

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING, AND CONSTRUCTION MANAGEMENT

Description of the Programs

The School of Civil & Environmental Engineering, and Construction Management (CECM) is one of the five schools/departments of the Klesse College of Engineering and Integrated Design (KCEID). It is housed in the Biotechnology Sciences and Engineering Building (BSE) on the main campus. The school offers two undergraduate degrees, one in Civil Engineering and another in Construction Science and Management. The Bachelor of Science (B.S.) degree in Civil Engineering (CE) was first offered in 1982, and the Bachelor of Science (B.S.) degree in Construction Science and Management (CSM) was first offered in 2008. The Civil Engineering B.S. program is currently accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>), and the Construction Science and Management B.S. program is currently accredited by the American Council for Construction Education (<https://www.acce-hq.org/>).

Civil Engineering Mission Statement

The faculty of the Civil & Environmental Engineering Division are committed to excellence in teaching, research, and service to the community and the engineering divisions. The Civil & Environmental Engineering program's mission is to provide our students an education that integrates fundamental science and engineering skills with design principles to solve engineering problems. Our programs provide students opportunities for graduate education, to acquire life-long learning skills, and to participate in research that advances the discipline and benefits society. Students will be prepared to become professional engineers and leaders in the Civil & Environmental Engineering profession.

Civil Engineering Direct Admission Criteria

Applicants entering UTSA as Freshmen or Freshmen Transfers (fewer than 12 transferable semester credit hours) will be directly admitted to the CE program if they:

- meet all UTSA undergraduate admission requirements,
- qualify for enrollment in MAT 1213 Calculus I, or a higher level mathematics course, and
 - are ranked in the top 10 percent of their high school class (no minimum SAT or ACT scores required), *or*
 - are ranked below the top 10 percent of their high school class and have a minimum 1200 SAT¹ or 25 ACT score.

Applicants with SAT¹ scores below 1200 or ACT scores below 25 may undergo admission by committee review.

Transfer requirements for direct admission to the CE program for students who have earned 12 or more transferable semester credit hours:

- meet all UTSA undergraduate transfer admission requirements, and
- have completed MAT 1213 Calculus I and WRC 1013 Freshman Composition I, or the equivalents, with grades of "C-" or better, and

- meet grade point average requirements:
 - applicants with a transfer grade point average of 3.00 or higher may be granted direct admission to the major, or
 - applicants with a transfer grade point average below 3.00 may be granted admission to the College by committee review.

Applicants who do not meet Civil Engineering admission requirements will be admitted to the Engineering, Math, and Sciences Studies major in the University College. Students have three semesters to complete Calculus I with a grade of "C-" or better and meet the Civil Engineering Transfer Requirements.

"C-" Grade Rule

A grade of "C-" or better in any science, engineering, or mathematics course required for an engineering degree, or any other course that is a prerequisite to any required CE or Engineering (EGR) course, indicates satisfactory preparation for further engineering education. Any course assigned a grade below a "C-" must be repeated before enrolling in any course for which it is a prerequisite. This requirement is subject to both the Gateway Course and Three-Attempt Limit rules.

Gateway Courses

Students pursuing a degree in Civil Engineering must successfully complete Gateway Courses with a grade of "C-" or better in no more than two attempts. If the student does not successfully complete a Gateway Course in two attempts, then the student is required to change their major.

For the purpose of this policy, dropping a course with a grade of "W" or taking an equivalent course at another institution of higher education counts as an attempt at taking the course.

Three-Attempt Limit

Students pursuing a Civil Engineering degree must successfully complete all science, engineering, and math courses for their program with a grade of "C-" or better in no more than three attempts. A student unable to achieve the "C-" Grade Rule within three enrollments (attempts) shall be required to change their major.

For the purpose of this policy, dropping a course with a grade of "W" or taking an equivalent course at another institution of higher education counts as an attempt at taking the course.

Construction Science and Management Mission Statement

The mission of the Construction Science and Management (CSM) Division at The University of Texas at San Antonio is to provide quality construction education for the next generation of construction professionals and leaders. The Division has established the following objectives to achieve this mission:

- Provide quality education to meet the current and future needs of the construction industry in the region based on a solid foundation in ethical, managerial, and technical principles.
- Prepare the next generation of construction professionals with an understanding of sustainable and responsible practice.
- Enhance the construction profession through scholarly research and professional development.

Construction Science and Management Direct Admission Criteria

Available openings within the CSM program are limited and, therefore, entry is competitive. Top-performing students from high school will be admitted directly into the major. Successful applicants entering the University from high school and transfer students who meet the program requirements will be admitted into Academic Studies (XACP) in the University College. Students in Academic Studies will be reviewed before registration each academic semester, and students will be accepted to the CSM major based on their grade point average (GPA) and number of available seats.

Applicants entering UTSA as Freshmen will be directly admitted to the CSM major if they:

- meet all UTSA undergraduate admission requirements, and
 - are ranked in the top 10 percent of their high school class (no minimum SAT or ACT scores required), *or*
 - are ranked in the top 25 percent of their high school class and have a minimum 1170 SAT¹ or 24 ACT score, *or*
 - are ranked in the top 50 percent of their high school class and have a minimum 1220 SAT¹ or 25 ACT score.

Transfer students with less than 12 transferable semester credit hours will be directly admitted to the CSM major if they:

- meet all UTSA undergraduate transfer admission requirements, and
- have a minimum transfer grade point average (GPA) of 3.0.

Transfer students with 12 or more transferable semester credit hours will be directly admitted to the CSM major if they:

- meet all UTSA undergraduate transfer admission requirements, and
- have a minimum transfer GPA of 3.1.

Freshmen and Transfer students who do not meet the above requirements, but meet UTSA's general admission requirements will be admitted to the Architecture/Construction Studies (XACP) major in University College, where students will be able to work toward meeting the prerequisites needed to declare CSM as their major. Students in XACP who are interested in pursuing a major in Construction Science and Management will be reviewed before registration each academic semester, and students will be accepted to the CSM major based on their grade point average (GPA) and the number of available seats.

Current UTSA students interested in CSM are first considered by the School for admission to the Architecture/Construction Studies program (XACP) and then considered for possible admission into the CSM program. Change of major applications will be reviewed before registration each academic semester. Students will be accepted to the major based on their GPA and the number of available seats.

Students not accepted into the CSM program are encouraged to improve their GPA and re-submit the application.

Laptop Program

Students must have a laptop (notebook) computer upon entering the CE and CSM programs. The computer should be upgradeable in order to be of productive use for the duration of the academic program. For further and specific information concerning laptop requirements for each major, please see <https://klesse.utsa.edu/student/computer-requirements.html>.

Student Work

CE and CSM faculty reserve the right to retain, exhibit, and reproduce work submitted by students. Work submitted for grading is the property of KCEID and remains such until it is returned to the student.

¹ Based on the new SAT score range

- B.S. degree in Civil Engineering (p. 2)
- B.S. degree in Construction Science and Management (p. 5)

Bachelor of Science Degree in Civil Engineering

The School of Civil & Environmental Engineering, and Construction Management offers an ABET-accredited bachelor's degree in civil engineering. The School is committed to excellence in teaching, research, and service to the community and the profession. The Civil Engineering program's mission is to provide our students an education that integrates fundamental science and engineering skills with design principles to solve engineering problems. Our program provides students opportunities for graduate education, to acquire life-long learning skills, and to participate in research that advances the discipline and benefits society. Students will be prepared to become professional engineers and leaders in the Civil & Environmental Engineering profession.

Civil Engineering Educational Objectives

The American Society of Civil Engineers (ASCE) defines Civil Engineering as "The profession in which a knowledge of the mathematical and physical sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the progressive well-being of humanity in creating, improving, and protecting the environment; in providing facilities for community living, industry, and transportation; and in providing structures for the use of humanity."

The faculty of the Civil & Environmental Engineering Division has established a specific set of program objectives to support the mission and the goals of the School and to meet the requirements of ABET accreditation under the Criteria for Accrediting Engineering Programs. Civil Engineering Bachelor of Science graduates are expected to attain the following program educational objectives (PEOs):

- meet the expectations of their employers,
- will endeavor to become licensed professional engineers, and
- are able to pursue graduate studies, if so desired.

The minimum number of semester credit hours required for the Bachelor of Science (B.S.) in Civil Engineering is 128, including at least 39 at the upper-division level. All candidates for this degree must fulfill the Core Curriculum requirements, the General Engineering requirements, and the Civil Engineering degree requirements prior to graduation. Each is explained in detail.

Student Outcomes

Graduates of the UTSA Civil Engineering Program will demonstrate the following student outcomes.

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Core Curriculum Requirements (42 semester credit hours)

Students seeking the B.S. degree in Civil Engineering must fulfill the University Core Curriculum requirements in the same manner as other students. If courses are taken to satisfy both degree requirements and Core Curriculum requirements, then students may need to take additional courses in order to meet the minimum number of semester credit hours required for this degree.

MAT 1213 may be used to satisfy the core requirement in Mathematics, as well as one of the General Engineering requirements. PHY 1943 and PHY 1963 may be used to satisfy the core requirement in Life and Physical Sciences, as well as two of the General Engineering requirements. In addition to the prerequisite knowledge needed for EGR 3713, ECO 2023 may be used to satisfy the core requirement in Social and Behavioral Sciences. CS 1173 may be used to satisfy the core requirement in the Component Area Option.

Core Curriculum Component Area Requirements (<http://catalog.utsa.edu/undergraduate/bachelorsdegreeregulations/degree requirements/corecurriculumcomponentarearequirements/>)

First Year Experience Requirement	3
Communication	6
Mathematics	3
Life and Physical Sciences	6
Language, Philosophy and Culture	3
Creative Arts	3
American History	6
Government-Political Science	6
Social and Behavioral Sciences	3
Component Area Option	3
Total Credit Hours	42

General Engineering Requirements

In addition to the Core Curriculum requirements, all degree-seeking Civil Engineering students must complete the following 22 semester credit hours:

Code	Title	Credit Hours
CHE 1103	General Chemistry I	3
EGR 2302	Linear Algebra for Engineers	2
EGR 3423	Differential Equations for Engineers	3
MAT 1213	Calculus I	3
MAT 1223 or EGR 1333	Calculus II Calculus II for Engineers	3
PHY 1943 & PHY 1951	Physics for Scientists and Engineers I and Physics for Scientists and Engineers I Laboratory	4
PHY 1963 & PHY 1971	Physics for Scientists and Engineers II and Physics for Scientists and Engineers II Laboratory	4
Total Credit Hours		22

Gateway Courses

Students pursuing the B.S. degree in Civil Engineering must successfully complete each of the following Gateway Courses with a grade of “C-” or better in no more than two attempts. A student who is unable to successfully complete these courses within two attempts, including dropping a course with a grade of “W” or taking an equivalent course at another institution, will be required to change their major.

Code	Title	Credit Hours
MAT 1213	Calculus I	3
EGR 3423	Differential Equations for Engineers	3

Civil Engineering Degree Requirements

Students seeking the B.S. degree in Civil Engineering must complete the following semester credit hours, as well as the Core Curriculum requirements and General Engineering requirements.

Code	Title	Credit Hours
A. Required courses		
For courses with two options, only one course is required. If student takes both courses, then other will be treated as a technical elective.		
CE 1301	Introduction to Civil Engineering	1
CE 2103	Civil Engineering Measurements	3
CE 2313	Computer-Aided Design in Civil Engineering	3
CE 2633	Environmental Engineering	3
CE 3103	Mechanics of Solids	3
CE 3113	Structural Analysis	3
CE 3173	Numerical Methods	3
CE 3213 or CE 3233	Reinforced Concrete Design Steel Design	3
CE 3223 or CE 4463	Highway Engineering Foundation Engineering	3
CE 3243	Properties and Behavior of Engineering Materials	3
CE 3413	Geotechnical Engineering and Applications	3
CE 3603	Fluid Mechanics	3
CE 4543	Project Design and Construction Management	3

CE 4603 or CE 4633	Water Resources Engineering Water and Wastewater Treatment	3
CE 4813	Civil Engineering Design	3
EGR 1403	Technical Communication	3
EGR 2103	Statics	3
EGR 2313	Multivariable Calculus and Series for Engineers	3
EGR 2513	Dynamics	3
EGR 3713	Engineering Economic Analysis	3
STA 2303	Applied Probability and Statistics for Engineers	3
CS 1173	Data Analysis and Visualization	3
ECO 2023	Introductory Microeconomics	3

B. Civil Engineering technical electives

Select three of the following courses. Alternatively, students with a grade point average of 3.0 or higher may choose to satisfy this requirement by taking graduate courses offered by the School of Civil & Environmental Engineering, and Construction Management (School Director approval required). 9

EGR 3303	Engineering Co-op	
CE 3213	Reinforced Concrete Design	
CE 3223	Highway Engineering	
CE 3233	Steel Design	
CE 4103	Advanced Steel Design	
CE 4133	Advanced Reinforced Concrete	
CE 4143	Introduction to Timber Design	
CE 4153	Prestressed Concrete	
CE 4163	Advanced Structural Analysis	
CE 4173	Dynamics and Vibrations	
CE 4183	Experimental Stress Analysis	
CE 4223	Introduction to Masonry Design	
CE 4283	Design of Buildings for Lateral Loads	
CE 4293	Geographic Information Systems (GIS)	
CE 4303	Hydrometeorology	
CE 4403	Advanced Characterization of Highway Materials	
CE 4453	Transportation Engineering	
CE 4463	Foundation Engineering	
CE 4603	Water Resources Engineering	
CE 4613	Environmental Chemistry	
CE 4633	Water and Wastewater Treatment	
CE 4723	Hydraulic Systems Design	
CE 4733	Applied Hydrology	
GEO 4023	Engineering Geology	

C. Life and Physical Sciences

Select one of the following courses: 3

AST 1013	Introduction to Astronomy	
AST 1033	Exploration of the Solar System	
BIO 1233	Contemporary Biology I	
BIO 1243	Contemporary Biology II	
BIO 1203 & BIO 1201	Biosciences I for Science Majors and Biosciences I Laboratory for Science Majors	

BIO 1223 & BIO 1221	Biosciences II for Science Majors and Biosciences II Laboratory for Science Majors	
ES 1213	Environmental Geology	
ES 2013	Introduction to Environmental Science I	
ES 2023	Introduction to Environmental Science II	
ES 3103	Environmental Microbiology	
GEO 1013	The Third Planet	
GEO 1103	Physical Geology	
GEO 4023	Engineering Geology	

Total Credit Hours 79

The elective courses allow some specialization in one of the traditional Civil Engineering areas, namely, Environmental, Geotechnical, Hydraulics, Structures, and Transportation. Senior Civil Engineering students, in their last semester of study, are strongly encouraged to take the Fundamentals of Engineering (FE) Examination as administered by the National Council of Examiners for Engineering and Surveying (<http://ncees.org/>). Graduates are expected to pursue life-long learning and obtain their Professional Engineering license.

This curriculum is designed to meet the student learning outcomes defined by the Accreditation Board of Engineering and Technology and the American Society of Civil Engineers. More specifically, it integrates design throughout the curriculum starting with the freshman introductory course, CE 1301 Introduction to Civil Engineering, and ending with the senior capstone Civil Engineering Design course CE 4813. Design components are contained in most required and/or elective Civil Engineering courses, such as CE 3213 Reinforced Concrete Design, CE 3233 Steel Design, CE 4463 Foundation Engineering, CE 4633 Water and Wastewater Treatment, CE 3223 Highway Engineering, and CE 4603 Water Resources Engineering. The design experience culminates in the senior capstone design course, CE 4813 Civil Engineering Design. In this course, students work in multidisciplinary teams involving three or more civil engineering areas and solve practical civil engineering problems drawing upon most of their prior coursework experience. These projects culminate in formal presentations evaluated by professional engineers.

The following provides a summary table of the recommended courses by semester for the B.S. degree in Civil Engineering.

B.S. in Civil Engineering – Recommended Four-Year Academic Plan First Year

Fall		Credit Hours
AIS 1243	AIS: Engineering, Mathematics, and Sciences (core)	3
CE 1301	Introduction to Civil Engineering	1
CHE 1103	General Chemistry I	3
CS 1173	Data Analysis and Visualization (core)	3
MAT 1213	Calculus I	3
WRC 1013	Freshman Composition I (core)	3

Credit Hours 16

Spring		Credit Hours
CE 2103	Civil Engineering Measurements	3
EGR 1403	Technical Communication	3
MAT 1223 or EGR 1333	Calculus II or Calculus II for Engineers	3

PHY 1943	Physics for Scientists and Engineers I (core and major)	3
PHY 1951	Physics for Scientists and Engineers I Laboratory	1
WRC 1023	Freshman Composition II (core)	3

Credit Hours 16

Second Year

Fall

EGR 2103	Statics	3
EGR 2302	Linear Algebra for Engineers	2
EGR 2313	Multivariable Calculus and Series for Engineers	3
PHY 1963	Physics for Scientists and Engineers II (core and major)	3
PHY 1971	Physics for Scientists and Engineers II Laboratory	1
STA 2303	Applied Probability and Statistics for Engineers	3
American History (core)		3

Credit Hours 18

Spring

CE 2313	Computer-Aided Design in Civil Engineering	3
CE 2633	Environmental Engineering	3
CE 3103	Mechanics of Solids	3
ECO 2023	Introductory Microeconomics (core)	3
EGR 2513	Dynamics	3
EGR 3423	Differential Equations for Engineers	3

Credit Hours 18

Third Year

Fall

CE 3113	Structural Analysis	3
CE 3173	Numerical Methods	3
CE 3243	Properties and Behavior of Engineering Materials	3
CE 3603	Fluid Mechanics	3
Life & Physical Sciences Elective		3

Credit Hours 15

Spring

CE 3213 or CE 3233	Reinforced Concrete Design or Steel Design	3
CE 3413	Geotechnical Engineering and Applications	3
EGR 3713	Engineering Economic Analysis	3
POL 1013	Introduction to American Politics (core)	3

American History (core) 3

Credit Hours 15

Fourth Year

Fall

CE 4463 or CE 3223	Foundation Engineering or Highway Engineering	3
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CE 4603 or CE 4633	Water Resources Engineering or Water and Wastewater Treatment	3
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CE 4543	Project Design and Construction Management	3
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POL 1133 or POL 1213	Texas Politics and Society (core) or Civil Rights in Texas and America	3
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CE Technical Elective		3
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Credit Hours 15

Spring

CE 4813	Civil Engineering Design	3
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CE Technical Elective		3
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CE Technical Elective		3
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Creative Arts (core)		3
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Language, Philosophy & Culture (core)		3
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Credit Hours 15

Total Credit Hours 128

Bachelor of Science Degree in Construction Science and Management

The School of Civil & Environmental Engineering, and Construction Management offers an ACCE-accredited bachelor's degree in construction science and management that combines courses in construction science, design, and business to educate managers for the construction industry. The minimum number of semester credit hours required for the degree, including Core Curriculum requirements, is 120, at least 39 of which need to be at the upper-division level. Students obtaining a Bachelor of Science (B.S.) degree in Construction Science and Management pursue management careers in a wide variety of occupations throughout the construction industry. The degree also provides students with the opportunity to continue with their studies in a graduate program.

The curriculum prepares students to manage the construction process on the job site and effectively interact with architects, engineers, owners, and other professionals who compose the team required by the complexities of modern construction projects. Project owners recognize the need for timely project delivery, indoor/outdoor environmental quality, and short-term and life-cycle costing. Therefore, the curriculum emphasizes environmentally sustainable building practice, project and cost controls, communication skills, understanding the technical aspects of construction and the construction process, and the application of information technology to the construction industry. In addition to the formal academic curriculum, students are required to complete a construction management internship in the construction industry between their junior and senior years. The program maintains a close partnership with the construction industry to provide graduates with various opportunities.

All candidates seeking this degree must fulfill the Core Curriculum requirements and the degree requirements

Core Curriculum Requirements (42 semester credit hours)

Students seeking the B.S. degree in Construction Science and Management must fulfill University Core Curriculum requirements in the same manner as other students. The courses listed below satisfy

both degree requirements and Core Curriculum requirements; however, if these courses are taken to satisfy both requirements, then students may need to take additional courses in order to meet the minimum number of semester credit hours required for this degree.

MAT 1043 or MAT 1053 may be used to satisfy the core requirement in Mathematics.

ES 2023 and GEO 1013 should be used to satisfy the core requirement in Life and Physical Sciences.

ECO 2023 should be used to satisfy the core requirement in Social and Behavioral Sciences.

COM 2113 should be used to satisfy the Component Area Option requirement.

Core Curriculum Component Area Requirements (<http://catalog.utsa.edu/undergraduate/bachelorsdegreeregulations/degerequirements/corecurriculumcomponentarearequirements/>)

First Year Experience Requirement	3
Communication	6
Mathematics	3
Life and Physical Sciences	6
Language, Philosophy and Culture	3
Creative Arts	3
American History	6
Government-Political Science	6
Social and Behavioral Sciences	3
Component Area Option	3
Total Credit Hours	42

Degree Requirements

A. Construction Science and Management Program sequence. Must be completed with a grade of "C-" or better in each course.

1. Required courses in design, construction science, and project management:

CSM 2113	Construction Materials and Methods	3
CSM 2143	Construction Materials and Testing	3
CSM 3113	Construction Surveying	3
CSM 3123	Technical Communication in Construction	3
CSM 3143	Structures I	3
CSM 4013	Construction Estimating I	3
CSM 4023	Construction Estimating II	3
CSM 4143	Structures II	3
CSM 4513	Project Management	3
CSM 4523	Project Planning and Scheduling	3
CSM 4533	Building Information Modeling for Construction Management	3
CSM 4613	Sustainable Building Practice	3
CSM 4623	Construction Safety	3
CSM 4633	Construction Law	3
CSM 4643	Mechanical, Electrical and Plumbing Systems	3
CSM 4713	Construction Capstone	3
CSM 4933	Summer Internship	3

2. Required business and related courses:

ACC 2013	Principles of Accounting I	3
BLW 3013	Business Law for Small Business Owners	3
FIN 3003	Survey of Finance	3
GBA 2013	Legal, Social and Ethical Issues in Business	3
MGT 3013	Introduction to Organization Theory, Behavior, and Management	3
3. One course in physics:		
PHY 1603	Algebra-based Physics I	3
4. One course in statistics:		
STA 1053	Basic Statistics	3
B. Two prescribed or preapproved electives selected from the following list, with a grade of "C-" or better in each course:		
CSM 4913	Independent Study	
CSM 4953	Special Studies in Construction Science and Management	
FIN 3013	Principles of Business Finance	
GEO 3343	Introduction to Geospatial Technologies	
IS 1403	Business Information Systems Fluency	
MGT 3003	Business Communication and Professional Development	
MGT 3253	Interpersonal Communication	
MGT 4893	Management Strategy	
MKT 3013	Principles of Marketing	
MS 3043	Business Statistics with Computer Applications II	
MS 3053	Management Science and Operations Technology	
MS 3073	Business Intelligence and Analytics	
MS 3403	Logistics Management	
SPN 2023	Intermediate Spanish II	
Total Credit Hours		78

B.S. in Construction Science and Management – Recommended Four-Year Academic Plan

Students are strongly encouraged to complete WRC 1013, WRC 1023, MAT 1043 or MAT 1053, and PHY 1603 in their first year.

"In order to facilitate required prerequisite completions on schedule throughout the curriculum, students are strongly encouraged to complete CSM 2113, CSM 3123, CSM 4513, and CSM 4533 in their second year."

First Year

Fall		Credit Hours
First Semester (Fall or Spring)		
AIS 1243	AIS: Engineering, Mathematics, and Sciences	3
MAT 1043 or MAT 1053	Quantitative Reasoning (core) ¹ or Mathematics for Business	3
WRC 1013	Freshman Composition I (core)	3
American History (core)		3
Language, Philosophy and Culture (core)		3
Credit Hours		15

Spring

Second Semester (Fall or Spring)		
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ES 2023 or GEO 1013	Introduction to Environmental Science II (core) or The Third Planet	3
PHY 1603	Algebra-based Physics I ¹	3
WRC 1023	Freshman Composition II (core)	3
American History (core)		3
Creative Arts (core)		3
Credit Hours		15

Second Year

Fall

Third Semester (Fall or Spring)		
CSM 2113	Construction Materials and Methods ²	3
CSM 3123	Technical Communication in Construction ²	3
COM 2113	Public Speaking	3
GEO 1013 or ES 2023	The Third Planet (core) or Introduction to Environmental Science II	3
MGT 3013	Introduction to Organization Theory, Behavior, and Management	3
Credit Hours		15

Spring

Fourth Semester (Fall or Spring)		
CSM 2143	Construction Materials and Testing	3
CSM 4013	Construction Estimating I	3
CSM 4513	Project Management ²	3
CSM 4533	Building Information Modeling for Construction Management ²	3
CSM 4623	Construction Safety	3
Credit Hours		15

Third Year

Fall

Fifth Semester (Fall or Spring)		
CSM 3143	Structures I	3
CSM 4023	Construction Estimating II	3
CSM 4523	Project Planning and Scheduling	3
CSM 4643	Mechanical, Electrical and Plumbing Systems	3
ACC 2013	Principles of Accounting I	3
Credit Hours		15

Spring

Sixth Semester (Fall or Spring)		
CSM 4143	Structures II	3
CSM 4633	Construction Law	3
STA 1053	Basic Statistics	3
ECO 2003 or ECO 2023	Economic Principles and Issues or Introductory Microeconomics	3
FIN 3003	Survey of Finance	3
Credit Hours		15

Summer

CSM 4933	Summer Internship	3
Credit Hours		3

Fourth Year

Fall

Seventh Semester (Fall or Spring)		
CSM 3113	Construction Surveying (may also be taken in the Eighth Semester)	3
CSM 4613	Sustainable Building Practice	3
POL 1013	Introduction to American Politics (core)	3
GBA 2013	Legal, Social and Ethical Issues in Business	3
Prescribed Elective		3
Credit Hours		15

Spring

Eighth Semester (Fall or Spring)		
CSM 4713	Construction Capstone	3
BLW 3013	Business Law for Small Business Owners	3
POL 1133 or POL 1213	Texas Politics and Society (core) or Civil Rights in Texas and America	3
Prescribed Elective		3
Credit Hours		12
Total Credit Hours		120

¹ Students are strongly encouraged to complete MAT 1043 or MAT 1053 and PHY 1603 in their first year.

² Students are strongly encouraged to complete CSM 2113 , CSM 3123 , CSM 4513 , and CSM 4533 in their second year.

Civil Engineering (CE) Courses

CE 1301. Introduction to Civil Engineering. (1-0) 1 Credit Hour.

Prerequisites: Completion of or concurrent enrollment in MAT 1093 and WRC 1013. Engineering as a career, engineering ethics, and approaches to engineering problem formulation and solution using principles of design and decision making. Generally offered: Fall, Spring. Course Fees: L001 \$10; LRE1 \$25; STSE \$10.

CE 2103. Civil Engineering Measurements. (2-3) 3 Credit Hours.

Prerequisite: CE 1301 and MAT 1213 (or MAT 1214 in previous catalogs). Principles of measurement and error analysis; application of equipment to acquire, analyze, and control data in civil engineering systems; and introduction to plane surveying. Generally offered: Fall, Spring, Summer. Course Fee: LRE1 \$25; STSE \$30.

CE 2313. Computer-Aided Design in Civil Engineering. (3-0) 3 Credit Hours.

Prerequisites: EGR 1403 and completion of or concurrent enrollment in CE 2103. Organization and programming of civil engineering problems for computer solutions; application of computer-aided design in civil engineering. (Formerly CE 4313. Credit cannot be earned for both CE 4313 and CE 2313.) Generally offered: Fall, Spring, Summer. Course Fees: LRE1 \$25; STSE \$30; DL01 \$75.

CE 2633. Environmental Engineering. (3-0) 3 Credit Hours.

Prerequisites: CE 1301 and CHE 1103. Principles, analysis, and design related to environmental monitoring, protection, and remediation systems. Topics include environmental quality and legislation, modeling, water treatment, wastewater treatment, solid and hazardous waste management, air and noise pollution, and radioactive waste management. Generally offered: Fall, Spring. Course Fees: DL01 \$75; LRE1 \$25; STSE \$30.

CE 3103. Mechanics of Solids. (2-3) 3 Credit Hours.

Prerequisite: EGR 2103 and completion of or concurrent enrollment in EGR 3423. Internal forces and deformations in solids; stress, strain, and their relations; stresses and deflections in beams column theory and analysis; and engineering applications. (Same as ME 3813. Credit cannot be earned for both CE 3103 and ME 3813.) Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: DL01 \$75.

CE 3113. Structural Analysis. (3-0) 3 Credit Hours.

Prerequisite: CE 3103. Forces and deflections in structural systems; considers stationary and moving loads and exact and approximate methods. Generally offered: Fall, Spring. This course has Differential Tuition.

CE 3173. Numerical Methods. (2-3) 3 Credit Hours.

Prerequisite: EGR 2323 or EGR 3423. Use of numerical methods in solving civil and environmental engineering problems. Techniques for mathematical solutions of linear simultaneous equations; splines; root finding methods; finite differences; numerical integration; numerical solutions to ordinary differential equations; error analysis. Case studies in various civil engineering areas. (Same as EGR 3173. Credit cannot be earned for both EGR 3173 and CE 3173.) Generally offered: Fall, Spring. This course has Differential Tuition.

CE 3213. Reinforced Concrete Design. (2-3) 3 Credit Hours.

Prerequisites: CE 3113 and completion of or concurrent enrollment in CE 3243. Ultimate strength theory and design for reinforced concrete members. Generally offered: Fall, Spring. This course has Differential Tuition. Course fee: DL01 \$75.

CE 3223. Highway Engineering. (3-0) 3 Credit Hours.

Prerequisites: CE 2103 and completion of or concurrent enrollment in EGR 3713. General characteristics of highway design; horizontal and vertical alignment, cross-sections, earthwork, drainage, and pavement; and economic analysis. (Formerly CE 4123. Credit cannot be earned for both CE 4123 and CE 3223.) Generally offered: Fall, Spring. This course has Differential Tuition. Course fee: DL01 \$75.

CE 3233. Steel Design. (2-3) 3 Credit Hours.

Prerequisite: Completion of or concurrent enrollment in CE 3113 and CE 3243. Analysis and design of steel tension members, beams, columns, and bolted or welded connections. Generally offered: Fall, Spring. This course has Differential Tuition.

CE 3243. Properties and Behavior of Engineering Materials. (2-3) 3 Credit Hours.

Prerequisites: CE 3103 and STA 2303. Structure, properties, and behavior of engineering materials; measurement and analysis of material properties and behavior. Laboratory exercises illustrate typical material behavior and selected principles of mechanics. Generally offered: Fall, Spring. This course has Differential Tuition. Course fee: L001 \$30.

CE 3413. Geotechnical Engineering and Applications. (2-3) 3 Credit Hours.

Prerequisite: CE 3103. Exploration, sampling, and in-situ measurements; laboratory testing; review of fundamental properties of soil and rock; flow-through porous media; the effective stress principle and computation of in-situ stress distributions; shear strength of soils and one-dimensional consolidation settlement; introduction to slope stability. Generally offered: Fall, Spring. This course has Differential Tuition. Course fee: L001 \$30; DL01 \$75.

CE 3603. Fluid Mechanics. (2-3) 3 Credit Hours.

Prerequisite: EGR 2513. This course covers fluid properties, fluid statics and dynamics, including hydrostatic pressure and forces, conservation of mass and momentum principles, and Bernoulli and Work-Energy equations. Course concepts and tools are implemented to solve various engineering problems, including pipe flows and external flows. Concepts are demonstrated and quantified through laboratory experiments. Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: DL01 \$75.

CE 4013. Civil Engineering Systems Analysis. (3-0) 3 Credit Hours.

Prerequisite: EGR 3713. Technical elective course. Systems approach to optimization and problem solving; operations research applications in civil engineering; mathematical modeling and analysis techniques including linear programming, dynamic programming, decision analysis and use of software to solve linear and nonlinear programming problems. (Formerly CE 3713. Credit cannot be earned for both CE 4013 and CE 3713.) This course has Differential Tuition. Course Fees: LRE1 \$25; STSE \$30.

CE 4103. Advanced Steel Design. (3-0) 3 Credit Hours.

Prerequisite: CE 3233. Technical elective course. Connection design, welded and bolted, moment-resistant connections, plate girders, column stability, bracing design, and seismic design of frames. This course has Differential Tuition. Course Fee: DL01 \$75.

CE 4133. Advanced Reinforced Concrete. (3-0) 3 Credit Hours.

Prerequisite: CE 3213. Technical elective course. Design of concrete building systems including continuous one-way and two-way slab systems as well as vertical and lateral load resisting members such as slender columns and shear walls. This course has Differential Tuition.

CE 4143. Introduction to Timber Design. (3-0) 3 Credit Hours.

Prerequisite: Completion of or concurrent enrollment in CE 3113 and CE 3243. Technical elective course. Design philosophy and methodology for timber structures. Flexure design, axial load design, and shear design of basic timber components. (Formerly CE 3253 and CE 4253. Credit can only be earned for one of the following: CE 4143, CE 3253, or CE 4253.) This course has Differential Tuition. Course Fee: DL01 \$75.

CE 4153. Prestressed Concrete. (3-0) 3 Credit Hours.

Prerequisite: CE 3213. Technical elective course. Design of statically determinate and indeterminate structures, estimation of prestress loss, flexure and shear strength, deflections and stress control, composite construction, and continuous span theory. This course has Differential Tuition.

CE 4163. Advanced Structural Analysis. (3-0) 3 Credit Hours.

Prerequisite: CE 3113. Technical elective course. The class focuses on the matrix analysis method applied to structural analysis. The course will cover all the facets of the structural analysis method including the assembly of element and structure stiffness matrices, fixed end force and moment vectors, and nodal displacements. This course has Differential Tuition.

CE 4173. Dynamics and Vibrations. (3-0) 3 Credit Hours.

Prerequisite: CE 3113. Technical elective course. The class focuses on the fundamentals of structural dynamics, including single degree-of-freedom and multi-degree-of-freedom systems. The course presents common analysis techniques used to calculate the dynamic response of structures to different types of time-varying loads. This course has Differential Tuition.

CE 4183. Experimental Stress Analysis. (3-0) 3 Credit Hours.

Prerequisite: CE 3103 or ME 3813. Technical elective course. After completing the course students should be able to recognize and properly use different types of sensors for applications in experimental analysis of structures. Students should have acquired an understanding of the basic principles used to develop the sensors discussed in the class, to evaluate the quality of the data obtained from measurements, and to make adjustments to improve the quality of test data if necessary. This course has Differential Tuition.

CE 4193. Fundamentals of Traffic Engineering. (3-0) 3 Credit Hours.

Prerequisite: STA 2303. This is an introductory course that prepare students for more advanced classes on focused topics in traffic engineering. The course covers the full spectrum of key topics ranging from characteristics of the transportation system, analysis of flow and capacity, traffic counts, determination of level of service of various types of roads, traffic operations, traffic control devices, pedestrian/bicycle facilities, traffic safety, to introduction to Intelligent Transportation Systems (ITS). It will also introduce to students the basic theories behind the operation of signalized and un-signalized intersections. The course also provides an opportunity to get an introduction to emerging techniques in the area of transportation engineering. This course has Differential Tuition. Course Fee: DL01 \$75.

CE 4223. Introduction to Masonry Design. (3-0) 3 Credit Hours.

Prerequisite: Completion of or concurrent enrollment in CE 3113 and CE 3243. Technical elective course. Design philosophy and methodology for masonry structures. Flexure design, axial load design, and shear design of basic masonry components. (Formerly CE 3253 and CE 4253. Credit can only be earned for one of the following: CE 4223, CE 3253, or CE 4253.) This course has Differential Tuition. Course Fee: DL01 \$75.

CE 4283. Design of Buildings for Lateral Loads. (3-0) 3 Credit Hours.

Prerequisite: Completion of or concurrent enrollment in CE 3213 and CE 3233. Technical elective course. Understanding and application of lateral loads to the design of steel, concrete, wood and masonry structures. This course has Differential Tuition. Course Fee: LRE1 \$25; STSE \$30.

CE 4293. Geographic Information Systems (GIS). (3-0) 3 Credit Hours.

Prerequisite: CE 2103 or GEO 4023. Technical elective course. Introduces vector, raster and tabular concepts, emphasizing the vector approach. Topics include: spatial relationships, map features, attributes, relational database, layers of data, data ingesting, digitizing from maps, projections, output, applications, and availability of public data sets. Focus will be placed on spatial/temporal data analyses using digitized maps and database information in an area of Civil Engineering specialization. This course has Differential Tuition. Course Fee: DL01 \$75.

CE 4303. Hydrometeorology. (3-0) 3 Credit Hours.

Prerequisite: CE 3603. Technical elective course. The main objective of this course is to familiarize the student with topics related to local and global distribution of freshwater. Conceptualizations of the water balance/budget are developed using principles of physical hydrology and meteorology. Emphasis will be on recent research and modern methods for data analysis and modeling. Real-life events and phenomena will be discussed. In addition to the text, material will be presented from other sources. Guest instructors will give presentations on some case studies. This course has Differential Tuition.

CE 4403. Advanced Characterization of Highway Materials. (3-0) 3 Credit Hours.

Prerequisite: CE 3243. Technical elective course. Basic and advanced level of the fundamentals of material response to static and repeated loading; emphasis on the deformation and fatigue behavior of asphalt mixtures, constitutive modeling for mixtures, microstructure characterization for mixtures, nondestructive testing of pavements, asphalt binder characterization, unbound materials (base and sub-base materials) evaluation and characterization. This course has Differential Tuition.

CE 4453. Transportation Engineering. (3-0) 3 Credit Hours.

Prerequisite: CE 3223. Technical elective course. Study of the Highway Capacity Manual, traffic stream parameters and relationships, analytical techniques in traffic engineering such as capacity analysis, queuing theory, and traffic simulation. Design and operation of advanced traffic management systems including signalization, real-time motorist information, urban incident management, and ITS concepts. (Formerly CE 4233. Credit cannot be earned for both CE 4453 and CE 4233.) This course has Differential Tuition.

CE 4463. Foundation Engineering. (3-0) 3 Credit Hours.

Prerequisite: CE 3413. Technical elective course. Shallow and deep foundations including: footings, slabs on-grade, cofferdams, sheet-pile walls, drilled shafts, piles and retaining walls. (Formerly CE 4413. Credit cannot be earned for both CE 4463 and CE 4413.) Generally offered: Fall. This course has Differential Tuition. Course fee: DL01 \$75.

CE 4543. Project Design and Construction Management. (3-0) 3 Credit Hours.

Prerequisites: EGR 3713, CE 3113, CE 3173, and either CE 3213 or CE 3233. Civil Engineering design process, project specifications, and construction management. Topics covered include design process/practices, project proposals, pricing, specifications, bidding strategies, project management/scheduling and project financing. The course forms the student teams for CE 4813 Civil Engineering Design and identifies projects. Students are trained on how to write Request for Proposals (RFPs) for the identified projects and how to write engineering consulting proposals in reply to the RFP. Students are also trained on how to present proposals to a panel of senior engineers at the end of the semester. Course must be taken the semester prior to taking CE 4813. (Formerly CE 3543. Credit cannot be earned for both CE 3543 and CE 4543.) This course has Differential Tuition. Course fee: DL01 \$75.

CE 4603. Water Resources Engineering. (3-0) 3 Credit Hours.

Prerequisites: CE 3173, CE 2633, and CE 3603. Analysis and design of surface and subsurface water resource facilities. Design of water supply, wastewater collection, and storm water systems. Generally offered: Fall, Spring. This course has Differential Tuition. Course fee: DL01 \$75.

CE 4613. Environmental Chemistry. (3-0) 3 Credit Hours.

Prerequisite: CE 4633. Technical elective course. This course explores the chemistry of the environment, the chemistry underlying environmental problems and solutions to environmental problems. Emphasis is placed on thermodynamics and kinetics of reaction cycles; sources, sinks and transport of chemical species; and quantitation of chemical species. Examples are selected from the chemistry of natural and contaminated air, water, and soil. (Same as ES 3153. Credit cannot be earned for both CE 4613 and ES 3153.) This course has Differential Tuition.

CE 4633. Water and Wastewater Treatment. (2-3) 3 Credit Hours.

Prerequisites: CE 2633 and CE 3603. The application of chemical, biochemical, and physical processes to water treatment, wastewater treatment, and pollution control. This course has Differential Tuition. Course fee: L001 \$10; DL01 \$75.

CE 4723. Hydraulic Systems Design. (3-0) 3 Credit Hours.

Prerequisite: CE 3603. Technical elective course. Analysis and design of water resource systems; dam and reservoir design for recharge, flood control, and water supply and demand forecasting, optimization of multi-objective systems, and allocations planning and management. This course has Differential Tuition. Course Fee: LRE1 \$25; STSE \$30.

CE 4733. Applied Hydrology. (3-0) 3 Credit Hours.

Prerequisite: CE 3603. Technical elective course. Hydrologic cycle, precipitation, hydrologic abstractions, surface runoff; unit hydrographs; synthetic hydrographs; peak discharge relationships; flood frequency analysis; flood and reservoir routing; and groundwater hydrology. (Formerly CE 3723. Credit cannot be earned for both CE 4733 and CE 3723.) This course has Differential Tuition.

CE 4813. Civil Engineering Design. (3-0) 3 Credit Hours.

Prerequisite: CE 4543, either CE 3223 or CE 4463, and either CE 4603 or CE 4633. Opportunity to apply design skills to execution of an open-ended integrated civil engineering design project, including field and laboratory investigations, numerical and scale modeling, design, and formal oral and written presentation of results. Considers safety, reliability, environmental, economic, and other constraints, as well as ethical and social impacts. Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: L001 \$30.

CE 4911. Independent Study. (0-0) 1 Credit Hour.

Prerequisites: Permission in writing (form available) from the instructor, the School Director and Dean of the College. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition.

CE 4912. Independent Study. (0-0) 2 Credit Hours.

Prerequisites: Permission in writing (form available) from the instructor, the School Director, and Dean of the College. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition.

CE 4913. Independent Study. (0-0) 3 Credit Hours.

Prerequisites: Permission in writing (form available) from the instructor, the School Director and Dean of the College. Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition.

CE 4953. Special Studies in Civil Engineering. (3-0) 3 Credit Hours.

Prerequisite: 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 Studies may be repeated for credit when topics vary, but not more than 6 semester credit hours, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition.

Construction Science and Management (CSM) Courses

CSM 2113. Construction Materials and Methods. (3-0) 3 Credit Hours.

Prerequisite: Enrollment as an Architecture, Interior Design, or Construction Science and Management major or permission of instructor. Introduction to materials, methods, equipment, and sequences of the construction process including structural elements, components, and assemblies. Course Fee: SAP1 \$25; STSE \$30; DL01 \$75.

CSM 2143. Construction Materials and Testing. (2-3) 3 Credit Hours.

Prerequisites: CSM 2113, PHY 1603, and enrollment as a Construction Science and Management major or permission of instructor. Analysis of materials and methods used in the design and construction process with a particular emphasis on quality control, quality assurance, and testing including soils, concrete, steel, masonry, and wood. Course Fees: SAP1 \$25; STSE \$30; DL01 \$75.

CSM 3113. Construction Surveying. (2-3) 3 Credit Hours.

Prerequisite: Enrollment as a Construction Science and Management major or permission of instructor. Practical applications of surveying, including distance, grade and angular measurements, surveying equipment and its application to construction layout and control, surveying documentation, and fieldwork. (Formerly CSM 3111. Credit cannot be earned for both CSM 3113 and CSM 3111.) This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 3123. Technical Communication in Construction. (3-0) 3 Credit Hours.

Prerequisite: MAT 1043 or MAT 1053 and enrollment as a Construction Science and Management major or permission of instructor. Visualization, interpretation, and communication of graphical geometry in construction design and engineering; graphical analysis of problems; plan reading; computer aided design, and fundamentals of information modeling software; introduction to common quantitative tools in construction. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30; DL01 \$75.

CSM 3143. Structures I. (3-0) 3 Credit Hours.

Prerequisites: PHY 1603 and enrollment as a Construction Science and Management major or permission of instructor. Introduction to the physical principles that govern classical statics and strengths of materials through the design of concrete, timber, and steel components of structures. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 4013. Construction Estimating I. (3-0) 3 Credit Hours.

Prerequisites: CSM 2113 and CSM 3123. Introduction to estimating procedures for buildings related to quantity surveying, cost of materials and labor, life-cycle costs, and applicable software. (Formerly ARC 4013. Credit cannot be earned for both CSM 4013 and ARC 4013.) Generally offered: Spring. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30; DL01 \$75.

CSM 4023. Construction Estimating II. (3-0) 3 Credit Hours.

Prerequisites: CSM 2143 and CSM 4013. Continuation of CSM 4013 with emphasis on pricing work, subcontracting, and bidding strategies utilizing applicable software. (Formerly ARC 4023. Credit cannot be earned for both CSM 4023 and ARC 4023.) Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30; DL01 \$75.

CSM 4143. Structures II. (3-0) 3 Credit Hours.

Prerequisite: CSM 3143. Analysis and design of structural members in steel, reinforced concrete, reinforced masonry, and their relationship to design and construction. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 4513. Project Management. (3-0) 3 Credit Hours.

Prerequisite: CSM 3123. Introduction to project management of the construction process and integration with allied professions. Introduction to applicable software. (Formerly ARC 4613. Credit cannot be earned for both CSM 4513 and ARC 4613.) Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30; DL01 \$75.

CSM 4523. Project Planning and Scheduling. (3-0) 3 Credit Hours.

Prerequisite: CSM 4513. Continuation of CSM 4513 with emphasis on scheduling and project delivery methods utilizing applicable software. (Formerly ARC 4623. Credit cannot be earned for both CSM 4523 and ARC 4623.) (Formerly titled "Construction Management II.") Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 4533. Building Information Modeling for Construction Management. (3-0) 3 Credit Hours.

Prerequisite: CSM 3123. Introduction to techniques used in development and management of Building Information Models. Emphasis on constructability and management. Generally offered: Spring. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30; DL01 \$75.

CSM 4613. Sustainable Building Practice. (3-0) 3 Credit Hours.

Prerequisite: Enrollment as a Construction Science and Management major or permission of instructor. Ethics and application of environmental sustainability practice in building construction. Introduction to U.S. Green Building Council LEED program standards, methods, and procedures as applied to construction documents interpretation and construction. Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 4623. Construction Safety. (3-0) 3 Credit Hours.

Prerequisite: Enrollment as a Construction Science and Management major or permission of instructor. Development and management of safety programs, worker's compensation, OSHA compliance, safety policies, standards, and record keeping. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 4633. Construction Law. (3-0) 3 Credit Hours.

Prerequisite: Enrollment as a Construction Science and Management major or permission of instructor. Legal and ethical aspects of construction contracts, bonds, insurance, and bidding. Owner, architect, contractor, and subcontractor relationships. Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30; DL01 \$75.

CSM 4643. Mechanical, Electrical and Plumbing Systems. (3-0) 3 Credit Hours.

Prerequisite: CSM 3123. Building systems with an emphasis on design, installation and control of heating, ventilation and cooling, plumbing and drainage, electrical, fire and lightning protection systems. Generally offered: Fall. This course has Differential Tuition. Course Fee: DL01 \$75; SAP1 \$25; STSE \$30.

CSM 4713. Construction Capstone. (3-0) 3 Credit Hours.

Prerequisites: CSM 4023, CSM 4523, CSM 4633, and CSM 4643. Senior capstone project emphasizing integration of the design and construction processes. Project delivery systems, project development, estimating, scheduling and project controls of various types of construction projects. Generally offered: Fall, Spring, Summer. This course has Differential Tuition. Course Fees: DL01 \$75; SAP1 \$25; STSE \$30.

CSM 4911. Independent Study. (0-0) 1 Credit Hour.

Prerequisite: Permission in writing (form available) of the instructor, the student's advisor, the School Director, and the Dean of the College in which the course is offered. Scholarly research under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, may apply to a bachelor's degree. Generally offered: Fall. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$10.

CSM 4913. Independent Study. (0-0) 3 Credit Hours.

Prerequisite: Permission in writing (form available) of the instructor, the student's advisor, the School Director, and the Dean of the College in which the course is offered. Scholarly research under the direction of a faculty member. May be repeated for credit, but not more than 6 semester credit hours of independent study, regardless of discipline, may apply to a bachelor's degree. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 4931. Summer Internship. (0-0) 1 Credit Hour.

Prerequisite: CSM 4623, CSM 4013, and CSM 4523. This is a part-time, on-site, construction work experience. Supervised by a qualified construction manager and intern mentor to prepare the intern for construction management functions. In addition, the CSM Internship Coordinator's prior approval of the selected internship organization is required. Must be repeated for credit and taken in consecutive five-week summer sessions. Generally offered: Summer. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$10.

CSM 4932. Internship. (0-0) 2 Credit Hours.

Prerequisite: CSM 4623, CSM 4013, and CSM 4523. This is a part-time, on-site, construction work experience. Supervised by a qualified construction manager and intern mentor to prepare the intern for construction management functions. In addition, the CSM Internship Coordinator's prior approval of the selected internship organization is required. Generally offered: Fall, Spring. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$20.

CSM 4933. Summer Internship. (0-0) 3 Credit Hours.

Prerequisite: CSM 4623, CSM 4013, and CSM 4523. This is a full-time, on-site, construction work experience during the summer semester. Supervised by a qualified construction manager and intern mentor to prepare the intern for construction management functions. In addition, the CSM Internship Coordinator's prior approval of the selected internship organization is required. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 4943. Internship I. (0-0) 3 Credit Hours.

Prerequisite: CSM 4623, CSM 4013, and CSM 4523. This is a part-time, on-site, construction work experience during the Fall or Spring semesters.

Supervised by a qualified construction manager and intern mentor to prepare the intern for construction management functions. In addition, the CSM Internship Coordinator's prior approval of the selected internship organization is required. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.

CSM 4946. Internship II. (0-0) 6 Credit Hours.

Prerequisite: CSM 4623, CSM 4013, and CSM 4523. This is a full-time, on-site, construction work experience during the Fall or Spring semesters.

Supervision by a qualified construction manager and intern mentor to prepare the intern for construction management functions. In addition, the CSM Internship Coordinator's prior approval of the selected internship organization is required. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$60.

CSM 4953. Special Studies in Construction Science and Management. (0-9) 3 Credit Hours.

Prerequisite: 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 Studies may be repeated for credit when the topics vary, but not more than 3 hours for CSM 4951, 6 hours for CSM 4953, or 12 hours for CSM 4956, regardless of discipline, will apply to a bachelor's degree. This course has Differential Tuition. Course Fee: SAP1 \$25; STSE \$30.