

# Department of Civil and Architectural Engineering

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## Contact Information

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## Architectural Engineering Program Educational Objectives

Within a few years of graduation, alumni of the Texas A&M University-Kingsville undergraduate architectural engineering program have distinguished themselves in the following areas:

- a. Professional practice, licensure, and certification in one of the areas appropriate to the interdisciplinary field of architectural engineering (project/construction management, building systems engineering, or structural engineering).
- b. Leadership and service, to the profession and the community.
- c. Professional ethics with attitudes of respectfulness and a reputation for trustworthiness.
- d. Professional development and continuing education in emerging fields, such as sustainability.

## Civil Engineering Program Educational Objectives

Within a few years of graduation, alumni of the Texas A&M University-Kingsville undergraduate civil engineering program have distinguished themselves in the following areas:

- a. Ethics, being recognized for professionalism and responsibility.
- b. Licensure, having gained extensive professional practice in the civil engineering field.
- c. Leadership, in areas such as career advancement, community service, and professional society activity.
- d. Continuing education, having furthered their knowledge through formal graduate education and/or professional development opportunities.

## Architectural Engineering (AEEN)

### **AEEN 1302** Architectural History II **3 SCH (3-0)**

Part two of a survey of the history of world architecture from pre-history to the present. This course focuses on the period of neo-classicism up to the modern era.

### **AEEN 1310** Computer Graphics **3 SCH (2-3)**

Introduction to procedures in computer-aided drafting and computer applications.

### **AEEN 2325** Architectural Develop Intro **3 SCH (3-0)**

Introduction to topics which influence the development of architectural designs including: building codes, building elements, major building systems and their selection, and materials and methods of construction. Prerequisite: AEEN 1310.

### **AEEN 3130** Instrumentation Laboratory **1 SCH (0-3)**

Principles of instrumentation and experimental skills. Accuracy of measurements, calibration, error analysis, uncertainty analysis, and data correlation. Sound, pressure, lighting, thermal and air pollution measurements. Prerequisite: AEEN 3335. Fee: \$5.00

### **AEEN 3303** Structural Analysis **3 SCH (3-0)**

Statically determinate structures. Moving loads. Analysis of statically indeterminate structures by consistent deformation, slope-deflection and moment-distribution. Prerequisite: CEEN 3311. (Credit may not be obtained in both AEEN 3303 and CEEN 3303.)

### **AEEN 3304** Reinforced Concrete Design **3 SCH (3-0)**

Mechanics, behavior and design of reinforced concrete members subject to axial loads, bending, torsion and shear. Prerequisites: AEEN 3303 and C or higher in CEEN 3311. (Credit may not be obtained in both AEEN 3304 and CEEN 3304.)

### **AEEN 3310** Building Information Modeling **3 SCH (2-3)**

Building Information Modeling with Autodesk Revit. Includes building modeling, structural modeling, work sharing and collaboration, views, scheduling, annotating, and documentation. Prerequisite: AEEN 1310.

### **AEEN 3316** Architectural Design **3 SCH (1-6)**

Development of schematic architectural designs requiring the evaluation of alternative systems for selection and integration in multi-system building design. Modern constraints and standards are addressed through physical and virtual three-dimensional studies. Six laboratory hours a week. Prerequisite: AEEN 2325.

**AEEN 3325 Design Codes and Ordinances 3 SCH (3-0)**

Design codes and municipal ordinances and their integration in design. Including zoning occupancy, construction classification, building constraints, fire resistant construction, egress, accessibility and plumbing. Prerequisite: junior standing in engineering.

**AEEN 3332 Building Electrical Systems I 3 SCH (2-1)**

An introduction to electrical systems for buildings and their applications, including electrical circuits, electrical system components, and load calculation. Prerequisite: PHYS 2326/2126. Fee: \$20.00

**AEEN 3334 Building Electrical Systems II 3 SCH (2-1)**

An introduction to building electrical systems design and control, including electrical system design, control, variable frequency drive (VFD), and programmable logic control (PLC). Prerequisite: AEEN 3332

**AEEN 3335 Building Environmental Systems 3 SCH (3-0)**

Fundamentals of heating, ventilation and air conditioning systems; moist air properties; analysis of different psychrometric processes; thermal comfort and air quality; infiltration and ventilation; psychrometric tools; and basic heat transfer. Prerequisites: AEEN 3346 and credit or enrollment in CEEN 3390.

**AEEN 3346 Thermal Analysis 3 SCH (3-0)**

Properties of gases, vapors, and liquids; the first and second laws of thermodynamics; power and refrigeration cycles. Prerequisites: MATH 2414, PHYS 2325 and PHYS 2125.

**AEEN 3350 Facility Management 3 SCH (3-0)**

Introduction to concepts of facility management, including links between assets and users; owner's perspective; and life cycle costs. Prerequisite: approval of the instructor.

**AEEN 4279 Senior Design Project I 2 SCH (1-3)**

Applications of engineering concepts covered in the upper division courses to architectural engineering problems including design of building structural and services systems, with emphasis on teamwork. Introduction to practical aspects of construction and professional ethics. Prerequisite: Credit in AEEN 3316.

**AEEN 4289 Senior Design Project II (WI) 2 SCH (1-3)**

Application of engineering concepts covered in the upper division courses to architectural engineering problems including design of building structural and services systems, with an emphasis on teamwork. Introduction to practical aspects of construction and professional ethics. Prerequisites: Credit in AEEN 3304 or AEEN 4316, and credit in AEEN 4279 and AEEN 4320.

**AEEN 4310 Computer Modeling 3 SCH (2-3)**

Introduction to three-dimensional computer modeling. Includes 3d wire frame construction in AutoCAD, extrusion and Boolean for AutoCAD and Viz, basic application of skins, lighting and rendering techniques. Prerequisite: AEEN 1310.

**AEEN 4316 Structural Steel Design 3 SCH (3-0)**

AISC specifications for the design of axially loaded members, beams, columns and connections. Introduction to plastic design. Prerequisite: AEEN 3303. (Credit may not be obtained in both AEEN 4316 and CEEN 4316.)

**AEEN 4320 Building Services Engineering 3 SCH (3-0)**

Analysis and design of different types of secondary systems; flow, pumps and piping system; fans, ductwork and building air distribution; and HVAC equipment. Prerequisites: CEEN 3392, AEEN 3335 and C or higher in AEEN 3346.

**AEEN 4326 Construction Engineering 3 SCH (3-0)**

Construction methods and management of earthwork with heavy equipment and others. Construction estimating, planning and control. Network theory and critical path methods. Prerequisite: credit or registration in CEEN 3317. Credit may not be obtained in both AEEN 4326 and CEEN 4326.

**AEEN 4333 Real Design and Construction 3 SCH (2-3)**

Real-world design/build course with project emphasizing development of design, implementation of best practice construction, field experience, and government work. Prerequisites: AEEN 2325 and AEEN 3316.

**AEEN 4336 Selected Topics 1-3 SCH (1-3)**

One or more topics of architectural engineering. May be repeated when topic changes. Prerequisite: junior standing.

**AEEN 4340 Eng Proj Est, Plan & Control 3 SCH (3-0)**

Develop cost estimates and schedules for construction projects. Analysis of cost components including labor, materials and equipment. Estimating techniques applied to project development. Integration of time and cost to track work progress. Use of modern computer tools for cost estimation and scheduling. Prerequisite: Senior standing in engineering. (Credit may not be obtained in both AEEN 4340 and CEEN 4340).

**AEEN 4346 Building Systems Integration 3 SCH (3-0)**

Basic concepts in building energy systems. Electrical, heating, ventilation and air conditioning (HVAC) systems; design skills development and implementation in computer programs. Prerequisites or registration in: AEEN 3334 and AEEN 4320.

## Civil Engineering (CEEN)

*In addition to the listed prerequisite for the following 4000 series courses, a student must have an overall grade point average of 2.0 or higher.*

**CEEN 2113 Surveying Lab 1 SCH (0-3)**

Engineering field surveying and practices of taping, leveling, traversing, error adjustments, stadia, earthwork and highway curves. Prerequisite: Credit or registration in CEEN 2212.

Fee: \$5.00

**CEEN 2212 Surveying 2 SCH (2-0)**

Engineering principles and practices of plane surveying, taping, leveling, traversing, surveying errors, topographic stadia, earthwork, highway curves and construction surveys. Prerequisite: AEEN 1310 and credit or registration in MATH 2413.

**CEEN 2301 Statics 3 SCH (3-0)**

Resultants of force systems. Statics of beams, trusses, frames and other engineering structures. Friction. Distributed forces. Centroids and centers of gravity. Moments of inertia of areas and masses, Mohr's circle. Prerequisite: Credit in PHYS 2325/2125 and credit or registration in MATH 2414.

**CEEN 3143 Geotechnical Eng Lab 1 SCH (0-3)**

Principles and practices of geotechnical engineering laboratory with emphasis on the related ASTM and AASHTO testing standards. Prerequisite: Credit or registration in CEEN 3342.

Fee: \$5.00

**CEEN 3145 Construction Materials Lab 1 SCH (0-3)**

Engineering principles and practices for testing construction materials based on ASTM testing standards. Prerequisite: Credit for or registration in CEEN 3344.

Fee: \$5.00

**CEEN 3167 Hydraulics/Fluid Mechanics Lab 1 SCH (0-3)**

Open-channel-flow visualization and measurement, hydraulic machinery characteristics and water and wastewater analysis. Prerequisite: CEEN 3390.

Fee: \$7.00

Fee: \$7.00

**CEEN 3244 Construction Materials 2 SCH (2-0)**

Engineering properties of materials for design and construction. Related ASTM test specifications of construction materials such as concrete, asphalt, timber, steel, synthetic materials, etc. Prerequisite: CEEN 3311.

**CEEN 3303 Structural Analysis 3 SCH (3-0)**

Statically determinate structures. Moving loads. Analysis of statically indeterminate structures by consistent deformation, slope-deflection and moment-distribution. Prerequisite: CEEN 3311.

**CEEN 3304 Reinforced Concrete Design 3 SCH (3-0)**

Mechanics, behavior and design of reinforced concrete members subject to axial loads, bending, torsion and shear. Prerequisites: CEEN 3303 and C or higher in CEEN 3311. (Credit may not be obtained in both AEEN 3304 and CEEN 3304.)

**CEEN 3311 Strength of Materials 3 SCH (3-0)**

Hooke's Law; stress and strain at a point; Mohr's circle; axial stresses; torsion; shear, moment and deflection in beams; shear center; unsymmetrical bending; columns; theories of failure; introduction to fatigue; and statically indeterminate members. Prerequisites: MATH 2414 and a grade of C or higher in CEEN 2301..

**CEEN 3315 Computer Methods in Civil Engineering 3 SCH (3-0)**

Applications of computer methods to solution of civil engineering problems, including the use of mathematical modeling, error analysis, optimization, and structured programming. Includes use of spreadsheet applications and industry software relevant to the design and analysis of infrastructure systems. Prerequisite: Credit or Registration in AEEN 3303 or CEEN 3303.

**CEEN 3317 Engineering Economics 3 SCH (3-0)**

Principles of economic analysis applied to engineering; evaluation of engineering alternatives; economic significance of engineering proposals. Cash flow diagrams, equivalence of cash flow patterns, interest, rate of return comparison, inflation, time value of money, income tax and depreciation, benefit/cost comparison, break even analysis, fixed costs, operating costs and other costs. Prerequisite: junior standing in engineering.

**CEEN 3342 Geotechnical Engineering 3 SCH (3-0)**

Principles of geotechnical engineering, soil composition, classification, flownet, compaction, consolidation, effective stress, bearing capacity and slope stability. Prerequisite: CEEN 3311.

**CEEN 3344 Construction Materials 3 SCH (3-0)**

Engineering properties of materials for design and construction. Related ASTM test specifications of construction materials such as concrete, asphalt, timber, steel, synthetic materials, etc. Physical, thermal, and electrical properties of materials including phase diagrams. Prerequisite: CEEN 3311.

**CEEN 3365 Environmental Engineering 3 SCH (3-0)**

Treatment and distribution of water. Wastewater conveyance and treatment systems. Physical, chemical and biological treatment processes. Solid waste management. Introduction to air pollution control. Prerequisites: CEEN 3390 and CHEM 1311.

**CEEN 3389 Structural Vibration 3 SCH (3-0)**

Static analysis of structures using a computer program. Single-degree-of-freedom systems under free and forced vibration. Response spectrum and earthquake engineering. Introduction to vibration of multi-degree-of-freedom systems. Prerequisite: AEEN 3303 or CEEN 3303.

**CEEN 3390 Fluid Mechanics 3 SCH (3-0)**

Fluid properties, fluid statics, kinematics, control volume, conservation principles, impulse momentum principles, similitude and drag and lift.

Prerequisite: A grade of C or higher in CEEN 2301.

**CEEN 3392 Hydraulic and Fluid Mechanics 3 SCH (3-0)**

Fluid statics, flow of fluids through pipes and open channels, hydraulic machines. Prerequisite: a grade of C or higher in CEEN 2301.

**CEEN 3393 Hydraulic Engineering 3 SCH (3-0)**

Analysis and design of civil engineering hydraulic systems including pipelines and pipe networks, water pumps, open channels, and hydraulic structures.

Prerequisite: CEEN 3390.

**CEEN 4279 Senior Design Project I 2 SCH (1-3)**

Engineering concepts integrated from the topics taught in sequences of upper division courses to produce practical, efficient and feasible solutions of civil engineering problems with emphasis in professional ethics, teamwork, and use of standards. Computer applications are included. Prerequisites: credit or registration in CEEN 3143, CEEN 3342, and CEEN 4362.

**CEEN 4289 Senior Design Project II (WI) 2 SCH (1-3)**

Engineering concepts integrated from the topics taught in sequences of upper division courses to produce practical, efficient and feasible solutions of civil engineering problems with emphasis in professional ethics, teamwork, and use of standards. Computer applications are included. Prerequisites: Credit in CEEN 4279 and credit in CEEN 4316 or CEEN 3304.

**CEEN 4314 Matrix Structural Analysis 3 SCH (3-0)**

Formulation and application of the direct stiffness method to truss, beam and frame structures; introduction to the finite element method for 2-D problems; and use and interpretation of computer structural analysis programs. Prerequisite: AEEN 3303 or CEEN 3303.

**CEEN 4316 Structural Steel Design 3 SCH (3-0)**

AISC specifications for the design of axially loaded members, beams, columns and connections. Introduction to plastic design. Prerequisite: CEEN 3303. (Credit may not be obtained in both AEEN 4316 and CEEN 4316.)

**CEEN 4326 Construction Engineering 3 SCH (3-0)**

Construction methods and management of earthwork with heavy equipment and others. Construction estimating, planning and control. Network theory and critical path methods. Prerequisite: credit or registration in CEEN 3317. (Credit may not be obtained in both CEEN 4326 and AEEN 4326.)

**CEEN 4336 Selected Topics 1-3 SCH (0-0-1-3)**

One or more topics of civil engineering. May be repeated when topic changes. Prerequisite: senior standing.

**CEEN 4340 Eng Proj Est, Plan & Control 3 SCH (3-0)**

Develop cost estimates and schedules for construction projects. Analysis of cost components including labor, materials and equipment. Estimating techniques applied to project development. Integration of time and cost to track work progress. Use of modern computer tools for cost estimation and scheduling. Prerequisites: Senior standing in engineering. (Credit may not be obtained in both AEEN 4340 and CEEN 4340).

**CEEN 4350 Professional Preparation 3 SCH (3-0)**

Preparation for the Civil Engineering Fundamentals of Engineering (FE) Examination, including computation skills, fundamental topics listed in the FE exam, and training in resume writing and interviewing skills. Prerequisite: Credit or registration in CEEN 4279.

**CEEN 4359 Principles of Transportation Engineering 3 SCH (3-0)**

Principles of transportation engineering, profession of transportation engineering, system and organization, system characteristics, traffic engineering studies, traffic flow, intersection control and capacity, highway alignment and capacity. Prerequisite: credit or registration in CEEN 2212 and CEEN 2113.

**CEEN 4362 Hydrology 3 SCH (3-0)**

Hydrologic cycle; transpiration, evaporation, snow melt and planetary circulation. Rainfall-runoff relations, index, unit hydrographs, synthesized hydrographs. Binomial, normal and extreme-value skewed distributions. Prerequisites: Credit in CEEN 3390 and credit or registration in STAT 4303.

**CEEN 4364 Dsgn Wtr and Wstwr Convey Sys 3 SCH (3-0)**

Water and wastewater flows and measurement, design of water transportation systems, design of gravity-flow sanitary sewers and stormwater drainage systems, pumps and pump systems, design of pumping stations. Prerequisite: CEEN 3392.

**CEEN 4367 Geoenvironmental Engineering 3 SCH (3-0)**

Soil-water-contaminant interaction processes, conduction phenomena, hydraulic conductivity and contaminant transport phenomena, effects of contaminants on soil properties, site characterization and soil remediation techniques; design aspects of waste containment systems such as landfills, seepage barriers and cutoff walls. Prerequisites: CEEN 3342 and CEEN 3365.

**CEEN 4368 Foundation Engineering 3 SCH (3-0)**

Soil strength. Bearing capacity of soils and shallow foundation. Immediate and consolidation settlement. Lateral earth pressure theory and retaining walls. Deep foundation and stability analysis of soil slopes. Prerequisite: CEEN 3311.

**CEEN 4369 Transportation Eng Design 3 SCH (3-2)**

Engineering design concepts used to produce practical, efficient, economical and feasible solutions to problems in such transportation areas as highways, traffic freight and materials movement, railroads and air transport. Computer applications are included. Prerequisite: CEEN 2304 and CEEN 3311.

Fee: \$5.00

**CEEN 4399 Civil Engineering Internship 1-3 SCH (1-3)**

Internships in industry, government or consulting companies in career-based practical activities to broaden the skills obtained through curricular education. Prerequisite: senior standing.

**Majors**

- Architectural Engineering, B.S.
- Civil Engineering, B.S.

In addition to meeting all course requirements, students must earn a cumulative GPA of 2.0, a math/science GPA of 2.25, and an engineering GPA of 2.25. Students must earn a "C" or higher in one Writing Intensive course.

Students majoring in Architectural Engineering (AEEN) or Civil Engineering (CEEN) must receive a grade of C or better in all engineering courses (AEEN, CEEN, CSEN, ITEN, etc.).

**Minors**

- Construction Management, Minor

**Certificate**

- Building Systems Engineering, Certificate
- Geotechnical and Water Resources Engineering, Certificate
- Public Works, Certificate
- Structural Engineering, Certificate