

## Program Overview

The master's degree is increasingly becoming the degree of choice among Construction Managers as the field becomes more technologically advanced and the industry more complex with governmental regulations. The purpose of the Construction Management master's degree program is to provide advanced project management principles and practices, critical thinking and creativity, and complex problem solving and decision making in construction projects as a specialized program for working construction professionals and others seeking master's level preparation. Further, the program will provide students with the skills to integrate information and communication technology in Construction Management.

## Application Requirements

The items listed below are required for admission consideration for applicable semesters of entry during the current academic year. Submission instructions, additional details, and changes to admission requirements for semesters other than the current academic year can be found on The Graduate College's website (<http://www.gradcollege.txstate.edu>). International students should review the International Admission Documents page (<http://mycatalog.txstate.edu/graduate/admission-documents/international/>) for additional requirements.

- completed online application
  - \$55 nonrefundable application fee
- or
- \$90 nonrefundable international evaluation fee (if applicable)
  - baccalaureate degree (or equivalent) from an accredited college or university in construction related area. Graduates of curricula outside these program areas may be required to satisfy program prerequisite before full admission into the program. (Non-U.S. degrees must be equivalent to a four-year U.S. Bachelor's degree. In most cases, three-year degrees are not considered. Visit our International FAQs (<https://www.gradcollege.txst.edu/international/faqs.html>) for more information.)
  - official transcripts from **each institution** where course credit was granted
  - a competitive overall GPA or a competitive GPA in the last 60 hours of undergraduate course work (plus any completed graduate courses)
  - knowledge of Construction Management demonstrated through previous coursework and/or work experience
  - responses to specific essay questions on the statement of purpose
  - resume/CV detailing work experience, extracurricular and community activities, and honors and achievements
  - two letters of recommendation from persons best able to assess the student's ability to succeed in graduate school

Applicants should refer to The Graduate College website for additional information regarding the admission process.

### Approved English Proficiency Exam Scores

Applicants are required to submit an approved English proficiency exam score that meets the minimum program requirements below unless they have earned a bachelor's degree or higher from a regionally accredited U.S. institution or the equivalent from a country on our exempt

countries list (<http://www.gradcollege.txstate.edu/international/language.html#waiver>).

- official TOEFL iBT scores required with an 78 overall
- official PTE scores required with a 52
- official IELTS (academic) scores required with a 6.5 overall and minimum individual module scores of 6.0
- official Duolingo scores required with a 110 overall
- official TOEFL Essentials scores required with an 8.5 overall

This program does **not** offer admission if the scores above are not met.

## Degree Requirements

The Master of Science (M.S.) degree with a major in Construction Management requires 30 semester credit hours.

## Course Requirements

Code	Title	Hours
<b>Required Courses</b>		
CSM 5314	Technology Management in Construction	3
CSM 5360	Construction Company Financial Control	3
CSM 5362	Pre-Construction Services	3
CSM 5363	Construction Project Delivery and Leadership	3
CSM 5364	Decision Making in Construction Management	3
CSM 5366	Soils in Construction	3
CSM 5368	Sustainable Construction	3
CSM 5369	Construction Dispute Resolution	3
CSM 5380	Construction Safety Management	3
<b>Prescribed Electives</b>		
Choose 3 hours from the following:		3
CSM 5365	Construction Project Controls	
CSM 5367	Principles of Leadership in Construction	
CSM 5384A	Construction Failure	
<b>Total Hours</b>		<b>30</b>

## Comprehensive Examination

All candidates for graduate degrees must pass one or more comprehensive examinations, either written, oral, or both, covering at least the field of concentration.

Master's level courses in Engineering Technology: CSM, TECH

## Courses Offered

### Construction Science and Management (CSM)

#### CSM 5199B. Thesis.

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**CSM 5299B. Thesis.**

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**3 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**CSM 5302. Fundamentals of Construction Contracts and Liability Issues.**

This course introduces students to the legal aspects of design and construction contract documents, including dispute resolution methods and professional ethics commonly used in the construction industry. This course does not earn graduate degree credit.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from Graduate GPA|Leveling

**Grade Mode:** Leveling/Assistantships

**CSM 5303. Foundations of Heavy, Civil and Highway Construction.**

This course presents selection, acquisition and capabilities of heavy construction equipment. Applications of economics to performance characteristics and production of equipment is discussed. Sector-specific construction management methods are covered, including unit price estimating, equipment fleet design, repetitive scheduling and major components of highways, bridges and engineered facilities.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from Graduate GPA

**Grade Mode:** Leveling/Assistantships

**CSM 5304. Fundamentals of Construction Estimating.**

This course provides the student with a comprehensive introduction to the principles, techniques, technologies, and basic concepts involving methodologies and strategies used in the preparation of various types of construction estimates and bids. This course does not count as degree credit.

**3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Exclude from Graduate GPA|Leveling

**Grade Mode:** Leveling/Assistantships

**CSM 5306. Fundamentals of Commercial Building Construction Systems.**

This course is a commercial building construction systems class dealing with soils, site work, heavy foundations, steel, reinforced concrete, pre-cast structures and common assemblies. Commercial MEPs are studied along with CSI master format, as-built/shop drawings, schedule of values, AIA documents, and appropriate building codes. This course does not earn graduate degree credit.

**3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Exclude from Graduate GPA|Leveling

**Grade Mode:** Leveling/Assistantships

**CSM 5313. Building Information Modeling.**

This course covers understanding the supervisory role of construction professionals in the design process including, directing a design team in the integration of construction documents for commercial buildings, coordination of site work, structural, architectural, mechanical, electrical, plumbing plans and contemporary CAD software for 2D& 3D design including Building Information Modeling. Prerequisite: CSM 2313 with a grade of "D" or better or instructor approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5314. Technology Management in Construction.**

This course covers the supervisory role of construction professionals in the Virtual Design and Construction (VDC) process. Topics covered include directing a VDC team in the integration of construction documents for construction (architectural, structural, mechanical, electrical, and plumbing plans), coordination of site work, implementation of current CAD software for 2D and 3D design, the Building Information Modeling (BIM) process, and other technologies that have an impact on the construction industry.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5360. Construction Company Financial Control.**

Financial accounting and cost controls used at the company level in construction companies are studied. Topics include accounting systems, construction project profit calculations, and financial analysis.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5362. Pre-Construction Services.**

The course will introduce students to designer/contractor interactions, including conceptual estimating and scheduling, the RFQ/RFP process and legal, insurance, risk allocation issues, along with procurement and selection.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5363. Construction Project Delivery and Leadership.**

This course covers methods of construction project delivery in detail and focuses on analyzing data to assess its impact on project outcomes. Construction project delivery is covered along with contract strategies. An owner approach to a method selection is developed within this class.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5364. Decision Making in Construction Management.**

This course focuses on the application of systems engineering and statistics used in solving construction and civil engineering problems. Topics covered include network and linear programming models, construction and evaluation of decision trees to clarify a proper course of action considering uncertainty, probability distributions, sample statistics, linear regression models, risk analysis, and sampling plans for quality assurance. Personal computer usage emphasized for problem solving.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5365. Construction Project Controls.**

This course covers construction management cost and schedule concepts, cost/schedule management information systems, variance analysis, forecasting, resource management, project recovery strategies, and application of theory to practical problems.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5366. Soils in Construction.**

This course provides students with an in-depth examination of geotechnical principles as they apply to soil construction activities. Topics covered include geological formations of natural soils, soil mineralogy, soil sampling, classification, soil testing, dewatering, safety and sustainability in soil construction, soil contamination and remediation, recycled content used in soil construction and innovative technologies in soil stabilization.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5367. Principles of Leadership in Construction.**

This course covers individual, organizational, and process/structure styles of leadership using a transformational model.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5368. Sustainable Construction.**

This course examines a breadth of sustainable construction techniques, including material production, material selection, sustainable design, the ecology model for design, life cycle cost analysis, and sustainable construction. The sustainable construction techniques are discussed relative to advanced sustainable framing, waste minimization techniques, LEED, and green roofs.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5369. Construction Dispute Resolution.**

This course focuses on different mechanisms of dispute resolution in the industry. They are presented from the perspective of owner, designer, and contractor's liability/risk assessment. The course is comprised of best practices and pitfalls of negotiation, mediation and arbitration. Finally, a perspective on litigation is discussed, along with the fast changing world of case law. The course uses a collaborative model of contemporary research and industry case studies.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5380. Construction Safety Management.**

This course covers the administration and application of 29CFR 1926 OSHA Construction Industry Regulations for the construction industry along with applicable state and federal construction safety laws related to construction, alterations, or repair work at construction sites. The roles of all participants at the construction job site concerning construction safety are discussed.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5384A. Construction Failure.**

This course covers a breadth of causes of construction failure, including how past failures can improve current construction practices and litigation is a likely response to failures in construction.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**CSM 5390. Research in Construction.**

This course examines research methods used for construction, including such topics as designing experiments, scientific principles, problem solving techniques, producing a proposal, executing research, acquiring and managing data, statistical analysis methods, reporting results, and publishing. The course highlights up-to-date discussions on debates and concerns within the construction research community.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 5399A. Thesis.**

This course represents a student's initial thesis enrollment. No thesis credit is awarded until student has completed the thesis in Construction Management.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**CSM 5399B. Thesis.**

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**CSM 5599B. Thesis.**

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**CSM 5999B. Thesis.**

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**Technology (TECH)****TECH 5100. Academic Instruction for Technology.**

The course is seminar based and covers topics related to teaching and employment responsibilities. Completion of this course is required as a condition of employment for graduate assistants. This course does not earn graduate degree credit. Repeatable with different emphasis.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Course Attribute(s):** Graduate Assistantship|Exclude from Graduate GPA

**Grade Mode:** Leveling/Assistantships

**TECH 5195. Industrial Internship.**

This course is a supervised experiential learning course in Technology Management. This work integrated learning course helps the student link theory with practice. Repeatable for credit. Prerequisites: Instructor approval.

**1 Credit Hour. 0 Lecture Contact Hours. 4 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**TECH 5199B. Thesis.**

This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**TECH 5299B. Thesis.**

This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.

**2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**TECH 5300. Academic Instruction for Graduate Instructional Assistants.**

This course is designed to develop and enhance the professional and technical skills of graduate instructional assistants. Topics covered may include, but are not limited to, teaching skills, technical skills, ethical and legal issues, safety, and laboratory management. This course does not earn graduate degree credit.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Graduate Assistantship|Exclude from Graduate GPA

**Grade Mode:** Leveling/Assistantships

**TECH 5310. Product Design and Development.**

This course provides an overview of the new product realization process, focusing on systematic product design, including problem identification, product planning, conceptual design, and embodiment design. Standard CAD tools are employed for product modeling.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5311. Computer-Aided Engineering.**

This course teaches the application of computer hardware and software to the design of products and of systems. Specific topics include geometric modeling, the development of computational methods, and an overview of engineering analysis software. Additional topics may include finite element analysis, manufacturing simulation, solidification modeling, and rapid prototyping.

**3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**TECH 5315. Engineering Economic Analysis.**

This course covers economic analytical techniques used in engineering decision-making. Topics include time-value of money, comparing alternatives, depreciation, replacement, and income tax considerations.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5325. Quality & Process Improvement.**

This course provides an understanding of quality management, covering basic quality concepts, theories, and standards. A concise description of main quality tools used in manufacturing and service environments and a review of basic statistics are included. Topics include total quality management topics and quality tools, quality and global competitiveness, and strategic management. In addition, quality tools such as ISO 9000, total quality tools, quality function deployment, statistical process control and Six Sigma are included.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5330. Data-Driven Decision Making.**

This course takes students through a variety of data driven decision making methods. Students will learn how to approach a problem from a data perspective. Specifically, students will learn methods such as linear programming, transportation problems, network models, simulation, and decision analysis. They will use these methods and more to learn how to take a data driven approach to a managerial or technical problem.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5335. Operations & Supply Chain Management.**

This course will examine a wide array of topics in the realm of operations and supply chain management. Students will learn different methods of operations management including capacity planning, demand planning, product and service design, process and facility layouts. This course will focus on how to effectively manage operations and supply chains for an organization in order to be competitive in their business sector.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5364. Robust Product and Process Design.**

Provides the student with in-depth knowledge of inferential statistics as applied to design of robust processes and products. Topics covered include probability distributions, ANOVA, fractional factorial design, response surface method, orthogonal arrays, and Taguchi method. Prior experience with introductory-level statistics is assumed. Prerequisite: TECH 5394 with a grade "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5365. Industrial Project Management and Scheduling.**

This course introduces students to industrial management system concepts and applications relating to management operations, system design, implementation and management, case studies of practices, and application of theory to practical problems.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5380. Principles of Information and Communication Technology Management.**

This course, in a case-based learning environment, integrates concepts and principles of information and communication technology (ICT) including mobile communication and Internet of Things (IoT). Analysis and evaluation of advanced ICT management examples demonstrate issues and strategies of modern ICT management.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5382. Industrial Ecology and Sustainability Engineering.**

This course covers the principles of life cycle analysis (LCA) of engineered products and processes. Topics include industrial ecology, resource depletion, product design, process design, material selection, energy efficiency, product delivery, use, and end-of-life considerations.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5384. Problems in Technology.**

In this course graduate students investigate a particular topic by developing a technical problem, researching the topic, and presenting the findings. Plans will be developed on an individual basis with strict faculty supervision. It may be repeated for credit with the permission of the department chair. Prerequisite: Instructor approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**TECH 5385. Readings in Technology.**

A study of the ethical and moral viewpoints typically associated with American society as related to the development and introduction of new technology and engineering. Past, present, and future issues will be studied with selected readings focusing on industrial related problems and issues.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5387. Advanced Facilities Planning.**

This course is an in-depth study of technical problems encountered in designing, equipping, arranging, and specifying facility requirements for industrial and technical training facilities.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5390. Research in Technology.**

This course examines the scientific method, including theory formulation, deductive reasoning, hypothesis generation, observation, inductive reasoning, and theory revision. Categories of research are compared and contrasted as regards methodology. Experimental research relating to significant industrial problems, including design considerations, internal and external validity, and appropriate analytical techniques, is studied in-depth. The course includes an introduction to data analysis and its proper interpretation.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**TECH 5391. Advanced Manufacturing Systems.**

This course introduces various advanced tools, technologies, and strategies in modern manufacturing. Topic coverage emphasizes state-of-the-art in factory automation, as well as global and smart manufacturing enterprises. Specific topics include process automation and control, advanced manufacturing processes, intelligent manufacturing control, and information and communication technology (ICT) in manufacturing.

**3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5392. Fundamentals of Microelectronics Manufacturing.**

This course is an introduction to integrated circuit fabrication. Topics include crystal growth, wafer preparation, epitaxial growth, oxidation, diffusion, ion implantation, thin film deposition, lithography, etching, device and circuit formation, packaging, and testing. A significant part of the course is a project focusing on circuit design and simulation or on process design. Laboratory component involves the actual production and testing of a functional semiconductor device.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5394. Design of Experiments.**

This course covers fundamentals of designing industrial experiments.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TECH 5395A. Structure and Properties of Alloys.**

This course is an advanced exploration of the structure and properties of engineering alloys. Strengthening mechanisms of alloys are explored with specific applications to the alloys studied. The processing, properties, and structure of ferrous and nonferrous alloys are explored including new and emerging alloys. Prerequisite: Instructor approval.

**3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**TECH 5398. Directed Project.**

This course is a formal investigation into a business or industry problem. The directed project is an applied research project that is more extensive than an independent study and less extensive than a thesis. The course culminates in a detailed project report and oral presentation. Prerequisite: TECH 5394 with a grade of "C" or better and instructor approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**TECH 5399A. Thesis.**

This course represents a student's initial thesis enrollment. No thesis credit is awarded until student has completed the thesis in Technology 5399B.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**TECH 5399B. Thesis.**

This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**TECH 5599B. Thesis.**

This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.

**5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**TECH 5999B. Thesis.**

This course represents a student's continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding.

**9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit