

CONSTRUCTION ENGINEERING AND MANAGEMENT (CEMT)

CEMT 1000 - Introduction to Construction Management (1 Credit)

Course provides an introduction to the construction industry and project management. Student will learn basic CM terminology, roles and responsibilities associated with a construction project, and construction documents. Max hours: 1 Credits.

Grading Basis: Letter Grade

CEMT 2100 - Construction Management Fundamentals (3 Credits)

This course focuses on introducing the field of construction engineering and management. Topics will include introduction to construction management and work process; drawings; cost estimating; project planning and control; construction operations and job site management; quality and safety management; and building information modeling. Course participants will gain knowledge about construction engineering and management through lectures, exercises, class presentations, projects and group activities. Course includes a field trip to a construction site and guest speakers from the construction industry as the course time allows. Max hours: 3 Credits.

Grading Basis: Letter Grade

CEMT 2300 - Heavy Civil Construction and Equipment (3 Credits)

Course includes an introduction to heavy civil construction equipment, materials, labor and methods. Students will learn to perform comparative cost analysis for owning and operating heavy equipment; and perform the proper selection, applications, utilization and productivity of heavy equipment with the associated labor and logistics. Max hours: 3 Credits.

Grading Basis: Letter Grade

CEMT 2450 - Fundamentals of Statics and Solids (3 Credits)

The focus of this course is on the behavior of structural members in equilibrium analyzed with the principles of statics and mechanics of materials. Topics include vectors, trusses, frames, beams, internal and external forces, mechanical properties of materials, stresses and strains in members subjected to tension, compression and shear. Structural Analysis topics include design loads with the introduction of ASCE standards, transfer of loads through structures, and computer-assisted analysis with RISA. Prereq: Requires prerequisite course of PHYS 2010 or PHYS 2311 (all minimum grade C-). Restriction: Restricted to CMGT-BS students. Max hours: 3 Credits.

Grading Basis: Letter Grade

Requires prerequisite course of PHYS 2010 or PHYS 2311 (all minimum grade C-). Restriction: Restricted to CMGT-BS students.

CEMT 3100 - Field Engineering and Management (3 Credits)

Course includes an overview of field engineering and management, preconstruction planning, start-up and mobilization, construction operations, and close-out. Students will assess basic design of temporary structures, quality assurance and quality control, and materials testing and processing. Students will learn the fundamentals of soils engineering. Students will be able to apply surveying concepts and generate site layout. Students will learn the basics of safety, accident prevention, risk management, and regulatory compliance on construction sites. Prereq: CEMENT 2100 or CVEN 4230 with a C- or better. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: CEMENT 2100 or CVEN 4230 with a C- or better.

CEMT 3231 - Construction Materials and Methods (3 Credits)

This course serves as an introduction to the primary materials and methods used to construct buildings and infrastructure across the United States, including concrete, wood and steel. Students explore processes related to specifying and installing materials, as well as analyze various material performance characteristics. Students are required to complete lectures, videos and class activities. Students also research and present information on a wide range of materials and construction processes.

Prereq: CEMENT 2100 with a C- or better. Cross-listed with CEMENT 5231. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: CEMENT 2100 with a C- or better.

CEMT 3703 - Surveying Data Processing (1 Credit)

Presents basic techniques, technologies, and software for processing of field and survey data including feature extraction and basemap development, integrating data from multiple sources, accuracy, calibration, and case studies. Prereq: Requires prerequisite or corequisite courses of CVEN 2214 and CVEN 2215 OR graduate standing, including non-degree seeking graduate students. Cross-listed with CEMENT 5703.

Max hours: 1 Credits.

Grading Basis: Letter Grade

Requires prerequisite or corequisite courses of CVEN 2214 or CVEN 2215 OR graduate standing, including non-degree seeking graduate students.

CEMT 4067 - Construction Senior Capstone (3 Credits)

Students will work in teams to formulate or design a construction project requiring the synthesis of material learned in previous courses. The student teams will establish goals, plan and accomplish tasks, meet deadlines, analyze risk and uncertainty, and demonstrate leadership and management skills. Teams will coordinate and communicate with a range of stakeholders and give final presentations. Prereq: CEMENT 2100 or CVEN 4230 with a C- or better. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: CEMENT 2100 or CVEN 4230 with a C- or better.

CEMT 4232 - Construction Planning and Control (3 Credits)

This course presents knowledge on planning and controlling of construction projects. Students will learn the basics of construction planning to develop work breakdown structure and activity list, estimate activity cost and duration, and identify job logic and precedence relationships. Several scheduling techniques will be presented in this class, including bar chart, network scheduling, uncertainty in scheduling (PERT), limited resources scheduling, resource leveling, line of balance, and time-cost tradeoff analysis. Furthermore, this class will provide knowledge on cash flow analysis and construction control techniques such as Earned Value method. Students will acquire skills on the use of currently available computer scheduling and planning software such as Primavera 6 and Navisworks Manage to create 5D models to visualize sequence of the construction activities. In addition, students will form teams and work on a project throughout the semester to apply the skills that they learn in class. Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, CEMENT 3231 and a statistics course (MATH 2830, 3800, CVEN 3611, ELEC 3817, or BANA 2010) with a C- better or instructor permission; Restriction: Restricted to students with senior standing. Cross-listed with CVEN 5232. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, CEMENT 3231 and a statistics course (MATH 2830, 3800, CVEN 3611, ELEC 3817, or BANA 2010) with a C- or better or instructor consent; Restriction: Restricted to students with senior standing.

CEMT 4233 - Construction Cost Estimating (3 Credits)

This course presents the application of scientific principles to rough and detailed cost estimating for construction. The course starts with an introduction to estimating and how it fits in bid/proposal process and construction management. Quantity take offs, putting costs to those quantities, overhead costs, cost markups and profits; and computerized estimating will be explored. The project includes quantity take and cost estimate for the concrete and metals portion of an actual project. Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, and CEMENT 3231 all with a C- or better. Cross-listed with CEMENT 5233. Max hours: 3 Credits

Grading Basis: Letter Grade

Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, and CEMENT 3231 all with a C- or better.

CEMT 4234 - Sustainable Construction (3 Credits)

This course will serve as an introduction to major components and technologies used in sustainable design and construction to create healthy, environmentally-sensitive built environments. Content focuses on construction processes, renewable energy systems, healthy buildings, natural and cultural resources, and traditional as well as cutting-edge building techniques. Course participants will gain knowledge about effective sustainable practices through active learning by engaging in case studies, class presentations, and group activities. Numerous guest speakers will share first-hand experience regarding implementation and professional practice of sustainable principles in the real-world. Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, and CEMENT 3231 all with a C- or better. Cross-listed with CEMENT 5234. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, and CEMENT 3231 all with a C- or better.

CEMT 4236 - Project Management Systems (3 Credits)

Address the basic nature of managing projects and the advantages and disadvantages to this approach. Introduce the characteristics, techniques, and problems associated with initiating, planning, executing, controlling, and closeout of projects. Learn about the International Standards of PM and how to use them. Develop a management perspective about projects to help develop future project managers. Restriction: Restricted to CMGT-BS or CEMENT-BS majors or CMGT minors. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to CMGT-BS or CEMENT-BS majors or CMGT minors.

CEMT 4239 - Introduction to Temporary Structures and Construction Engineering (3 Credits)

This course will introduce the many types of temporary structures that are integral in the completion of construction projects. The temporary structures to be discussed include but are not limited to formwork, falsework, scaffolding, Support of Excavation (SOE), and equipment bridges. Construction Engineering will also be introduced including the application of structural engineering to crane picks and demolitions. The course includes planning, management and design aspects. The project includes the delivery of a formwork design that stresses the importance of constructability, cost, while providing updates throughout the project to the instructor. Cross-listed with CEMENT 5239. Prereq: CEMENT 2100 with a C- or better and junior standing or higher. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: CEMENT 2100 with a C- or better and junior standing or higher.

CEMT 4240 - Building Information Modeling (BIM) (3 Credits)

Building Information Modeling is an advanced approach to facility design and construction using object-oriented 3-D models. It can be integrated in the design and construction for analytical purposes, including design, visualization, quantity takeoff, cost estimating, planning, and facility management. Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, and CEMENT 3231 all with a C- or better. Cross-listed with CEMENT 5240. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, and CEMENT 3231 all with a C- or better.

CEMT 4242 - Construction Safety (3 Credits)

This course is a study of safety practices in the construction industry and the specific safety procedures used in safety management of a construction project. Topics include safety risks inherent in construction projects, the roles of government, the judicial system, the insurance industry, designers and project owners in safety management and the economic impact of injuries. Advanced topics include safety risk quantification and analysis, design for safety and emerging technologies. Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, and CEMENT 3231 all with a C- or better. Cross-listed with CEMENT 5242. Max hours: 3 Credits.

Grading Basis: Letter Grade

Prereq: CEMENT 2100, CEMENT 2300, CEMENT 3100, and CEMENT 3231 all with a C- or better.

CEMT 4724 - Construction Technology 1 (Drones, construction coordination and VR/AR) (3 Credits)

This course is divided into three modules, each focusing on key technologies in the construction industry. The Drone Operation and Data Processing module teaches students drone operation, safety, and data collection, along with hands-on experience in 3D modeling and aerial imagery analysis. In the Construction Coordination Methods and Tools module, students learn to use laser scanning equipment and cloud-based software for real-time data sharing and project coordination. The Virtual and Augmented Reality module introduces students to VR/AR technologies, focusing on improving communication, design, and planning, with practical applications in construction. Restriction: Restricted to students with sophomore standing or above. Cross-listed with CEMENT 5724. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to undergraduate students with sophomore standing or higher.

CEMT 4734 - Construction Technology 2 (Robotics, AI and data analytics) (3 Credits)

This course covers three key modules: robotics, AI, and data analytics, focusing on their applications in the construction industry. The Robotics in Construction module introduces students to cutting-edge autonomous systems like SPOT by Boston Dynamics and various robotic equipment, teaching them programming, navigation, and human-robot interaction. The AI in Construction module focuses on AI-driven solutions for project optimization, risk management, and predictive maintenance, offering hands-on experience with machine learning models. The Data Analytics for Construction module trains students to process and analyze construction data, leveraging big data to improve project performance, safety, and efficiency. Restriction: Restricted to students with sophomore standing or above. Cross-listed with CEMENT 5734. Max hours: 3 Credits.

Grading Basis: Letter Grade

Restriction: Restricted to undergraduate students with sophomore standing or higher.

CEMT 4800 - Special Topics in Construction (3 Credits)

These special topics courses cover a variety of topics in construction engineering and management. Repeatable. Max hours: 9 Credits.

Grading Basis: Letter Grade

Repeatable. Max Credits: 9.

CEMT 4939 - Internship (1-6 Credits)

Construction Engineering and Management Internship. Repeatable. Max hours: 6 Credits.

Grading Basis: Letter Grade

Repeatable. Max Credits: 6.