

# Construction Management & Engineering (CM&E)

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## **CM&E 111. Introduction to Construction Management and Engineering. 1 Credit.**

This course provides an introduction to the roles and duties of construction professionals and the various career opportunities available to construction graduates. 1 lecture. F.

## **CM&E 194. Individual Study. 1-3 Credits.**

## **CM&E 196. Field Experience. 1-15 Credits.**

## **CM&E 199. Special Topics. 1-5 Credits.**

## **CM&E 200. Construction Documents and Codes. 3 Credits.**

This course provides an introduction to construction working drawings; methods and materials of construction; and building codes. Prereq: Construction Management or Construction Engineering majors only.

## **CM&E 203. Building Construction: Methods and Materials. 3 Credits.**

This course provides an introduction to the fundamentals of building construction, materials, and methods for residential and commercial construction. Prereq: CM&E 200 and students must be admitted to the Construction Management program and be at least sophomore standing.

## **CM&E 204. Construction Surveying. 3 Credits.**

An introduction to basic surveying procedures and operations for construction site layout, alignment, and dimension control. Fieldwork topics include the operation of automatic levels, laser levels, transit theodolites, total stations, and GPS receivers. 2 one-hour lectures and 1 three-hour fieldwork.

Prereq: MATH 105, Construction Management or Construction Engineering majors and at least sophomore standing.

## **CM&E 212. Construction Graphic Communications. 3 Credits.**

This course provides an introduction to computer aided drafting (AutoCAD) for the creation of two-dimensional drawings related to the construction industry including a comprehensive final project layout using the techniques introduced in the course. Prereq: Construction Management or Construction Engineering major.

## **CM&E 240. Financial Cost Concepts for Construction Managers. 3 Credits.**

This course provides an introduction to financial management and economic appraisal of construction projects. Topics include: accounting systems; financial documents; managing costs and cash flow; setting profit margins for bidding; time value of money; and economic evaluation of projects.

Prereq: ECON 105, Construction Management or Construction Engineering major with at least sophomore standing.

## **CM&E 250. Construction Statics and Mechanics. 3 Credits.**

This course provides an introduction to the principles of statics and strength of materials with a focus on the behavior of structural components and systems in the construction industry. Prereq: MATH 146 or higher, Construction Management major and at least sophomore standing.

## **CM&E 260. Soils and Foundations. 3 Credits.**

This course provides a discussion of the aspects of engineering & physical properties of soils; stress; settlement; consolidation; slope stability; earth pressure; bearing capacity; drainage; pore pressure; and foundations. 2 lectures, 1 three-hour laboratory. Prereq: Construction Management majors only.

## **CM&E 291. Seminar. 1-3 Credits.**

## **CM&E 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

## **CM&E 294. Individual Study. 1-3 Credits.**

## **CM&E 299. Special Topics. 1-5 Credits.**

## **CM&E 301. Construction Technology and Equipment. 3 Credits.**

This course provides a discussion of construction techniques; analysis of equipment costs; production; methods of equipment selection; earthwork; dewatering systems; and aggregate production. Prereq: CM&E 240, admission to the Construction Management or Construction Engineering program and junior or senior standing. S.

## **CM&E 305. Pre-Construction Management. 3 Credits.**

Looks into the construction management process, giving insight to how the construction professional interacts with other industry professionals. Overview of estimating, scheduling, and administrative functions of a project and the collaborative efforts required. Prereq: Admission to the Construction Management or Construction Engineering program and at least junior standing.

## **CM&E 315. Specifications and Contracts. 3 Credits.**

This course provides a discussion of various types of construction contracts; contract administration; specifications using CSI and AIA documents. 3 lectures. Prereq: Admission to Construction Management or Construction Engineering program and Junior standing. F.

**CM&E 379. Global Seminar. 1-6 Credits.**

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

**CM&E 380. Construction Estimating: Quantities and Costs. 3 Credits.**

This course provides an introduction to the methods and techniques of conceptual and detailed construction estimating, including: quantity takeoffs; costs related to labor, materials, equipment, overhead and profit; and bidding strategies. Prereq: CM&E 200 and admission to the Construction Management or Construction Engineering program and at least junior standing.

**CM&E 391. Seminar. 1-3 Credits.**

**CM&E 394. Individual Study. 1-3 Credits.**

**CM&E 397. Fe/Coop Ed/Internship. 1-4 Credits.**

**CM&E 399. Special Topics. 1-5 Credits.**

**CM&E 403. Scheduling and Project Control. 3 Credits.**

This course provides a discussion on the theories, principles, and techniques of construction planning and scheduling with an emphasis on time management, costs, and resources through the preparation and analysis of network schedules. Co-req or Prereq: CM&E 380. Prereq: Admission to the Construction Management or Construction Engineering program and at least junior standing. {Also offered for graduate credit - see CM&E 603}.

**CM&E 405. Construction Support Operations. 3 Credits.**

This course provides an introduction to construction safety, construction quality control management, and labor productivity. Prereq: STAT 330. {Also offered for graduate credit - see CM&E 605}.

**CM&E 421. Electrical and Mechanical Construction. 3 Credits.**

This course provides an introduction to electrical and mechanical systems, the design and construction procedures used, code-based requirements, interaction with general construction and structural components, and spatial requirements. Prereq: PHYS 211 or PHYS 251 or PHYS 252 and admission to the Construction Management program and at least senior standing. S.

**CM&E 430. Land Development. 3 Credits.**

This course provides an introduction to the practical applications of the planning, design, and construction phases of the land development process. Prereq: CM&E 204, CM&E 212 and admission to the Construction Management program and at least senior standing. F {Also offered for graduate credit - see CM&E 630}.

**CM&E 431. Sustainable Design and Construction. 3 Credits.**

This course prepares students to become green building leaders and sustainability-focused citizens. This course involves the pre-selection and evaluation of a building to improve its sustainable performance through reviewing feasibility assessments, project management, implementation, audits, and documentation. Prereq: Admission to the Construction Management or Construction Engineering majors with at least junior standing.

**CM&E 450. Steel Design and Construction. 3 Credits.**

This course provides a discussion of the selection and design of structural steel systems and methods of construction assembly. 3 lectures. Prereq: CM&E 250 and admission to the Construction Management program and senior standing. F.

**CM&E 453. Concrete Design and Construction. 3 Credits.**

This course provides an introduction to the fundamental concepts of concrete construction from both design and construction perspectives. 2 one-hour lectures, 1 three-hour laboratory. Prereq: CM&E 250 and CM&E 260 and admission to the Construction Management program and senior standing. S.

**CM&E 460. Infrastructure Management. 3 Credits.**

This course provides an introduction to the methodologies, tools, and techniques of infrastructure management. Course topics focus on performance measures; deterioration modeling; life-cycle costs; optimization; budgeting; financial management; and policy analysis. Prereq: Junior standing. {Also offered for graduate credit - see CM&E 660}.

**CM&E 465. Bridge Engineering and Management. 3 Credits.**

This course provides an introduction to the planning, design, construction, and management concepts of structural steel and reinforced concrete bridges, including: application of AASHTO LRFD specifications and latest developments in bridge management systems. Prereq: Admission to the Construction Management or Construction Engineering program and senior standing. {Also offered for graduate credit - see CM&E 665}.

**CM&E 475. Design of Site Erosion Control. 3 Credits.**

This course provides an introduction to construction site erosion mechanisms; site hydrology and sediment transport; the selection, design, and maintenance of erosion control devices; and erosion control standards and regulations. Prereq: CE 309.

**CM&E 486. Building HVAC Design. 3 Credits.**

This course discusses design of the hardware necessary to satisfy a building's heating /cooling loads and ventilation. The hardware includes piping, pumps, diffusers, fans, ducts, cooling towers, and refrigeration equipment. Prereq: ME 485 and senior standing in Construction Engineering Program, or admission to Professional ME Program.

**CM&E 487. Building Automation and Control Systems. 3 Credits.**

This course is about automation and direct digital control for programmable control of commercial building HVAC systems, including control technology; measuring technology; actuators; control valves and dampers; control of HVAC plants; data communication. Prereq: CM&E 486 and ECE 301 and senior standing in Construction Engineering or Mechanical Engineering program. {Also offered for graduate credit - see CM&E 687.

**CM&E 488. Construction Management Capstone. 3 Credits.**

This course focuses on applying knowledge and skills learned in the previous courses, a look into construction management process, interactions, marketing, estimating, scheduling, and other functions for a management plan for a construction project. Students are required to take the Associate Constructor (AC) Exam to demonstrate their knowledge in construction management area. Prereq: CM&E 380, CM&E 403 and senior standing in Construction Management.

**CM&E 489. Construction Design Capstone. 3 Credits.**

This course focuses on the design and construction aspects of an actual construction project. Students are required to take the Fundamentals of Engineering (FE) Exam to demonstrate their knowledge in the construction engineering area. Prereq: CM&E 380, CM&E 403 and senior standing in Construction Engineering.

**CM&E 491. Seminar. 1-5 Credits.****CM&E 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

**CM&E 494. Individual Study. 1-5 Credits.****CM&E 496. Field Experience. 1-15 Credits.****CM&E 499. Special Topics. 1-5 Credits.****CM&E 603. Scheduling and Project Control. 3 Credits.**

This course provides a discussion on the theories, principles, and techniques of construction planning and scheduling with an emphasis on time management, costs, and resources through the preparation and analysis of network schedules. F {Also offered for undergraduate credit - see CM&E 403.}

**CM&E 605. Construction Support Operations. 3 Credits.**

This course provides an introduction to construction safety, construction quality control management, and labor productivity. {Also offered for undergraduate credit - see CM&E 405.}

**CM&E 630. Land Development. 3 Credits.**

This course provides an introduction to the practical applications of the planning, design, and construction phases of the land development process. F {Also offered for undergraduate credit - see CM&E 430.}

**CM&E 660. Infrastructure Management. 3 Credits.**

This course provides an introduction to the methodologies, tools, and techniques of infrastructure management. Course topics focus on performance measures; deterioration modeling; life-cycle costs; optimization; budgeting; financial management; and policy analysis. Prereq: Junior standing. {Also offered for undergraduate credit - see CM&E 460.}

**CM&E 665. Bridge Engineering and Management. 3 Credits.**

This course provides an introduction to the planning, design, construction, and management concepts of structural steel and reinforced concrete bridges, including: application of AASHTO LRFD specifications and latest developments in bridge management systems. Prereq: Senior standing. {Also offered for undergraduate credit - see CM&E 465.}

**CM&E 687. Building Automation and Control Systems. 3 Credits.**

This course is about automation and direct digital control for programmable control of commercial building HVAC systems, including control technology; measuring technology; actuators; control valves and dampers; control of HVAC plants; data communication. {Also offered for undergraduate credit - see CM&E 487.}

**CM&E 696. Special Topics. 1-5 Credits.****CM&E 701. Construction Technology and Equipment. 3 Credits.**

This course provides an overview of advanced construction technology and equipment. It covers site improvement, industrial plants, pavements, tunnels, buildings, construction innovation, sustainability, equipment selection and optimization, replacement analysis, and mathematical modeling in construction.

**CM&E 703. Advanced Project Planning and Control. 3 Credits.**

This course provides a discussion on advanced and emerging theories, principles, tools and techniques of planning, monitoring, and control problems and uncertainties arising in construction projects. Prereq: CM&E 603 or equivalent.

**CM&E 711. Construction Cost Estimating. 3 Credits.**

This course provides an advanced discussion of quantity takeoffs; labor, materials, equipment, and overhead costs; profit; and bidding strategies for construction projects. F.

**CM&E 712. Construction Management. 3 Credits.**

This course provides advanced topics on responsibilities and issues that construction professionals typically encounter as they administer a construction project. F.

**CM&E 715. Construction Specifications and Contracts. 3 Credits.**

This course provides a discussion of the procedures used to prepare and administer construction specifications and contracts, including: Construction Specification Institute format, AIA Documents, General Conditions, and liabilities and incentives for various construction contracts.

**CM&E 725. Decision Making and Risk Analysis. 3 Credits.**

Decision-making and decision theory. Decision support systems, applied risk identification, and analysis in construction activities. Computer applications. Prereq: CM&E 403. 3 lectures. S.

**CM&E 740. Financial and Economic Concepts for Construction Managers. 3 Credits.**

This course provides an advanced discussion of financial management and the economic appraisal of construction projects, including: accounting systems, financial documents, managing costs and cash flow, setting profit margins for bidding, time value of money, and economic evaluation of projects.

**CM&E 770. Construction Organization Processes. 3 Credits.**

The course provides an overview of critical management skills and the analysis of organizational management systems. Theories of motivation, planning, leadership, organizational interactions, etc. as they relate to construction operations.

**CM&E 785. Advanced Project Engineering and Management. 3 Credits.**

This course provides a discussion of advanced topics in construction project engineering and management. Topics include: Geographic Information Systems (GIS) applications in construction, front end planning, and forensic engineering.

**CM&E 790. Graduate Seminar. 1-5 Credits.**

**CM&E 793. Individual Study/Tutorial. 1-5 Credits.**

**CM&E 795. Field Experience. 1-15 Credits.**

**CM&E 797. Master's Paper. 1-3 Credits.**

**CM&E 798. Master's Thesis. 1-10 Credits.**