379; CNST 440; CNST 476, CONE 476

### **CNST 379 Construction Estimating II**

**Prerequisites:** CNST 378

**Description:** Continuation of CNST 378 with emphasis on the determination of total project cost and preparation of complete bid proposals for self-performed and subcontracted commercial projects. Evaluation and analysis of subcontractor bids to determine overall project costs by completing a hard bid simulation scenario. Exploration of contract delivery methods and their effect on overall project cost.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** CNST 405; CNST 406; CNST 489

### **CNST 405 Mechanical Estimating**

**Prerequisites:** CNST 305, 306 and 379.

**Description:** Application of estimating principles, quantity take-off, bidding strategies, and computerization to the specialty field of mechanical construction.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

### **CNST 406 Electrical Estimating**

**Prerequisites:** CNST 305, CNST 306 and CNST 379

**Description:** Application of estimating principles, quantity take-off, bidding strategies, and computerization to the specialty field of electrical construction.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

### **CNST 411 Project Administration**

**Crosslisted with:** CNST 811

**Prerequisites:** Junior or senior standing

**Notes:** Not open to non-degree graduate students

**Description:** Ownership and administration of companies focusing on documentation and specifications, contracts, take-offs, estimating, bidding, bonds, insurance, project management and administration, scheduling, time and cost management, labor law and labor relations, and project safety.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

### **CNST 415 Mechanical/Electrical Project Management**

**Crosslisted with:** CNST 815

**Prerequisites:** CNST 305, CNST 306, CNST 379

**Notes:** CNST 405 and CNST 406 are recommended.

**Description:** 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.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

### **CNST 420 Professional Practice and Ethics**

**Crosslisted with:** CNST 820

**Prerequisites:** CNST 378

**Notes:** Not open to non-degree graduate students

**Description:** Examination of professional practice considering the perspectives of designers and the contractors and their respective relationships to society, specific client types, and other collaborators in the design and construction fields. Focus on ethics, professional communication and responsibility, professional organization, office management, environmental stewardship, professional registration, and owner-designer-contractor relationships.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**ACE:** ACE 8 Civic/Ethics/Stewardship

### **CNST 425 Alternative Project Delivery Methods**

**Crosslisted with:** CNST 825

**Prerequisites:** CNST 379

**Notes:** Not open to non-degree graduate students

**Description:** Historical and current project delivery methods (PDM) are explored. Procurement strategies, contractual arrangements, and compensation methods are also discussed in conjunction with risks, costs, and legal and ethical issues that need to be considered when determining which system is best for a particular project.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Offered:** SPRING

**CNST 434 The Design-Build Project Delivery System****Crosslisted with:** CNST 834**Prerequisites:** CNST 378**Notes:** Not open to non-degree graduate students**Description:** The organizational, managerial, ethical and legal principles involved in design-build as a project delivery system. Advantages and disadvantages, growth, merits, and criticism of the design-build system.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded**Experiential Learning:** Research**CNST 436 Intent and Application of International Building Code****Crosslisted with:** CNST 836**Prerequisites:** CNST 379**Notes:** Not open to non-degree graduate students**Description:** Fundamentals of how to research, interpret, and apply building code requirements to the design and construction of both new and renovated structures.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded with Option**CNST 440 Building Information Modeling (BIM) II****Prerequisites:** CNST 225, CNST 378**Description:** Advanced 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.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded**CNST 442 Healthcare Design and Construction****Crosslisted with:** AREN 442, AREN 842, CNST 842**Prerequisites:** Senior or graduate standing**Description:** Introduction to the design and construction of healthcare facilities. Healthcare regulations and standards, infection control, interim life safety measures, code requirements, medical equipment selection and coordination, healthcare design and construction techniques, and best practices will be addressed. Provides guidance in preparation for the Certified Healthcare Constructor credential offered by the American Healthcare Association.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded**CNST 444 Construction Site Safety Management****Crosslisted with:** CNST 844**Prerequisites:** CNST 241 or CONE 319**Notes:** 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. Not open to non-degree graduate students**Description:** Introduction to 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.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded with Option**Offered:** FALL**Experiential Learning:** Case/Project-Based Learning**CNST 476 Project Budgets and Controls****Crosslisted with:** CONE 476**Prerequisites:** CNST 378, and BSEN 206 or FINA 300**Description:** 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.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded**Prerequisite for:** CONE 489**CNST 480 Productivity and Human Factors in Construction****Crosslisted with:** CNST 880**Prerequisites:** Corequisite CNST 489, senior standing**Notes:** Not open to non-degree graduate students**Description:** Motivation and productivity improvement methods for management in typical job environments. Methods to improve working environments in the field and office. Procedures and mechanisms to implement human behavior and ergonomics concepts for enhanced productivity and safety.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded with Option**Prerequisite for:** CNST 489**Experiential Learning:** Case/Project-Based Learning**CNST 482 Heavy and/or Civil Construction****Crosslisted with:** CNST 882, CONE 482, CONE 882**Prerequisites:** CNST 379**Notes:** Not open to non-degree graduate students**Description:** 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.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Grading Option:** Graded

**CNST 485 Construction Planning, Scheduling, and Controls**

**Crosslisted with:** CONE 485, CNST 885, CONE 885

**Prerequisites:** CNST 378

**Notes:** Not open to non-degree graduate students

**Description:** 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.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Prerequisite for:** CNST 489; CONE 489

**CNST 486 Construction Management Systems**

**Crosslisted with:** CNST 886

**Prerequisites:** CNST 379

**Notes:** Not open to non-degree graduate students.

**Description:** Application of selected topics in systems analysis (operations research). 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 industry.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**CNST 488 Residential Construction and Real Estate**

**Crosslisted with:** CNST 888

**Prerequisites:** CNST 379

**Description:** 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 pre-construction and bidding process.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**CNST 489 Senior Construction Project**

**Prerequisites:** CNST 379, CNST 420, CNST 476, CNST 485. CNST 480

must be completed as a prerequisite or taken parallel

**Notes:** Capstone course.

**Description:** Execution of a project from conceptual design and location through estimating, bidding, site layout, planning and scheduling, cost control, records management, and project completion and documentation.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**ACE:** ACE 10 Integrated Product

**Experiential Learning:** Case/Project-Based Learning

**CNST 495 Internship**

**Crosslisted with:** CONE 495

**Prerequisites:** Permission of instructor, Letter of application, Letter of agreement from industry mentor

**Notes:** Not open to non-degree graduate students

**Description:** 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.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Offered:** SUMMER

**Experiential Learning:** Fieldwork

**CNST 498 Special Topics in Construction Management**

**Crosslisted with:** CNST 898

**Prerequisites:** Permission.

**Notes:** A signed student-instructor learning contract is required.

**Description:** Individual or small group investigation of topics in construction management.

**Credit Hours:** 1-6

**Min credits per semester:** 1

**Max credits per semester:** 6

**Max credits per degree:** 6

**Grading Option:** Graded