Civil Engineering, BS

Program Description

Civil engineers oversee large construction projects, including designing, constructing, supervising, and maintaining road systems and the accompanying infrastructure, buildings, airports, and systems for water treatment, hydroelectricity, and more. Because there are so many different aspects of civil engineering, many civil engineers choose to pursue a specialty. Popular specialties include construction engineering, geotechnical engineering, structural engineering, geospatial surveying engineering, environmental engineering, water resources engineering, transportation engineering, and coastal engineering. The Civil Engineering curriculum prepares graduates to apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of basic science; to apply probability and statistics to address uncertainty; to analyze and solve problems in technical areas appropriate to civil engineering; to conduct experiments in technical areas of civil engineering and analyze and interpret the resulting data; to design a system, component, or process in civil engineering contexts; to include principles of sustainability in design; to explain basic concepts in project management, business, public policy, and leadership; and to analyze issues in professional ethics.

Program Educational Objectives

In accordance with ABET accreditation requirements, the Program Educational Objectives (PEOs) describe the professional accomplishments that Civil Engineering graduates are expected to achieve, within a few years of graduation. The PEOs are:

1. Within one year of graduation from TAMU-CC, our graduates will be working in industry, government, construction, or other professional service as civil engineers, or will be pursuing graduate degrees in civil engineering or post-baccalaureate degrees in other fields, such as law, business, or medicine.
2. Within five years of graduation from TAMU-CC our graduates will have
   • advanced in their careers as indicated by obtaining promotions and positions of leadership, awards, recognitions as subject matter experts, and/or registration as professional engineers or in other professional disciplines; or by entrepreneurial activities, products or processes developed, patents, and/or publications;
   • demonstrated the ability to increase their knowledge and expertise through continuing education or advanced degrees; and
   • contributed to the improvement of the profession and of society through research, national and/or international collaboration, and/or professional and public service including mentoring.

Student Learning Outcomes

Graduates will have:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. 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
3. an ability to communicate effectively with a range of audiences
4. 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
5. 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
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Fundamentals of Engineering (FE) Exam

All civil engineering students are encouraged to take the Fundamentals of Engineering (FE) exam. This is exam is an important step toward licensure as a Professional Engineer (PE), which many civil engineers find useful and necessary in their careers. Close to the end of the B.S. degree program is an excellent time to take the exam, because the student has the best preparation for the exam at that point in the student’s academic career.

Admission from pre-engineering

For all students admitted into a pre-engineering program at TAMU-CC who wish to transfer into one of the TAMU-CC engineering programs (CEEN, EEEN, IEEN, MEEN), the cumulative GPA for all MATH, CHEM, PHYS, ENGR, COSC, CEEN, EEEN, IEEN, or MEEN courses that appear in the CEEN, EEEN, IEEN, or MEEN program curricula, plus any ENTC courses, taken at TAMU-CC, or their equivalents taken at other institutions, should be 2.5 or greater to be admitted into the CEEN, EEEN, IEEN, or MEEN programs at TAMU-CC. There should be a minimum of at least 12 hours of such courses taken at TAMU-CC or elsewhere before a transfer / admission to CEEN, EEEN, IEEN, or MEEN may be considered. All such students must also meet the requirements to take MATH 2413 Calculus I (4 sch) if they have not already done so.

Master of Business Administration (MBA) Option

Civil engineering students who have completed 96 credit hours toward the Civil Engineering B.S. degree and earned a cumulative GPA of 3.0 or higher may elect the MBA option in senior year. Students who elect the MBA option are required to take three MBA foundation courses to satisfy the Technical Elective Block requirements:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 5312</td>
<td>Foundations of Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ECON 5311</td>
<td>Foundations in Economics</td>
<td>3</td>
</tr>
<tr>
<td>FINA 5311</td>
<td>Financial Management Concepts</td>
<td>3</td>
</tr>
</tbody>
</table>

Students who plan to elect the MBA Option are encouraged to have summer internship experience before senior year, and will be able to complete an MBA degree study with 2 regular semesters and 1 summer session beyond a Civil Engineering B.S. degree study.

General Requirements

The Civil Engineering curriculum consists of a minimum of 123 credit hours. It can be divided into five main areas:
## Requirements

<table>
<thead>
<tr>
<th>Credit Hours</th>
<th>First-Year Seminars (when applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Credit Hours</th>
<th>Core Curriculum Program (<a href="http://catalog.tamucc.edu/undergraduate/university-college/programs/core-curriculum-program/">http://catalog.tamucc.edu/undergraduate/university-college/programs/core-curriculum-program/</a>)</th>
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<tbody>
<tr>
<td>42</td>
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<table>
<thead>
<tr>
<th>Credit Hours</th>
<th>Common Engineering, Math and Science Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Credit Hours</th>
<th>Required Civil Engineering Courses</th>
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<tbody>
<tr>
<td>18</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Credit Hours</th>
<th>Capstone Project</th>
</tr>
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<tbody>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credit Hours</th>
<th>Technical Elective Block</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Credit Hours</th>
<th>Total Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>123-125</td>
<td></td>
</tr>
</tbody>
</table>

1 Full-time, first time in college students are required to take the first-year seminars.  
- UNIV 1101 First-Year Seminar I (1 sch)  
- UNIV 1102 First-Year Seminar II (1 sch)

## Program Requirements

### Code  Title  Hours

**Full-time, First-year Students**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIV 1101</td>
<td>First-Year Seminar I</td>
<td>1</td>
</tr>
<tr>
<td>UNIV 1102</td>
<td>First-Year Seminar II</td>
<td>1</td>
</tr>
</tbody>
</table>

**Core Curriculum Program**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core Curriculum</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

Civil Engineering students should take:  
- CHEM 1411 General Chemistry I  
- MATH 2413 Calculus I  
- MATH 2414 Calculus II  
- PHYS 2425 University Physics I

**Common Engineering, Math and Science Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1411</td>
<td>General Chemistry I (included in University Core)</td>
<td>1</td>
</tr>
<tr>
<td>COSC 1330</td>
<td>Programming for Scientists, Engineers, and Mathematicians</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 1211</td>
<td>Introduction to Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ENGR 1312</td>
<td>Engineering Graphics I</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 2325</td>
<td>Statics</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 2326</td>
<td>Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 2460</td>
<td>Circuit Analysis</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 3315</td>
<td>Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 3316</td>
<td>Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 3320</td>
<td>Strength of Materials</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 3322</td>
<td>Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 4240</td>
<td>Project Management</td>
<td>2</td>
</tr>
<tr>
<td>ENGR 4420</td>
<td>Engineering Lab Measurements</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2413</td>
<td>Calculus I (included in University Core)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2414</td>
<td>Calculus II (included in University Core)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 2415</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 3315</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3342</td>
<td>Applied Probability and Statistics **</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 2425</td>
<td>University Physics I (included in University Core)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Required Civil Engineering Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEEN 2315</td>
<td>Geomatics and Surveying Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEEN 3320</td>
<td>Geotechnical Engineering I</td>
<td>3</td>
</tr>
<tr>
<td>CEEN 3330</td>
<td>GIS for Civil and Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEEN 4304</td>
<td>Civil and Construction Materials</td>
<td>3</td>
</tr>
<tr>
<td>CEEN 4306</td>
<td>Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEEN 4312</td>
<td>Principles of Hydraulics and Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CEEN 4324</td>
<td>Structural Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

**Technical Electives Block**

These electives provide students with the option to take courses that apply to their field of study. Students must complete 9 hours of elective courses. These may include upper-division Engineering and 4000-level Engineering Technology courses outside of the required courses in their degree plans, any 4000-level MATH, COSC, BIOL, CHEM, or PHYS courses, the specified courses in the 5-year BS/MBA program, and other courses approved by the Department of Engineering.

### Capstone Project

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 4370</td>
<td>Capstone Projects</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Hours** 127

1 The 3 lecture hours in MATH 2413 Calculus I (4 sch), CHEM 1411 General Chemistry I (4 sch), and PHYS 2425 University Physics I (4 sch) satisfy the required 3 and 6 core curriculum hours in math and science, respectively. The 1 lab hour from each of these three courses, and the 3 lecture hours from MATH 2414 Calculus II (4 sch), satisfy the 6-hour component area option requirement in the core curriculum. Students transferring to Texas A&M University - Corpus Christi from other institutions may have various means for fulfilling the core curriculum. Please refer to the “General Education Requirement (https://client-snap.dev8.leepfrog.com/tamucc/catalog.tamucc.edu/index7ef1.html?catoid=12&amp;navoid=424&amp;General_Education_Requirement)” in the catalog section entitled “Undergraduate Programs.”

* Online offering  
^ Blended offering

### Capstone Project

All civil engineering students must complete a senior-level capstone project in ENGR 4370 Capstone Projects (3 sch) (3 sem. hrs.). Students will work with practicing engineers and engineering faculty. The Capstone Project will give engineering students practical, professional experience to prepare them for careers in civil engineering.
### Civil Engineering Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEEN 2315</td>
<td>Geomatics and Surveying Engineering</td>
<td>3</td>
<td>COSE 1330 and CEEN 2315.</td>
</tr>
<tr>
<td>CEEN 2315</td>
<td>Principles of Hydraulics and Hydrology</td>
<td>3</td>
<td>ENGR 3315.</td>
</tr>
<tr>
<td>CEEN 2315</td>
<td>Transportation Engineering</td>
<td>3</td>
<td>ENGR 3315.</td>
</tr>
<tr>
<td>CEEN 2315</td>
<td>Geotechnical Engineering I</td>
<td>3</td>
<td>ENGR 3315.</td>
</tr>
<tr>
<td>CEEN 2315</td>
<td>Remote Sensing</td>
<td>3</td>
<td>ENGR 3315.</td>
</tr>
<tr>
<td>CEEN 2315</td>
<td>Water Resources Engineering</td>
<td>3</td>
<td>ENGR 3315.</td>
</tr>
<tr>
<td>CEEN 2315</td>
<td>Principles of Hydraulics and Hydrology</td>
<td>3</td>
<td>ENGR 3315.</td>
</tr>
</tbody>
</table>

**Civil and Construction Materials**

- **Prerequisite:** ENGR 3315.
- **Prerequisite:** ENGR 3320.
- **Prerequisite:** ENGR 3315.
- **Prerequisite:** ENGR 3320.
- **Prerequisite:** ENGR 3315.
- **Prerequisite:** ENGR 3315.
- **Prerequisite:** ENGR 3315.
CEEN 4322 Geotechnical Engineering II – Coastal Environment
3 Semester Credit Hours (3 Lecture Hours)
(3:0) THIS COURSE INTRODUCES KEY CONCEPTS AND BASIC ANALYSIS
AND DESIGN TECHNIQUES IN GEOTECHNICAL ENGINEERING FOR
COASTAL ENVIRONMENTS. EMPHASIS IS ON THE INTERACTION
BETWEEN OCEANIC DYNAMIC PROCESSES (WAVES, CURRENTS, TIDES,
AND SEDIMENT TRANSPORT) AND COASTAL REGIONS (HARBORS,
STRUCTURES, BEACHES AND ESTUARIES) AND ON THE ENGINEERING
APPROACHES NECESSARY TO PREVENT ADVERSE EFFECTS CAUSED
BY THIS INTERACTION. GEOTECHNICAL ASPECTS OF COASTAL
ENGINEERING PROJECTS WILL INCLUDE DESIGN OF TRADITIONAL
STRUCTURES AND EXPOSURE TO SOFTER COASTAL ENGINEERING
TECHNIQUES.
Prerequisite: CEEN 3320.

CEEN 4324 Structural Engineering
3 Semester Credit Hours (3 Lecture Hours)
(3:0) THIS CLASS WILL PROVIDE STUDENTS WITH A SOLID
BACKGROUND ON PRINCIPLES OF STRUCTURAL ENGINEERING.
STUDENTS WILL BE EXPOSED TO THEORIES AND CONCEPTS OF
BOTH CONCRETE AND STEEL DESIGN AND ANALYSIS BOTH AT THE
ELEMENT AND SYSTEM LEVELS. HANDS-ON DESIGN EXPERIENCE AND
SKILLS WILL BE GAINED AND LEARNED THROUGH PROBLEM SETS AND
A COMPREHENSIVE DESIGN PROJECT. AN UNDERSTANDING OF REAL-WORLD OPEN-ENDED DESIGN ISSUES WILL BE DEVELOPED.
Prerequisite: CEEN 3320 and MATH 3315.

CEEN 4330 Introduction to Bridge and Pavement Engineering
3 Semester Credit Hours (3 Lecture Hours)
(3:0) THIS COURSE FOCUSES ON THE MATERIALS, TECHNOLOGY AND
PROCEDURES USED TO DESIGN AND MANAGE ROAD PAVEMENTS,
WITH REFERENCE TO THE NATIONAL ROADS AUTHORITY (NRA) DESIGN
MANUAL FOR ROADS AND BRIDGES, AND GUIDELINES ISSUED BY THE
DEPARTMENT OF TRANSPORT, TOURISM AND SPORT (DTTS).
Prerequisite: CEEN 4304.

CEEN 4332 Traffic Engineering
3 Semester Credit Hours (3 Lecture Hours)
(3:0) THE PURPOSE OF THIS COURSE IS TO INTRODUCE
FUNDAMENTALS OF TRAFFIC ENGINEERING INCLUDING DATA
COLLECTION, ANALYSIS, AND DESIGN. EMPHASIS IS ON THE SAFE
AND EFFICIENT OPERATIONS OF ROADWAY INTERSECTIONS. TRAFFIC
ENGINEERING STUDIES TRAFFIC CONTROL DEVICES, CAPACITY AND
LEVEL OF SERVICE ANALYSIS OF FREEWAYS AND URBAN ROADS.
APPLICATIONS OF TRAFFIC OPERATIONS INCLUDE COMPUTER
SIMULATION MODELS TO THE DESIGN OF ISOLATED INTERSECTION
AND COORDINATED TRAFFIC SIGNAL CONTROL SYSTEMS.
Prerequisite: CEEN 4306.

CEEN 4342 Construction Management
3 Semester Credit Hours (3 Lecture Hours)
THE COURSE FOCUSES ON MANAGEMENT TECHNIQUES TO SOLVE
THE UNIQUE PROBLEMS ASSOCIATED WITH A CONSTRUCTION
PROJECT. STUDY OF CONSTRUCTION MANAGEMENT FUNCTIONS
INCLUDING PROJECT MANAGEMENT, COST MANAGEMENT, TIME
MANAGEMENT, QUALITY MANAGEMENT, CONTRACT ADMINISTRATION,
AND SAFETY MANAGEMENT WILL BE COVERED. EMPHASIS IS PUT ON
THE APPLICATION OF EACH FUNCTION THROUGHOUT THE PROJECT
PHASES.
Prerequisite: CEEN 4304.

CEEN 4396 Directed Independent Study
1-3 Semester Credit Hours
(1-3) REQUIRES A FORMAL PROPOSAL OF STUDY TO BE COMPLETED
IN ADVANCE OF REGISTRATION, APPROVAL OF SUPERVISING FACULTY
AND DEPARTMENT CHAIRPERSON. PREREQUISITES: VARIES. OFFERED
FALL, SPRING, AND SUMMER.

Engineering Courses

ENGR 1211 Introduction to Engineering
2 Semester Credit Hours (1 Lecture Hour, 2 Lab Hours)
INTRODUCTION TO THE ENGINEERING PROFESSION, ETHICS,
AND DISCIPLINES; DEVELOPMENT OF SKILLS IN TEAMWORK,
PROBLEM SOLVING AND DESIGN; OTHER TOPICS INCLUDE
COMPUTER APPLICATIONS AND PROGRAMMING; VISUALIZATION,
ORTHOGRAPHIC DRAWINGS AND CAD TOOLS; INTRODUCTION TO
ELECTRICAL CIRCUITS, SEMICONDUCTOR DEVICES, DIGITAL LOGIC,
COMMUNICATIONS AND THEIR APPLICATION IN SYSTEMS; NEWTON'S
LAWS, UNIT CONVERSIONS, STATISTICS, EXCEL; BASIC GRAPHICS
SKILLS. OFFERING: FALL AND SPRING.
Prerequisite: MATH 1314.

ENGR 1212 FOUNDATIONS OF ENGINEERING II
2 Semester Credit Hours (2 Lecture Hours)
ENGR 1312 Engineering Graphics I
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
TOPICS INCLUDE, DEPENDING ON THE MAJOR: EMPHASIS ON
COMPUTER APPLICATIONS AND PROGRAMMING AND SOLIDS
MODELING USING CAD TOOLS OR OTHER SOFTWARE; FUNDAMENTALS
OF ENGINEERING SCIENCE; ADVANCED GRAPHIC SKILLS. OFFERED
FALL AND SPRING.
TCCNS: ENGR 1304

ENGR 2105 Electrical Circuits Laboratory
1 Semester Credit Hour (3 Lab Hours)
LABORATORY EXPERIMENTS SUPPORTING THEORETICAL PRINCIPLES
PRESENTED IN ENGR 2305 INVOLVING DC AND AC CIRCUIT THEORY,
NETWORK THEOREMS, TIME, AND FREQUENCY DOMAIN CIRCUIT
ANALYSIS. INTRODUCTION TO PRINCIPLES AND OPERATION OF BASIC
LABORATORY EQUIPMENT; LABORATORY REPORT PREPARATION.
Prerequisite: ENGR 2305.

ENGR 2106 Digital Systems Laboratory
1 Semester Credit Hour (1 Lab Hour)
BASIC LABORATORY EXPERIMENTS SUPPORTING THEORETICAL
PRINCIPLES PRESENTED IN ENGR 2306 INVOLVING DESIGN,
CONSTRUCTION, AND ANALYSIS OF COMBINATIONAL AND SEQUENTIAL
DIGITAL CIRCUITS AND SYSTEMS, INCLUDING LOGIC GATES, ADDERS,
MULTIPLEXERS, ENCODERS, DECODERS, ARITHMETIC LOGIC UNITS,
LATCHES, FLIP-FLOPS, REGISTERS, AND COUNTERS; PREPARATION OF
LABORATORY REPORTS.
Prerequisite: MATH 1314.
Co-requisite: ENGR 2306, SMTE 0099.
ENGR 2305 Electrical Circuits
3 Semester Credit Hours (3 Lecture Hours)
PRINCIPLES OF ELECTRICAL CIRCUITS AND SYSTEMS. BASIC CIRCUIT ELEMENTS (RESISTANCE, INDUCTANCE, MUTUAL INDUCTANCE, CAPACITANCE, INDEPENDENT AND DEPENDENT CONTROLLED VOLTAGE, AND CURRENT SOURCES). TOPOLOGY OF ELECTRICAL NETWORKS; KIRCHHOFF’S LAWS; NODE AND MESH ANALYSIS; DC CIRCUIT ANALYSIS; OPERATIONAL AMPLIFIERS; TRANSIENT AND SINUSOIDAL STEADY-STATE ANALYSIS; AC CIRCUIT ANALYSIS; FIRST- AND SECOND- ORDER CIRCUITS; BODE PLOTS; AND USE OF COMPUTER SIMULATION SOFTWARE TO SOLVE CIRCUIT PROBLEMS.
Prerequisite: (PHYS 2425 and MATH 2414).
Co-requisite: ENGR 2105.

ENGR 2306 Digital Systems
3 Semester Credit Hours (3 Lecture Hours)
INTRODUCTION TO THEORY AND DESIGN OF DIGITAL LOGIC, CIRCUITS, AND SYSTEMS. NUMBER SYSTEMS, OPERATIONS AND CODES; LOGIC GATES; BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION; KARNAUGH MAPS; COMBINATIONAL LOGIC; FUNCTIONS OF COMBINATIONAL LOGIC; FLIP-FLOPS AND RELATED DEVICES; COUNTERS; SHIFT REGISTERS; SEQUENTIAL LOGIC; MEMORY AND STORAGE.
Prerequisite: MATH 1314 and 2305*.
* May be taken concurrently.
Co-requisite: ENGR 2106.

ENGR 2320 STRENGTHS OF MATERIALS
3 Semester Credit Hours (3 Lecture Hours)
Concepts in strengths of materials, stress, strain; deformation under load, direct, shear, and combined stresses concentrations, bending stresses and torsional shear stresses, deflection in beams and shafts; columns, and pressure vessels.
Prerequisite: ENGR 2321.

ENGR 2325 Statics
3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)
THEORY OF ENGINEERING MECHANICS INVOLVING FORCES, MOMENTS, AND COUPLES ON STATIONARY STRUCTURES; EQUILIBRIUM IN TWO AND THREE DIMENSIONS; FREE BODY DIAGRAMS; TRUSS ANALYSIS; FRICTION; CENTROIDS; CENTERS OF GRAVITY AND MOMENTS OF INERTIA.
Prerequisite: PHYS 2425 and MATH 2414*.
* May be taken concurrently.
TCCNS: ENGR 2301

ENGR 2326 Dynamics
3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)
THEORY OF ENGINEERING MECHANICS INVOLVING THE MOTION OF PARTICLES, RIGID BODIES AND SYSTEMS OF PARTICLES; NEWTON’S LAWS; WORK AND ENERGY RELATIONSHIPS; PRINCIPLES OF IMPULSE AND MOMENTUM; APPLICATION OF KINETICS AND KINEMATICS TO THE SOLUTION OF ENGINEERING PROBLEMS.
TCCNS: ENGR 2302

ENGR 2350 MANUFACTURING PROCESSES
3 Semester Credit Hours (3 Lecture Hours)
Introduction to metal and non-metallic manufacturing processes; casting, forging, rolling, extrusion, sheet metal forming, cutting tools turing and milling operations, abrasive machining, welding and joining, powder compaction, molding, forming of plastics, surface treatment, human factors and safety.
Prerequisite: MATH 2414.

ENGR 2360 CIRCUIT ANALYSIS
3 Semester Credit Hours (3 Lecture Hours)
This course covers principles of electronics: charge, voltage, resistance, current, and power; Ohm’s Law; Kirchhoff’s voltage and current laws; RC and LC circuits; periodic functions, average and RMS measurements; transformers, electrical measurement instruments. The laboratory provides hands-on experience with devices and circuits discussed in the classroom.
Prerequisite: PHYS 2426.

ENGR 2406 DIGITAL SYSTEMS
4 Semester Credit Hours (4 Lecture Hours)
THIS COURSE COVERS PRINCIPLES OF ELECTRONICS: CHARGE, VOLTAGE, RESISTANCE, CURRENT, AND POWER; OHM’S LAW; KIRCHHOFF’S VOLTAGE AND CURRENT LAWS; RC AND LC CIRCUITS; PERIODIC FUNCTIONS, AVERAGE AND RMS MEASUREMENTS; TRANSFORMERS, ELECTRICAL MEASUREMENT INSTRUMENTS. THE LABORATORY PROVIDES HANDS-ON EXPERIENCE WITH DEVICES AND CIRCUITS DISCUSSED IN THE CLASSROOM.
Prerequisite: (PHYS 2426, MATH 2414 and 3315*).
* May be taken concurrently.
Co-requisite: SMTE 0099.

ENGR 2460 Circuit Analysis
4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)
COVERS PRINCIPLES OF ELECTRONICS: CHARGE, VOLTAGE, RESISTANCE, CURRENT, AND POWER; OHM’S LAW; KIRCHHOFF’S VOLTAGE AND CURRENT LAWS; RC AND LC CIRCUITS; PERIODIC FUNCTIONS, AVERAGE AND RMS MEASUREMENTS; TRANSFORMERS, ELECTRICAL MEASUREMENT INSTRUMENTS. THE LABORATORY PROVIDES HANDS-ON EXPERIENCE WITH DEVICES AND CIRCUITS DISCUSSED IN THE CLASSROOM.
Prerequisite: (PHYS 2426 and MATH 2414).
Co-requisite: ENGR 2406.
TCCNS: ENGR 2405

ENGR 3315 Fluid Mechanics
3 Semester Credit Hours (3 Lecture Hours)
FLUID PROPERTIES, FLUID STATICS, DYNAMICS, AND KINEMATICS, CONSERVATION OF ENERGY AND MOMENTUM INCOMPRESSIBLE, LAMINAR AND TURBULENT FLOW. SIMILITUDE AND DIMENSIONAL ANALYSIS, AND VISCOUS FLOW.
Prerequisite: MATH 3315 or 3315 and ENGR 2326 and MATH 2415.

ENGR 3316 Thermodynamics
3 Semester Credit Hours (3 Lecture Hours)
THEORY AND APPLICATION OF ENERGY METHODS IN ENGINEERING; CONSERVATION OF MASS AND ENERGY; ENERGY TRANSFER BY HEAT, WORK AND MASS; THERMODYNAMIC PROPERTIES; ANALYSIS OF OPEN AND CLOSED SYSTEMS; THE SECOND LAW OF THERMODYNAMICS AND ENTROPY; GAS, VAPOR AND REFRIGERATION CYCLES.
Prerequisite: PHYS 2425 and MATH 2414).

ENGR 3320 Strength of Materials
3 Semester Credit Hours (3 Lecture Hours)
CONCEPTS IN STRENGTH OF MATERIALS, STRESS, STRAIN; DEFORMATION UNDER LOAD, DIRECT, SHEAR, AND COMBINED STRESSES; STRESS CONCENTRATIONS, BENDING STRESSES AND TORSIONAL SHEAR STRESSES, DEFLECTION IN BEAMS AND SHAFTS; COLUMNS, AND PRESSURE VESSELS.
Prerequisite: ENGR 2325 and 3322 or ENGR 2322.

ENGR 3322 Materials Science
3 Semester Credit Hours (3 Lecture Hours)
STRUCTURE AND PROPERTIES OF METALLIC AND NONMETALLIC MATERIALS; MICROSTRUCTURE, MECHANICAL TESTING, PHASE DIAGRAMS, HEAT TREATMENT, TESTING, CERAMICS, POLYMERS, COMPOSITES, CONSTRUCTION MATERIALS, FAILURE ANALYSIS, NONDESTRUCTIVE EVALUATION, CORROSION AND THERMAL PROPERTIES OF MATERIALS.
Prerequisite: (CHEM 1411) and (PHYS 2425).
Co-requisite: SMTE 0099.
ENGR 3350  Manufacturing Processes
3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)
INTRODUCTION TO METAL AND NON-METALLIC MANUFACTURING PROCESSES; CASTING, FORGING, ROLLING, EXTRUSION, SHEET METAL FORMING, CUTTING TOOLS TURNING AND MILLING OPERATIONS, ABRASIVE MACHINING, WELDING AND JOINING, POWDER COMPACTION, MOLDING, FORMING OF PLASTICS, SURFACE TREATMENT, HUMAN FACTORS AND SAFETY.
Prerequisite: ENGR 1312, 3320 and 2326.
Co-requisite: SMTE 0099.

ENGR 4240  Project Management
2 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
FOUNDATIONS OF ENGINEERING ECONOMY, CASH FLOW AND EQUIVALENCE, AND PROJECT JUSTIFICATION. INTRODUCTION TO PROJECT MANAGEMENT, PLANNING, SCHEDULING, AND CONTROL, USE OF PROJECT MANAGEMENT SOFTWARE, GANTT CHARTS, PERT CHARTS, AND CRITICAL PATH. STUDENTS PREPARE PROPOSALS, INCLUDING SPECIFICATIONS, TIMELINES, SCHEDULE, AND BUDGET, FOR PROJECTS TO BE IMPLEMENTED IN ENGR 4370 - CAPSTONE PROJECTS. THIS COURSE SHOULD BE TAKEN THE SEMESTER PRECEDING ENGR 4370 - CAPSTONE PROJECTS.
Prerequisite: (MEEN 3330) and (MEEN 3345) or (EEEN 3330) or (EEEN 3310) and (EEEN 3350).
Co-requisite: SMTE 0099.

ENGR 4350  Machine Vision and Image Processing Applications
3 Semester Credit Hours (3 Lecture Hours)
INTRODUCES STUDENTS TO AUTOMATED VISION SYSTEMS AND COMPONENTS, CAMERA MODELS, TESTING AND MEASUREMENT, AND FUNDAMENTALS OF IMAGE PROCESSING. TOPICS INCLUDE IMAGE ANALYSIS AND PROCESSING IN BINARY, GRAY SCALE AND COLOR IMAGES IN SPATIAL- AND FREQUENCY-DOMAIN. TEXTURE AND SHAPE ANALYSIS, HYPERSPECTRAL IMAGING, OTHER TRANSFORMS, AND FILTERS ARE DISCUSSED AND APPLIED.
Prerequisite: (COSC 1330 or 1435) and ENGR 2460 and MATH 2414.

ENGR 4370  Capstone Projects
3 Semester Credit Hours (1 Lecture Hour, 5 Lab Hours)
THIS COURSE ALLOWS STUDENTS TO EMPLOY THE KNOWLEDGE ATTAINED IN OTHER COURSES TO IMPLEMENT (INCLUDING BUILDING, TESTING, AND DOCUMENTING) AN APPROVED PROJECT, WITHIN BUDGET AND ON SCHEDULE. COURSE REQUIREMENTS INCLUDE A WRITTEN REPORT AND ORAL PRESENTATIONS.
Prerequisite: (ENGR 4240) and (MEEN 4360) and (MEEN 4365) or (EEEN 4333), CEEN 4304 or IEEN 4310.
May be taken concurrently.
Co-requisite: SMTE 0099.

ENGR 4390  Special Topics in Engineering
1,3 Semester Credit Hours (1,3 Lecture Hours)
SUBJECT MATERIAL VARIABLE. MAY BE REPEATED FOR CREDIT WHEN TOPICS ARE DIFFERENT.