



B.S. in Construction Management Course Descriptions

CMGT-101 - Construction Graphics

Course Description Students will be introduced to the graphical language of construction and design through a combination of interactive lecture\ demonstration classes, graphic exercises, and hands on exercises. The hands on exercises will include the reading and interpretation of graphics. Graphic and field exercises will present a variety of opportunities for student understanding and expression of both visible field conditions and conceptual details as well as immersing the students in the use of graphics to accurately describe existing built conditions. The required software should be installed in students' personal laptops. See CABE Laptop Requirements for details.

Course Learning Outcomes

- Read and interpret the graphical expression used in a full spectrum of construction drawings, details, and sketches to include, architectural, structural, civil, mechanical, electrical, disciplines.
- Locate information within a set of construction drawings with regard to form, size, distance, quantity of elements, and interrelation of elements
- Convey drawing information completely and accurately, in a narrative form
- Express their understanding of drawings and field conditions using accurate free hand sketches of existing field conditions and suggested details

CMGT-102 – Introduction to the Construction Industry

Course Description This course introduces students to the basic process and pathways of a construction project. The course will explore the various types of construction along with identifying terms and specific industry vocabulary, participants and their roles. The course will include discussions on the methods of contracting used by Construction Managers and there will be group classroom activities simulating real-life construction management challenges. Students will be introduced to topics including planning, programming and documentation from pre-construction to project close-out in a lecture/discussion format. The principles will be reinforced through individual and group classroom activities and exercises.

Course Learning Outcomes

- Define the roles of key project stakeholders throughout the life of a construction project
- Evaluate project success from the perspective of all project stakeholders
- Identify the terms and project delivery systems construction managers used on a daily basis
- Identify how cooperation among stakeholders can enhance project success in a global and societal

context

- Familiarize with the concepts of estimating, bidding, and project execution
- Recognize the importance of ethical conduct in construction

CMGT-104 – Introduction to Estimating and Scheduling

Course Description This course teaches the methodology, procedures, and organizational techniques involved in the preparation of a competitive bid and schedule. Conceptual and detailed estimates are prepared based on real construction documents. The course is structured in laboratory modules that cover the Project Development Process. The intent is to pull the process together in a single course to provide a strong understanding of preliminary design, estimation, scheduling, and analysis. Students will be engaged in the lecture/discussion classroom setting and actively apply the techniques through a variety of practical group exercises and laboratory case experiences of increasing complexity. Estimating with computer software is introduced. The required software should be installed in students' personal laptops. See CABE Laptop Requirements for details.

Prereqs: CMGT-101 & CMGT-102

Course Learning Outcomes

- Understand the various types of estimates that are used in the construction industry
- Recognize how to prepare a quantity takeoffs and extend quantities to costs
- Demonstrate preparing a bid recap/summary
- Formulate and present construction project budgets using common spreadsheet applications
- Develop schedules using the Critical Path Method Algorithm (CPM) and computer-based methods necessary for professional practice
- Examine information vital to the development and maintenance of schedules and budgets
- Interpret the results of changes in the schedule or budget resulting from periodic progress or changes in the nature or scope of the project in an ethical manner
- Express the results of schedule and budget studies in concise written form

CMGT-200 - Construction Project Planning & Scheduling

Course Description This course teaches the study and application of the tools and concepts used in planning and controlling construction projects. Students will employ the Critical Path Method (CPM) of project scheduling, resource leveling, and time-cost analysis using manual and computer-based methods to develop and maintain working project schedule models. The course will broaden the student's understanding and use of construction scheduling methods pertinent to the management of a construction project. The required software should be installed in students' personal laptops. See CABE Laptop Requirements for details.

Prereqs: CMGT 104 or permission of the Program Director

Course Learning Outcomes

- Analyze proposed and ongoing projects through an elemental task framework and understanding the serial and parallel relationships of those elemental tasks
- Apply the CPM algorithm to establish and manage a project schedule using computer-based scheduling software
- Analyze progress data in an active schedule document and generate and interpret progress reports of management information
- Recognize the ways in which effective schedule models and schedule data are used to improve project efficiencies
- Design and conduct what/if studies of an active or proposed project in support of management decisions
- Work effectively in a group to complete and coordinate a multidisciplinary project.
- Express results and ideas related to schedule models both verbally and in writing to various

CMGT-202 - Construction Cost Estimating & Budgeting

Course Description This course will broaden and deepen the student's understanding of construction cost estimating. Topics include general principles of measuring work and preparing quantity takeoffs. Step-by-step methods of estimating to produce an accurate construction cost estimate using the latest in electronic takeoff technology are covered. The course culminates with the students preparing a complete cost estimate for a specific project.

Prereqs: CMGT 104 or permission of the Program Director

Course Learning Outcomes

- Differentiate the varying role of cost estimating in the pre-construction, construction, and close out phases of construction projects
- Demonstrate the application of techniques for performing material quantity surveys from contract documents in architectural, structural, civil, mechanical, plumbing, and electrical, disciplines
- Obtain and use historical unit cost data to prepare the elements of construction cost budgets
- Assemble the quantity and cost information into purchasing and construction budget systems

- Express estimating skills and work effectively in a group in preparing a complete cost estimate and report for a specific multidisciplinary project, including narrative, tabular format, and through oral presentation

CMGT-204 - Behavior of Materials

Course Description The course will broaden and deepen the student's understanding of the external forces systems acting on structural elements and strength of materials-the internal forces and deformations that result from external forces.

Prereqs: MATH-103 or 111 & PHYS-101

Course Learning Outcomes

- Construct free-body diagrams and calculate the reactions of static equilibrium
- Identify and apply the criteria for selecting suitable materials for strength and stiffness for a variety of structural applications
- Calculate simple forces, moments, stress, strain, and shear in structural elements and analyze the physical behavior of those elements under various loads

CMGT-206 - Building Systems

Course Description Through analysis of relevant case studies, this course examines building mechanical and electric systems from the construction manager's point of view. The class will review how the basic design calculations are performed to determine how building systems are selected and designed. Student will review design documents including drawings and specifications on how the subcontractor bid packages are determined and how the subcontracts are purchased. Assessment of the shop drawing process including the review of the mechanical systems shop drawing coordination process, construction of systems, turn-on and energization, start-up, testing, systems balancing, commissioning of systems, final turn-over, training, and demonstration to the Owner and close-out will be included.

Prereqs: CMGT 104 or by permission of Program Director

Course Learning Outcomes

- Identify the component systems incorporated in the design of a commercial building
- Understand and explain the functional relationships of a building's component systems
- Analyze the value of various alternative building systems that is derived from quality, constructability, and performance characteristics
- Evaluate the role various building systems serve in achieving a project's sustainability goals
- Recognize and understand the unique characteristics of building systems with regard to estimating, submittals, commissioning, documentation, and warranty

CMGT-208 - Materials & Methods of Construction

Course Description This course is intended to broaden and deepen the student's understanding of building systems, material science, important to students of construction management, architecture and engineering. Emphasis is placed on exploring the impact of design decisions with construction scenarios on the final product. Topics include site work, foundation, and structural framing systems of concrete, reinforced concrete, site cast and pre-cast concrete; brick and concrete masonry, reinforced masonry, roofing, cladding systems and interior and exterior finishes.

Prereqs: CMGT 104 or by permission of Program Director

Course Learning Outcomes

- Identify basic building materials and systems incorporated in the design of both residential and commercial buildings
- Recognize how materials are fabricated and connected to form a building's wall and floor systems
- Identify the value of various alternative building materials and methods derived from quality, constructability, and performance characteristics
- Analyze materials and building systems based on code compliance, budget, function, constructability, and value

CMGT-300 – Construction Accounting and Cost Control

Course Description This course familiarizes students with construction cost accounting systems and reporting formats. Students will examine the sources of cost data and report generation and will evaluate performance based on analysis of data for labor, material, equipment, and subcontract cost. Emphasis is placed on the formulation of management decisions and the ongoing evaluation of their effectiveness. The course will broaden the student's understanding and use of construction cost accounting systems and reporting methods pertinent to the management of a construction management financial system.

Prereqs: CMGT 200

Course Learning Outcomes

- Demonstrate the methods by which cost data is acquired and organized in a construction cost accounting system
- Analyze financial performance of individual projects using project cost accounting reports and formulate recommendations that would lead to duplicating success and avoiding undesirable project outcomes
- Recognize the inherent ethical issues surrounding the collection, analysis, and reporting of construction cost accounting data
- Distinguish the accounting practices and customs specific to the construction industry.
- Formulate financial analysis to support sound management decisions

CMGT-302 - Construction Contract Administration

Course Description This course explains the various facets of construction contract administration from both the contractor's and construction manager's point of view. The student will be introduced to the construction contract documents typically used for effective project management. Topics will include contract components, types of construction contracts, subcontracts and supply contracts, design/build contracts, bidding and award of contracts, negotiation, claims and disputes, changes to the work, time and cost, correction of the work and contract completion.

Prereqs: CMGT 200

Course Learning Outcomes

- Distinguish between various forms of construction contract with regard to advantages, disadvantages, risks from the perspective a both contracting parties
- Interpret the operation of construction contract terms for a range of circumstances throughout the project duration
- Recognize the special way the law applies to construction projects and construction companies
- Demonstrate the interrelationship of the various contracts that define the agreements among members of the project team
- Recognize the rights, duties, and responsibilities associated with contracts for construction
- Interpret construction specifications along with other contract documents to define both the scope and quality of constructed

CMGT-304 - Construction Safety & Risk Management

Course Description This course familiarizes students with best practices for risk identification, assessment, and mitigation for construction businesses and projects. Students will examine case examples of construction industry businesses and construction project site conditions, identify and assess specific risks, and formulate management plans to mitigate and manage the risks. Particular emphasis is placed on Occupational Safety and Health Administration (OSHA) compliance and worksite safety management. The course will broaden the student's understanding of risk and safety issues pertinent to the management of construction projects. The course will look at qualitative and quantitative risk and safety management techniques, the impact of human relations in risk management, financial options, and safety and environmental management systems.

Prereqs: CMGT 200 & CMGT 202

Course Learning Outcomes

- Develop awareness and understanding of jobsite safety hazards, mitigation techniques, and OSHA Regulation compliance
- Formulate quantitative approaches to assess, evaluate, and respond to job siterisks
- Successfully satisfy the requirements for obtaining OSHA 30-hour certification

- Demonstrate a clear understanding of approaches to risk management
- Evaluate jobsite conditions, procedures, and operations and propose appropriate risk mitigation procedures

CMGT-306 - Construction Site Operations

Course Description This course familiarizes students with methods, procedures, and practices required for the effective management of field operations preparing students to assess construction project sites and prepare comprehensive site management plans. The course explores aspects of site management such as layout, logistics, sustainable practices, administration, and false work in a hands-on collaborative environment.

Prereqs: CMGT 200 & CMGT 202

Course Learning Outcomes

- Analyze the staffing requirements and understand the roles of those individuals required to operate and manage various types of construction project sites
- Develop, document, and communicate an efficient, effective construction site plan on a project-specific basis to include phasing, temporary facilities, temporary utilities, vertical and lateral transportation, storage facilities, security, safety, lighting, and environmental considerations
- Recognize the need for scaffolding, false work, shoring, and formwork and best practices for their design and implementation
- Understand the administrative requirements of project site management to include effective communication, record keeping, product samples and submittals, and record drawings

CMGT-310 - Construction Surveying

Course Description This course introduces the theory and practice of surveying through lectures and labs. Students are introduced to modern surveying instruments like Total Station and are expected to use them during labs to perform fieldwork. Fieldwork addresses the topics discussed in class to give students hands-on experience with surveying.

Prereqs: CMGT 202 or by permission of Program Director

Course Learning Outcomes

- Apply a working knowledge of surveying equipment and techniques required to do basic construction layout
- Setup and operate a total station and other surveying equipment
- Perform horizontal distance measurement
- Apply horizontal angle measurement techniques

- Determine elevations of existing features and set elevations for future construction on a project site
- Recognize how topography relates to construction progress
- Discuss typical problems encountered in surveying and how they affect a construction manager
- Value the importance of surveying to the construction management profession

CMGT-401 - Codes and Specifications

Course Description This course offers an introduction to building code requirements, material specifications and performance standards, and their application to the building design and construction process. Students develop an appreciation for and understanding of how building codes seek to ensure building performance and occupant safety and how related standards and specifications support these goals.

Prereqs: By permission of Program Director

Course Learning Outcomes

- Apply the International Building Code (IBC) and its companion codes to building design and prepare a preliminary code analysis
- Become familiar with the principal material and performance standards referenced in the IBC and their relationship to CSI Master Format specifications
- Through the study of standard CSI specifications, understand how specs are developed and then applied in the design and construction process
- Learn to navigate the accessibility guidelines incorporated in IBC Chapter 11
- Understand the goals and application of the principal green building standards and certification systems

CMGT-402 – Special Topics in Construction

Course Description This course addresses pertinent issues relative to construction. Special issues related to construction will be investigated by individual or groups of students based on a discussion with the instructor. The course is designed to broaden the Construction Management topics to include enhanced research opportunities.

Prereqs: By permission of Program Director

Course Learning Outcomes

- Demonstrate an up-to-date knowledge of the selected topic(s)
- Recognize research methodologies applicable to construction
- Develop a written report based on the research conducted within the class

CMGT-403 – Introduction to BIM

Course Description This course introduces students with the basic concepts of Building Information Modeling (BIM) with practical applications of Autodesk Revit. The sequence will include starting a project, adding basic building elements, modifying elements as needed, and creating a 3D Revit model. Students will be able to get used to the Revit interface and explore how information and building components are integrated in BIM. The course will also introduce utilizing Revit for purposes in addition to modeling, such as estimating. Students will develop the Revit model of an actual building to strengthen their BIM knowledge. The required software should be installed in students' personal laptops. See CABA Laptop Requirements for details.

Prereqs: By permission of Program Director

Course Learning Outcomes

- Demonstrate an up-to-date knowledge of BIM
- Recognize the value of BIM software for the CM profession
- Apply a working knowledge of the BIM software
- Collaborate with classmates to develop an actual project's 3D building model by using the BIM software

CMGT-410 - Principles and Practices of Heavy Construction

Course Description This course is intended to provide students with an introduction to the principles and practices employed in heavy/civil infrastructure and marine construction. The course content is presented from a practical perspective focusing on the management of heavy/civil construction projects. The course is designed for construction management majors as well as those majoring in related fields and is intended to provide a broad understanding of heavy construction techniques and contracting.

Prereqs: By permission of Program Director

Course Learning Outcomes

- Understand basic soil behavior characteristics during earthwork construction operations
- Select the proper and most cost effective / efficient equipment to optimize performance of various earthwork and infrastructure construction operations
- Compute simple earthwork quantities and volumes based on cross sections and contours and use earthwork mass haul diagrams to manage cut and fill operations
- Plan for, implement, and monitor the safe operation of construction equipment and heavy construction operations
- Analyze project conditions systematically to plan and develop management systems for earthwork and heavy construction projects

CMGT-450 - Construction Management Seminar

Course Description It is a seminar intended to prepare students for professional practice through a survey of the current and future state of the industry. This course is intended to provide students with an overview of the world of construction through the portal of Engineering News-Record (ENR). Current and future industry trends and challenges will be examined throughout the course. Topics include emerging technologies, business trends, project case studies, construction economics, legal issues, legislative and political activities affecting construction, building information modeling (BIM), sustainable construction, and environmental concerns.

Prereqs: CMGT 300 & CMGT 302

Course Learning Outcomes

- Apply the broad range of skills and knowledge acquired in the Construction Management curriculum to the understanding, evaluation, and solution of challenges faced by industry executives.
- Effectively collaborate to conduct conclusive evaluations of complex real-world management challenges.
- Recognize the value of a lifelong curiosity regarding threats and opportunities presented by current and emerging industry trends.
- Clearly communicate complex ideas to a broad audience using appropriate media.
- Identify and evaluate the ethical choices faced by construction management professionals and formulate value-based responses.

CMGT-499 - Construction Capstone Project

Course Description This course is the application of course materials covered in the four-year curriculum to an actual construction project. Students are required to submit and present a comprehensive bid package with a detailed quantity takeoff and estimate, a list of activities with appropriate relationships, a (critical path method) CPM network schedule, and Leadership in Energy and Environmental Design (LEED) certification plan. Preparation includes developing a company organization along with detailed project bid. Students will be working in groups of 3-4 to set up the construction company and prepare submittals for a commercial project. The course requires each team making a presentation to an “owner/client organization” and an audience consisting of faculty, alumni, and representatives from the industry. The students are required to not only apply all that they have learned but also to synthesize and integrate the knowledge gained to solve additional problems they have not previously encountered. In addition to testing their knowledge, the course emphasizes collaboration and communication skills through written submittals and report writing, oral assignments, and facilitated classroom discussion. The required software should be installed in students’ personal laptops. See CAFE Laptop Requirements for details.

Prereqs: Completion of at Least 36 Credit Hours of CMGT Courses

Course Learning Outcomes

- Explore the process of collaborating with designers and consultants.
- Examine, research and evaluate different the use of construction materials for a specific project
- Demonstrate a working knowledge for determining pre-construction requirements
- Demonstrate proficiency in developing a complete bid package for an actual project
- Demonstrate outstanding written and oral communication skills with construction project team members and outside evaluators
- Analyze ethical, social, and environmental responsibility of construction professionals