

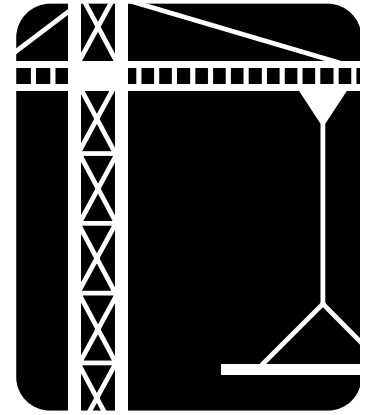


NOTE:

This document is specific to the
2002-2004 printed catalog.

engineering — construction management

BACHELOR OF SCIENCE
MINOR IN BUSINESS
ADMINISTRATION



PROGRAM DESCRIPTION

The CSUS Construction Management degree prepares students for managerial positions with contractors and other organizations involved in the construction process. For a graduate, this preparation can combine with experience and lead to recognition as a construction professional, a Constructor. The construction professional is responsible for the execution of construction work, for the creation of completed projects from plans prepared by design professionals such as Architects and Engineers. What is to be built is defined by design professionals; how the work is to be accomplished is the concern of the Constructor. A Constructor is master of the construction process, the process that involves determining the methods to be used and directing the economical application of resources in the construction of timely and safe projects at satisfactory prices, and to the required standards of quality.

The immediate objective of the program is to provide university-level preparation for managerial positions in construction and a foundation for continued learning. The curriculum emphasizes subject areas that are significant to the Constructor: engineering fundamentals, construction management, business administration, humanities and social sciences, and the development of analytical and communication skills.

FACULTY

Keith Bisharat, *Coordinator*
Keith Bisharat, Donald Nostrant, Donald L. Steward
Gina Lombardo, *Administrative Support Assistant*
Department Office, Riverside Hall 4024, (916) 278-6616

FEATURES

To meet the objectives of this specialized professional program, the Construction Management curriculum consists of four distinct components.

The **engineering** component, based in sciences and mathematics, stresses engineering principles and their application to the construction process. This component provides sound engineering fundamentals.

The **construction management** component utilizes the functional approach as a framework for studying the management of the construction process. In the individual courses, construction activities are analyzed from a managerial viewpoint and the functions of management are stressed.

Courses in **business administration**, the supporting field, form the third component and reinforce the program's management emphasis. A minor in Business Administration is obtained by combining the required lower and upper division business courses. Furthermore, completing the minor requirements can satisfy many of the core requirements of the graduate program in Business Administration at CSUS.

The fourth component — **general education** courses — is critical to the success of construction students, who must be sensitive to the issues driving contemporary society.

Overall, the curriculum provides the balanced content that is essential to construction professionals. This unique program is accredited by the American Council for Construction Education (ACCE).

CAREER POSSIBILITIES

Construction Manager • General Contractor • Sub-Contractor • Project Manager • Construction Estimator • Technical Salesperson • Construction Scheduler or Planner • Forensic Construction Specialist

DEGREE REQUIREMENTS • BS

Lower Division Premajor: 33 units

Lower Division Business: 15 units

Upper Division Major: 42 units

Upper Division Business: 12 units

Minimum total units for the BS: 138

Note: Additional units may be required to meet the CSUS foreign language requirement. See page 86.

Courses in parentheses are prerequisites.

A. Required Lower Division Courses (Pre-major)

1. First Semester Freshman Year - Spring (16 units)

- (3) ENGL 001A* College Composition (EPT score of 151 or above, or completion of ENGL 001)
- (1) MIS 001A Microcomputer Hardware and Software
- (1) MIS 001B Spreadsheets (MIS 001A, instructor permission, or a passing score on the MIS 001A competency examination)
- (1) MIS 001C Word Processing and Presentation Graphics (MIS 001A, instructor permission, or a passing score on the MIS 001A competency examination)
- (3) MATH 026A Calculus I for the Social and Life Sciences (MATH 011 or three years of high school mathematics which includes two years of algebra and one year of geometry; completion of ELM requirement and the Intermediate Algebra Diagnostic Test) **OR**
- MATH 030* Calculus I (MATH 029 or four years of high school mathematics which includes two years of algebra, one year of geometry, and one year of mathematical analysis; completion of ELM requirement and Pre-Calculus Diagnostic Test)
- (4) PHYS 005A* General Physics: Mechanics, Heat, Sound (Recently completed three years of high school algebra and geometry; and a college course in algebra and trigonometry [MATH 009 recommended] for those having an inadequate mathematics background)
- (3) General Education Course

2. Second Semester Freshman Year - Fall (17 units)

- (1) CM 010 The Construction Industry
- (3) CM 020 Construction Materials and Processes
- (3) MATH 026B Calculus II for the Social and Life Sciences (MATH 026A or appropriate high school based AP credit) **OR**
- MATH 031* Calculus II (MATH 030 or appropriate high school based AP credit)
- (3) ENGL 020 Expository Writing (ENGL 001A with a grade "C-" or better, or equivalent) **OR**
- ENGR 150 Technical Communications
- (3) OBE 018 Business Law
- (4) PHYS 005B* General Physics: Light, Electricity and Magnetism, Modern Physics (PHYS 005A or instructor permission)

3. First Semester Sophomore Year - Spring (16 units)

- (3) ACCY 001 Accounting Fundamentals
- (3) CE 009 Plane and Topographic Surveying (MATH 026A or MATH 030; may be taken concurrently)
- (3) CM 021 Construction Graphics (CM 020, competence in mechanical drawing)
- (3) CM 040 Properties of Construction Materials (CM 020, PHYS 005A)
- (4) BIO 005 General Biology

4. Second Semester Sophomore Year - Fall (18 units)

- (3) ACCY 002 Managerial Accounting (ACCY 001)
- (3) CM 022 Construction Documents (CM 010, CM 021, OBE 018)
- (3) CM 030 Engineering Mechanics—Statics (CM 021, MATH 026B, PHYS 005A; MATH 026B may be taken concurrently,)
- (3) COMS 004* Introduction to Public Speaking **OR**
- COMS 005* The Communication Experience
- (3) STAT 001* Introduction to Statistics (MATH 009 or three years of high school mathematics which includes two years of algebra and one year of geometry; completion of ELM requirement and the Intermediate Algebra Diagnostic Test)
- (3) ECON 001A Introduction to Macroeconomic Analysis **OR**
- ECON 001B Introduction to Microeconomic Analysis

* Indicates courses that can also be used to satisfy General Education requirements. For the degree, students must satisfy all the University's General Education requirements for Construction Management. Students should contact the program office for a complete list of these requirements. A second year foreign language course (2A or equivalent) may also satisfy 3 units of GE when the course is being taken to comply with the CSUS foreign language requirement. Students should consult with an advisor for exact GE eligibility of these courses.

Notes:

- High school chemistry (one year), mechanical drawing (one year), and trigonometry (one-half year) also required. Students without this high school preparation must take the necessary courses in addition to those listed above.
- The recommended course sequence in lower division may change. Students should consult the Construction Management Program Office for current information.

B. Required Upper Division Courses (Major)

Upper division Construction Management courses are open only to students who have satisfactorily completed all required lower division preparation and have been admitted to the major. Lower division prerequisites are noted below only to show the relationship of the subjects.

1. First Semester Junior Year - Spring (18 units)

- (3) CM 120 Construction Operations and Methods Analysis (CM 022)
- (3) CM 121 Fundamentals of Construction Estimating (CM 022; Corequisite: CM 120)
- (3) CM 130 Structures I - Design Principles and Structural Steel Design (CM 030, CM 040)
- (3) Select one of the following:
 - OBE 117 Business, Ethics, and Society
 - OBE 130 Business Communications (Completion of Area A in General Education and English 20. Recommend COMS 002 or COMS 004)
- (3) General Education Course
- (3) General Education Course

2. Second Semester Junior Year - Fall (18 units)

- (3) CM 111 Construction Labor Relations
- (3) CM 125 Advanced Estimating and Bidding (CM 121)
- (3) CM 127 Planning, Scheduling and Control (CM 120, CM 121)
- (3) CM 135 Soils and Foundations (CM 130)
- (3) CM 140 Structures II - Timber and Formwork Design (CM 130)
- (3) OBE 150 The Management of Contemporary Organizations

3. First Semester Senior Year - Spring (18 units)

- (3) CM 110 Legal Aspects of Construction (OBE 018, CM 022)
- (3) CM 124 Engineering Construction (CM 125, CM 135)
- (3) CM 126 Construction Project Management (CM 125, CM 127)
- (3) CM 150 Structures III - Concrete and Masonry (CM 140)
- (3) Select one of the following:
 - MGMT 120 Principles of Marketing
 - MGMT 133 Business Finance
 - MGMT 180 Operations Management
- (3) General Education Course

4. Second Semester Senior Year - Fall (18 units)

- (3) CM 129* Construction Management (CM 110, CM 111, CM 124, CM 126, OBE 150)
- (3) CM 136 Principles of Mechanical and Electrical Engineering (PHYS 005B, CM 030)
- (3) BA Elective A 100-level Business Administration course
- (3) General Education Course
- (3) General Education Course
- (3) General Education Course

*Indicates courses that also can be used to satisfy General Education requirements. For the degree, students must satisfy all the University's General Education requirements for Construction Management. Students should contact the program office for a complete list of these requirements.

Note: Business Administration lower and upper division courses apply both to the major and to a Business Administration minor. Students interested in pursuing a pre-MBA sequence should contact the Degree Program Center in the College of Business Administration.

Cooperative Education

Students are encouraged to participate in the Cooperative Education Program which provides alternate periods of study at the University and practical work experience in industry or government for pay. Most participants of the Co-op plan will complete one six-month work period in their junior year and the other in their senior year.

Academic credit is granted for successful completion of the Co-op phase. Students interested in the Cooperative Education Program should apply in the satellite office in Riverside Hall 2004 or the main office in Lassen Hall 2008. For information call (916) 278-7234.

LOWER DIVISION COURSES

CM 010. The Construction Industry. An introduction to 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. Fall only. 1 unit.

CM 020. Construction Materials and Processes. An 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. Fall only. 3 units.

CM 021. Construction Graphics. Instruction and exercises in graphic techniques and procedures applicable to construction. The analysis of drawings in the civil, architectural, structural, mechanical and electrical field and how drawings affect construction planning. Freehand sketching. Isometric and oblique presentations. Quantity surveying. Laboratory nine hours. **Prerequisite:** CM 020, competence in mechanical drawing. Spring only. 3 units.

CM 022. Construction Documents. Analysis of construction contract documents. Technical and legal interpretations and implications to managers of the construction process. Quantity surveying. Lecture two hours; laboratory three hours. **Prerequisite:** CM 010, CM 021, OBE 018. Fall only. 3 units.

CM 030. Engineering Mechanics—Statics. An introduction to the solution of engineering design problems. Concepts of units, vectors, equilibrium, forces, force systems, shear and moment diagrams. Lecture three hours. **Prerequisite:** CM 021, MATH 026B, PHYS 005A; MATH 026B may be taken concurrently. Fall only. 3 units.

CM 040. Properties of Construction Materials. A 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. **Prerequisite:** CM 020, PHYS 005A. Spring only. 3 units.

UPPER DIVISION COURSES

CM 110. Legal Aspects of Construction. The application of basic legal concepts to the construction process. Analysis of 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. **Prerequisite:** OBE 018, CM 022. Spring only. 3 units.

CM 111. Construction Labor Relations. A 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. Fall only. 3 units.

CM 120. Construction Operations and Methods Analysis. An introduction to the analysis and management of construction projects in terms of the work that must be performed in the construction process. Analysis of operations and methods using concepts and techniques, including video, that are applicable to all types of projects in all segments of the industry. Safety as an integral part of project and operations management. Field trips. Lecture two hours; laboratory three hours. **Prerequisite:** CM 022. Spring only. 3 units.

CM 121. Fundamentals of Construction Estimating. A study of the basic approaches to estimating the cost of all types 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. **Prerequisite:** CM 022. **Corequisite:** CM 120. Spring only. 3 units.

CM 124. Engineering Construction. A 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. **Prerequisite:** CM 125, CM 135. Spring only. 3 units.

CM 125. Advanced Estimating and Bidding. A 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, variables affecting labor productivity, 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. **Prerequisite:** CM 121, CM 120. Fall only. 3 units.

CM 126. Construction Project Management. An introductory class in 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. **Prerequisite:** CM 125, CM 127. Spring only. 3 units.

CM 127. Planning, Scheduling and Control. A 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. **Prerequisite:** CM 121. Fall only. 3 units.

CM 129. Construction Management. 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. **Prerequisite:** CM 110, CM 111, CM 126, OBE 150. Fall only. 3 units.

CM 130. Structures I — Design Principles and Structural Steel Design. 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. **Prerequisite:** CM 030, CM 040. Spring only. 3 units.

CM 135. Soils and Foundations. A 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. **Prerequisite:** CM 130. Fall only. 3 units.

CM 136. Principles of Mechanical and Electrical Engineering. 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. **Prerequisite:** PHYS 005B, CM 030. Fall only. 3 units.

CM 140. Structures II — Timber and Formwork Design. 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. **Prerequisite:** CM 130. Fall only. 3 units.

CM 150. Structures III — Concrete and Masonry. 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. **Prerequisite:** CM 140. Spring only. 3 units.

CM 199. Special Problems. 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 student's advisor. 1-3 units.