CONSTRUCTION

Construction Degrees

The Charles W. Durham School of Architectural Engineering and Construction offers students an education that opens up a full range of professional opportunities in the construction industry. The two bachelor's degree options, Construction Engineering and Construction Management, are found under the Majors tab.

There is also Construction Management Minor, found under the Minors tab, which is available to engineering, architecture and business majors.

Degrees Offered

- Construction Engineering, Bachelor of Science (http://catalog.unomaha.edu/undergraduate/college-engineering/construction/construction-engineering-bs/)
- Construction Management, Bachelor of Science (http://catalog.unomaha.edu/undergraduate/college-engineering/construction/construction-management-bs/)
- Construction Management Minor (http://catalog.unomaha.edu/undergraduate/college-engineering/construction/construction-management-minor/)

CNST 112 CONSTRUCTION COMMUNICATIONS (3 credits)
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.

CNST 131 INTRODUCTION TO THE CONSTRUCTION INDUSTRY (1 credit)
Introduction to basic management principles and practices for labor, materials, machinery, and budgets.

CNST 225 INTRODUCTION TO BUILDING INFORMATION MODELING (3 credits)
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.
Prerequisite(s): CNST 112

CNST 241 HORIZONTAL CONSTRUCTION (3 credits)
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.
Prerequisite(s): MATH 1950

CNST 242 VERTICAL CONSTRUCTION (3 credits)
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.
Prerequisite(s): MATH 1950

CNST 251 CONSTRUCTION MATERIALS AND SPECIFICATIONS (3 credits)
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.
Prerequisite(s): MATH 1950

CNST 252 CONSTRUCTION MATERIALS AND TESTING (3 credits)
Introduction to basic materials used in construction. Laboratory testing and evaluation of material properties of soil, aggregate, and concrete.
Prerequisite(s): MATH 1950; parallel registration in CNST 241 is recommended. Laboratory testing procedures emphasizing testing of aggregates, soil, and concrete.

CNST 305 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): PHYS 1050

CNST 306 ELECTRICAL SYSTEMS (3 credits)
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.
Prerequisite(s): MATH 1950, PHYS 1050.

CNST 331 STRUCTURAL MECHANICS (3 credits)
Introduction to various external force systems, and their resulting internal forces and deformations, which act on structural elements.
Prerequisite(s): Not open to non-degree graduate students.

CNST 332 STRUCTURAL OPTIMIZATION (3 credits)
Optimization of key properties of elements and systems of building structures: force, geometric, and material.
Prerequisite(s): CNST 331. Not open to non-degree graduate students.

CNST 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 CONE 378).
Prerequisite(s): CNST 112.

CNST 379 CONSTRUCTION ESTIMATING II (3 credits)
Continuation of CNST 3780 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.
Prerequisite(s): CNST 378

CNST 405 MECHANICAL ESTIMATING (3 credits)
Application of estimating principles, quantity take-off, bidding strategies, and computerization to the specialty field of mechanical construction.
Prerequisite(s): CNST 305 and CNST 306 and CNST 379

CNST 406 ELECTRICAL ESTIMATING (3 credits)
Application of estimating principles, quantity take-off, bidding strategies, and computerization to the specialty field of electrical construction.
Prerequisite(s): CNST 305, CNST 306 and CNST 379.

CNST 411 PROJECT ADMINISTRATION (3 credits)
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. (Cross-listed with CNST 811).
Prerequisite(s): CNST 379. Not open to non-degree graduate students.

CNST 415 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 815).
Prerequisite(s): CNST 305, CNST 306 and CNST 379. CNST 405 and CNST 406 are recommended.

CNST 420 PROFESSIONAL PRACTICE AND ETHICS (3 credits)
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. (Cross-listed with CNST 820).
Prerequisite(s): CNST 379, LAWS 3930. Not open to non-degree graduate students.

CNST 425 ALTERNATIVE PROJECT DELIVERY METHODS (3 credits)
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. (Cross-listed with CNST 825)
Prerequisite(s): CNST 379. Not open to non-degree graduate students.

CNST 434 THE DESIGN-BUILD PROJECT DELIVERY SYSTEM (3 credits)
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. (Cross-listed with CNST 834)
Prerequisite(s): CNST 379. Not open to non-degree graduate students.

CNST 436 INTENT AND APPLICATION OF INTERNATIONAL BUILDING CODE (3 credits)
Fundamentals of how to research, interpret, and apply building code requirements to the design and construction of both new and renovated structures. (Cross-listed with CNST 836)
Prerequisite(s): CNST 379. Not open to non-degree graduate students.

CNST 440 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 840)
Prerequisite(s): CNST 225 and CNST 378.

CNST 442 HEALTHCARE DESIGN AND CONSTRUCTION (3 credits)
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. (Cross-listed with AREN 8426, AREN 4420, CNST 842).
Prerequisite(s): Senior or graduate standing

CNST 444 CONSTRUCTION SITE SAFETY MANAGEMENT (3 credits)
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. (Cross-listed with CNST 844).
Prerequisite(s): CNST 241 or CONE 319. Not open to non-degree graduate students.

CNST 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 CONE 476).
Prerequisite(s): CNST 378 and CONE 206.

CNST 480 PRODUCTIVITY AND HUMAN FACTORS IN CONSTRUCTION (3 credits)
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. (Cross-listed with CNST 880).
Prerequisite(s): CNST 379 and senior standing. Not open to non-degree graduate students.

CNST 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 882, CONE 482, CONE 882).
Prerequisite(s): CNST 379. Not open to non-degree graduate students.

CNST 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 885, CONE 485, CONE 885)
Prerequisite(s): CNST 378. Not open to non-degree graduate students.

CNST 486 CONSTRUCTION MANAGEMENT SYSTEMS (3 credits)
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. (Cross-listed with CNST 886).
Prerequisite(s): CNST 379. Not open to non-degree graduate students.

CNST 488 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 888).
Prerequisite(s): CNST 379.

CNST 489 SENIOR CONSTRUCTION PROJECT (3 credits)
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. Capstone course.
Prerequisite(s): CNST 379; CNST 420; CNST 476 ; CNST 4850. Pre/Coreq: CNST 480.

CNST 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 CONE 495).
Prerequisite(s): Permission of instructor, Letter of application, Letter of agreement from industry mentor. Not open to non-degree graduate students.

CNST 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 898, CONE 498).

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).
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)