

Graduate Certificate in Construction Engineering, Science and Management (CESM)

1 Overview:

Students who pursue the Graduate Certificate in Construction Engineering, Science and Management (CESM) will have a wide range of professional construction industry career opportunities in the office and the field.

This program certifies to employers that the individuals who receives the CESM graduate certificate have completed coursework essential to be valuable assets to construction companies. The CESM graduate certificate courses will provide students with essential knowledge in the areas of Project Controls and Scheduling, Construction Safety Planning and Management, Cost Estimating, Building Information Modeling, Sustainable Construction and Delivery, Artificial Intelligence in Construction Management, Decision-Making in Construction Management, and Resiliency within the Built Environment and Leadership.

The unique blend of coursework imparts holistic knowledge to the graduate students to influence the entire lifecycle of the built environment - from planning to design, construction, and sustainable maintenance.

The Department of Construction Science maintains a close partnership with the construction industry through its Construction Industry Advisory Council (CIAC) and supports continuous collaboration with other construction program in the nation through its peer exchange meetings and research projects. The graduate students benefit from such close partnerships and continuous collaborations as they enrich the educational experience. Additionally, the CIAC sponsors a variety of social events: mixers, tailgating, cook-offs, sports, competitions, and field trips, among others.

The regulations for this degree comply with the general University regulations (refer to Student Policies, General Academic Regulations, and the Graduate Catalog).

1.1 Admission Requirements:

The requirement for admission to the certificate program includes at least a senior level of a four-year undergraduate degree in either engineering, architecture, business or other related disciplines. Students admitted to the program will be required to have a minimum overall GPA of 3.0. Additionally, 0.1 will be added to the overall GPA for applicants with each full-time year of construction experience. For example, if an applicant has a 2.5 overall GPA and five years of construction industry experience, the finalized GPA would be 3.0 and the applicant would meet the minimum requirement for admission. Students that do not meet the admission requirements could be accepted conditionally by registering in additional leveling courses as indicated by the Chair of the CESM Graduate Certificate Committee and must obtain a minimum GPA of 3.0 in the first 6 semester credit hours in order to be in good standing.

Applications containing official transcripts and a resume must be submitted online through the UTSA Graduate School application portal. Incomplete applications will not be considered. Acceptance to the CESM graduate certificate program is determined by the CSM faculty graduate committee.

1.2 Degree Requirements:

A minimum of 15 semester credit hours are required for completion of the graduate CESM certificate program. Students are also expected to complete 3 semester credit hours of CSM 6943. In exceptional cases and with the approval from the Chair of the Graduate CESM certificate committee, the CSM 6973 could be approved as a replacement course for CSM 6943 (Table 1). The remaining 12 semester credit hours of prescribed elective courses are selected from Table 2.

Table 1: Required Graduate Construction Courses

CSM 6943	Construction Internship	3 SCH
CSM 6973	Special Topics	3 SCH

Table 2: Prescribed Graduate Construction Elective Courses

CSM 5033	Construction Cost Estimation	3 SCH
CSM 5133	Construction Practice in a Global Setting	3 SCH
CSM 5223	Building Information Modeling for Construction Management	3 SCH
CSM 5243	Sustainable Construction and Delivery	3 SCH
CSM 5413	Advanced Topics in Construction Systems	3 SCH
CSM 5423	Advanced Topics in Project Controls and Scheduling	3 SCH
CSM 5433	Construction Safety Planning and Management	3 SCH
CSM 5633	Advanced Construction Management	3 SCH
CSM 6643	Artificial Intelligence in Construction Management	3 SCH
CSM 6953	Independent Study	3 SCH
CSM 6973	Special Topics	3 SCH
CSM 7103	Decision-Making in Construction Management	3 SCH
CSM 7113	Resiliency within the Built Environment	3 SCH

With prior approval from the Chair of the Graduate CSEM certificate committee, students can substitute up to 3 semester credit hours of the prescribed elective courses shown in Table 2.

Work experience prior to being accepted into the graduate program will not satisfy the construction internship requirement of the Graduate Certificate in CESM. The students working in a construction or construction-related company, will need to obtain approval for their current work to count towards the CSM 6943 Construction Internship, register for the course CSM 6943 and pass the CSM 6943 course to complete the internship requirement for the Graduate Certificate in CESM.

Students eligible to receive the Graduate Certificate in Construction Engineering, Science and Management must apply for it when they submit their intent to graduate in the semester before

graduation. Certificates will be awarded upon completion of the 15 approved hours, and a GPA of 3.0 or above.

2 Construction Science and Management (CSM) Courses

CSM 5033. Construction Cost Estimation (3-0) 3 Credit Hours.

Modern estimating procedure for construction projects related to quantity surveying, cost of materials and labor, life cycle cost and applicable software. Emphasis in pricing work, sub-contracting and bidding strategies using applicable software. Fall, Spring. Course Fees: SAP1 \$25; STSA \$15.

CSM 5133. Construction Practice in a Global Setting. (3-0) 3 Credit Hours.

Seminar dealing with national and international business and legal environments in the construction industry. Topics include agreement and delivery options, forms of construction, project procedures and administration, liability, contract documents, and ethics. Course Fees: SAP1 \$25; STSA \$15.

CSM 5223. Building Information Modeling for Construction Management. (3-0) 3 Credit Hours.

Advanced techniques used in development and management of Building Information Models. Emphasis on constructability and management. Course Fees: SAP1 \$25; STSA \$15.

CSM 5243. Sustainable Construction and Delivery. (3-0) 3 Credit Hours.

Sustainability principles applied to design, construction and operation of built environment. Emphasis on site management and constructability. Course Fees: SAP1 \$25; STSA \$15.

CSM 5413. Advanced Topics in Construction Systems. (1-4) 3 Credit Hours.

The management of the construction process pertaining to large, complex, and unique buildings. The management of sustainable construction, adaptive use of existing buildings, and historic preservation projects will be included. (Formerly ARC 5413. Credit cannot be earned for both CSM 5413 and ARC 5413.) Course Fees: SAP1 \$25; STSA \$15.

CSM 5423. Advanced Topics in Project Controls and Scheduling. (3-0) 3 Credit Hours.

Advanced techniques used in scheduling and planning processes in construction project control, including resource allocations and schedule recovery. Course Fees: SAP1 \$25; STSA \$15.

CSM 5433. Construction Safety Planning and Management. (3-0) 3 Credit Hours.

Current construction safety and health issues. Development of site-specific plans and methodology to provide hazard reduction on job sites. Course Fees: SAP1 \$25; STSA \$15.

CSM 5633. Advanced Construction Management. (3-0) 3 Credit Hours.

Prerequisite: Consent of instructor. Organization and integration of construction resources and activities to include consideration of ethical practice, scheduling, methods of construction, project planning and management, cost accounting, and personnel utilization. Course Fees: SAP1 \$25; STSA \$15.

CSM 6643. Artificial Intelligence in Construction Management. (3-0) 3 Credit Hours.

This course introduces the concepts of artificial intelligence and machine learning to help construction students build data-driven solutions without necessarily requiring prior machine

learning knowledge. Students will also learn to analyze multidimensional data and develop machine learning models in Python using datasets that are relevant to the CSM discipline. Course Fees: SAP1 \$25; STSA \$15.

CSM 6943. Construction Internship. (0-0) 3 Credit Hours.

Prerequisites: Graduate standing, 18 semester credit hours of graduate work, and consent of instructor. Supervised full-time construction work experience with public agencies or private companies. Individual conferences and written reports required. Course Fees: SAP1 \$25; STSA \$15.

CSM 6953. Independent Study. (0-0) 3 Credit Hours.

Prerequisites: Graduate standing and permission in writing (form available) of the instructor and the Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of the regular course offerings. May be repeated for credit, but not more than 6 hours will apply to the degree. Course Fees: SAP1 \$25; STSA \$15.

CSM 6973. Special Topics. (3-0) 3 Credit Hours.

Prerequisite: Graduate standing or consent of instructor. An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Topics courses may be repeated for credit when topics vary, but not more than 6 hours of CSM 6973 or 12 hours of CSM 6976 will apply to the degree. Course Fees: SAP1 \$25; STSA \$15.

CSM 7103. Decision-Making in Construction Management. (3-0) 3 Credit Hours.

Decision processes can range from quantitative computational analysis to qualitative experiential evaluations. This course provides a set of practical tools and theoretical frameworks to help construction managers address the challenges of decision-making and problem-solving. Course Fees: SAP1 \$25; STSA \$15.

CSM 7113. Resiliency within the Built Environment. (3-0) 3 Credit Hours.

This course provides a thorough understanding of resiliency issues and its interrelation with the built environment by retrospectively investigating technological progress, addressing current issues, and contemplating on possible futures. Course Fees: SAP1 \$25; STSA \$15.

Contact Us:

For additional information, please contact the CSM graduate coordinator:

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