

CONSTRUCTION MANAGEMENT (CM)

- CM 9. Construction Surveying and Layout.** 3 Units
Prerequisite(s): CM 10, CM 20, CM 21 and either Math 26A or MATH 30 ; CM 21 and Math 26A or MATH 30 may be taken concurrently.
Corequisite(s): CM 21.
 Geomatics and the principles of surveying measurements for distance, direction, and elevation. Special emphasis on the application of surveying skills relevant to the field of construction, including building, bridge, and sitework layout techniques and procedures, establishment of reference line and grade, topographic mapping, and earthwork computations. Lecture two hours. Laboratory 3 hours.
- CM 10. The Construction Industry.** 1 Unit
 Introduction to the Construction Management program and the many facets of the construction industry and to the various career opportunities. The unique products of construction, the organizations involved, and the people that make it happen. Guest speakers. Lecture one hour.
 Credit/No Credit
- CM 20. Construction Materials and Processes.** 3 Units
Prerequisite(s): CM 10, ENGL 1A; CM 10 may be taken concurrently.
 Introduction to construction materials; to their properties in-place in completed projects, and to their characteristics that affect construction processes. The organizations, methods, equipment and safety considerations that are common to projects of all types and to all segments of the industry. Field trips. Lecture two hours; laboratory three hours.
 Field trip(s) may be required.
- CM 21. Construction Graphics.** 3 Units
Prerequisite(s): ENGL 1A and CM 10; CM 10 may be taken concurrently.
 Instruction and exercises in graphic techniques and procedures applicable to construction. Analysis of drawings in the civil, architectural, structural, mechanical, and electrical fields and how drawings affect construction planning. Freehand sketching. Isometric and oblique projections. Material quantity surveying. Lecture two hours; laboratory three hours.
- CM 22. Construction Documents.** 3 Units
Prerequisite(s): ENGL 1A, CM 20, and CM 21; CM 20 may be taken concurrently.
 Analyzes construction contract documents. Technical and legal interpretations and implications to managers of the construction process. Quantity surveying. Lecture two hours; laboratory three hours.
- CM 30. Engineering Mechanics--Statics.** 3 Units
Prerequisite(s): MATH 26B, PHYS 5A; MATH 26B may be taken concurrently.
 Introduction to the solution of engineering design problems. Concepts of units, vectors, equilibrium, forces, force systems, shear and moment diagrams. Lecture three hours.
- CM 40. Properties of Construction Materials.** 3 Units
Prerequisite(s): PHYS 5A.
 Study of the engineering performance characteristics of materials. Covers testing concepts and procedures. Includes basic properties of metals, aggregates, cements, concrete, timber, asphalt, masonry and plastics with emphasis on construction applications. Lecture two hours; laboratory three hours.
- CM 96A. Fundamentals of Construction Management.** 3 Units
 Introduction to the Construction Management program. Critical reading, thinking and writing for the construction profession. Introduction to visualization and graphic communication using software. Introduction to quantitative software commonly used in the construction industry.
- CM 110. Legal Aspects of Construction.** 3 Units
Prerequisite(s): Senior class standing, MGMT 101, CM 22.
Corequisite(s): CM 126
 Application of advanced legal concepts to the construction process. Analyzes problems relating to contract formation, administration, and interpretation. Includes bidding and contract enforcement; litigation of disputes vs. arbitration; liability for negligence, warranty, and strict liability; safety; license law requirements; mechanics' liens and stop notices; bond rights and obligations. Lecture three hours.
- CM 111. Construction Labor Relations.** 3 Units
 Study of federal and state labor law; labor unions, and their importance in the construction industry; and an analysis of the growth of open-shop construction. Employment law. Lecture three hours.
- CM 120. Construction Operations and Methods Analysis.** 3 Units
Prerequisite(s): CM 22.
Corequisite(s): CM 121.
 Introduction to the analysis and management of construction projects in terms of the work that must be performed in the construction process. Analyzes operations and methods using concepts and techniques, including video, that are applicable to all types of projects in all segments of the industry, variables affecting productivity. Safety as an integral part of project and operations management. Field trips. Lecture two hours; laboratory three hours.
 Field trip(s) may be required.
- CM 121. Fundamentals of Construction Estimating.** 3 Units
Prerequisite(s): CM 22.
Corequisite(s): CM 120.
 Study of the basic approaches to estimating the cost of construction projects from a managerial viewpoint. Types of estimates and methods; elements of cost, variables and costing concepts; analysis procedures for detailed estimates. Lecture two hours; laboratory three hours.
- CM 124. Engineering Construction.** 3 Units
Prerequisite(s): CM 125, CM 135.
 Study of engineering construction projects with emphasis on equipment-paced operations including safety aspects. Engineering fundamentals and other factors that affect equipment selection and production. Amplification of recording and analysis techniques. Unit price contracts. Field trips. Lecture two hours; laboratory three hours.
 Field trip(s) may be required.
- CM 125. Advanced Estimating and Bidding.** 3 Units
Prerequisite(s): CM 120, CM 121.
 Study of the concepts and practices involved in the total estimating and bidding process in construction, from initial project selection to submission of final bids. Covers considerations in project selection, sub-bid analysis, contingency and risk analysis, pricing concepts, bidding models, and an introduction to computer applications. A complete project estimate and bid is prepared by each student. Lecture two hours; laboratory three hours.

- CM 126. Construction Project Management. 3 Units**
Prerequisite(s): CM 125, CM 127.
Corequisite(s): CM 110.
 Introduction to the study of Project Management as it is used on the larger construction project. Students study how construction contractors manage cost, time, scope, and quality. The theory of Project Management is developed and compared to management of the on-going business enterprise. Matrix and functional organizations are examined within the context of the industrial, commercial and heavy contract construction industries using the principles of the management process. Lecture three hours.
- CM 127. Planning, Scheduling and Control. 3 Units**
Prerequisite(s): CM 121.
 Study of the concepts used in planning and controlling construction projects. Arrow, PERT, precedence, and linear scheduling methods; resource leveling; time-cost analysis; bar charts; and time-scaled diagrams. Manual procedures followed by computer applications. Lecture three hours.
- CM 129. Senior Project. 3 Units**
Prerequisite(s): CM 110, CM 111, CM 124, CM 126, HROB 101.
 Consideration of technical, legal, business and human factors (including safety) in applying the functional approach to the management of construction organizations, projects, and operations. The individual construction professional in a competitive industry: personal and professional development, ethics, stress, physical and mental health. The industry and the construction professional in relation to the social and physical environments. Lecture three hours.
- CM 130. Structures I -- Design Principles and Structural Steel Design. 3 Units**
Prerequisite(s): CM 30, CM 40; CM 40 may be taken concurrently.
 Introduction to structural design. Consideration of load conditions, stresses, strain, beam deflection and column action. Basic design of structural steel members with emphasis on systems used in practical situations. Beams, trusses, and columns are designed using the Uniform Building Code as a reference and the results are shown on detailed drawings and sketches. Lecture three hours.
- CM 135. Soils and Foundations. 3 Units**
Prerequisite(s): CM 130.
 Study of the properties and behaviors of soils used as materials in construction. Index and physical properties of soils including compaction; permeability, compressibility, and shear strength. Methods of laboratory and field tests. Principles of foundation design, pavements, embankments and temporary soil support systems for trenches and cuts. Lecture two hours; laboratory three hours.
- CM 136. Principles of Mechanical and Electrical Engineering. 3 Units**
Prerequisite(s): PHYS 5B, CM 30.
 Basic principles of thermodynamics with application to heating, ventilating and air conditioning systems. Introduction to electrical circuits and circuit analysis with construction applications. Lecture three hours.
- CM 140. Structures II -- Timber and Formwork Design. 3 Units**
Prerequisite(s): CM 130.
 Basic design of structural timber members with emphasis on systems used in practical situations. Beams, trusses, and columns are designed using the Uniform Building Code as a reference and the results are shown on detailed drawings and sketches. Application of engineering principles to satisfy construction requirements that are not designed or shown in typical construction documents. Includes analysis and design of concrete form systems, shoring, and falsework, and construction dewatering. Lecture three hours.
- CM 150. Structures III -- Reinforced Concrete and Reinforced Masonry. 3 Units**
Prerequisite(s): CM 130.
 Basic design concepts of reinforced concrete and reinforced masonry design. Topics and examples include design of beams, slabs, columns and walls. Students are required to demonstrate drafting ability. Assignments include design and drawings of various structural systems. Lecture three hours.
- CM 199. Special Problems. 1 - 3 Units**
 Individual projects or directed reading.
Note: Open only to students competent to carry on individual work. Admission to this course requires approval of an instructor and the program coordinator.
 Credit/No Credit