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 (P.E.), 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:

Code	Title	Hours
ACCT 5312	Foundations of Accounting	3
ECON 5311	Foundations in Economics	3
FINA 5311	Financial Management Concepts	3

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	Credit Hours
First-Year Seminars (when applicable)[1]	0-2
Core Curriculum Program (http://catalog.tamucc.edu/undergraduate/university-college/programs/core-curriculum-program/)	42
Common Engineering, Math and Science Courses	51
Required Civil Engineering Courses	18
Capstone Project	3
Technical Elective Block	9
Total Credit Hours	**123-125**

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		
UNIV 1101	First-Year Seminar I *	1
UNIV 1102	First-Year Seminar II *	1
Core Curriculum Program		
University Core Curriculum		42
Civil Engineering students should take:[1]		
CHEM 1411	General Chemistry I *	
MATH 2413	Calculus I	
MATH 2414	Calculus II	
PHYS 2425	University Physics I	
Common Engineering, Math and Science Courses		
CHEM 1411	General Chemistry I (included in University Core) *	
COSC 1330	Programming for Scientists, Engineers, and Mathematicians	3
ENGR 1211	Introduction to Engineering	2
ENGR 1312	Engineering Graphics I	3
ENGR 2325	Statics	3
ENGR 2326	Dynamics	3
ENGR 2460	Circuit Analysis	4
ENGR 3315	Fluid Mechanics	3
ENGR 3316	Thermodynamics	3
ENGR 3320	Strength of Materials	3
ENGR 3322	Materials Science	3
ENGR 4240	Project Management	2
ENGR 4420	Engineering Lab Measurements	4
MATH 2413	Calculus I (included in University Core)	
MATH 2414	Calculus II (included in University Core)	
MATH 2415	Calculus III	4
MATH 3315	Differential Equations	3
MATH 3342	Applied Probability and Statistics *,^	3
PHYS 2425	University Physics I (included in University Core)	
PHYS 2426	University Physics II	4
Required Civil Engineering Courses		
CEEN 2315	Geomatics and Surveying Engineering	3
CEEN 3320	Geotechnical Engineering I	3
CEEN 3330	GIS for Civil and Environmental Engineering	3
CEEN 4304	Civil and Construction Materials	3
CEEN 4306	Transportation Engineering	3
CEEN 4312	Principles of Hydraulics and Hydrology	3
CEEN 4324	Structural Engineering	3
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.		9
Capstone Project		
ENGR 4370	Capstone Projects	3
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&navoid=424&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

CEEN 2315 Geomatics and Surveying Engineering
3 Semester Credit Hours (3 Lecture Hours)
(3:0) CONCEPTS, PRINCIPLES, AND APPLICATIONS OF SURVEYING METHODS AND TECHNOLOGY FOR PLANAR MEASUREMENT, GEO-POSITIONING AND MAPPING, AND CIVIL ENGINEERING PROJECT DESIGN AND MANAGEMENT ARE INTRODUCED. TOPICS INCLUDE: LAND SURVEYING METHODS FOR FIELD MEASUREMENT; PRINCIPLES OF DISTANCES, ELEVATION AND ANGLES; GEODETIC DATUMS AND COORDINATE SYSTEMS; TOPOGRAPHIC MAPPING; BASIC ERROR THEORY IN MEASUREMENT AND COMPUTATIONAL ADJUSTMENTS; TRAVERSE CALCULATIONS; INTRODUCTION TO GLOBAL POSITIONING SYSTEM (GPS). COMPUTATIONAL EXERCISES TO PROCESS, ANALYZE, AND ADJUST SURVEY DATA WILL PROVIDE PRACTICAL EXPERIENCE IN CIVIL SURVEY DESIGN AND ASSESSMENT.
Prerequisite: MATH 1316 or 2413.

CEEN 3320 Geotechnical Engineering I
3 Semester Credit Hours (3 Lecture Hours)
(3:0) GEOTECHNICAL ENGINEERING FOCUSES ON HOW SOIL SUPPORTS AND AFFECTS THE PERFORMANCE OF STRUCTURES BUILT ON OR BELOW THE EARTH'S SURFACE. THIS COURSE WILL INTRODUCE THE TERMINOLOGY USED IN GEOTECHNICAL ENGINEERING AND PROVIDE A BASIC UNDERSTANDING OF IMPORTANT GEOTECHNICAL PRINCIPLES AND ANALYTIC METHODS. THE TOPICS TO BE COVERED IN THIS CLASS INCLUDES: INDEX SOIL PROPERTIES AND SOIL CLASSIFICATION; SOIL PERMEABILITY AND PORE WATER MOVEMENT; SOIL STRESSES; SOIL COMPRESSIBILITY, CONSOLIDATION AND SETTLEMENT; SHEAR STRENGTH OF SOIL; ENGINEERING SOIL PROPERTIES AND MEASUREMENT.
Prerequisite: ENGR 3315 and 3320.

CEEN 3330 GIS for Civil and Environmental Engineering
3 Semester Credit Hours (3 Lecture Hours)
(3:0) INTRODUCTORY DESIGN PRINCIPLES PRESENTED ON THE USE OF GEOGRAPHIC INFORMATION SYSTEM (GIS) TECHNOLOGY FOR MODELING AND ANALYSIS OF CIVIL AND ENVIRONMENTAL ENGINEERING SYSTEMS. INTRODUCTION TO THE INTEGRATION OF GEOSPATIAL DATA AND ANALYSIS FOR DECISION MAKING AND MANAGEMENT FOR SITE SELECTION, MITIGATION, CHANGE ANALYSIS, MODELING AND ASSESSMENT. TOPICS COVERED INCLUDE MAP PROJECTIONS AND GEOREFERENCING, VECTOR AND RASTER DATA MODELS, ACQUISITION AND MANIPULATION OF DATA, CARTOGRAPHY, CURRENT TOPICS, DATA QUALITY, AND BASIC SPATIAL ANALYSIS. THE COURSE INTEGRATES COMMERCIAL GIS SOFTWARE (ESRI ARCGIS) FOR PERFORMING ENGINEERING ANALYSIS AND PROBLEM SOLVING. STUDENTS WILL PARTICIPATE IN BOTH INDIVIDUAL SOFTWARE LABS AND TEAM PROJECTS.
Prerequisite: COSC 1330 and CEEN 2315.

CEEN 4302 Remote Sensing
3 Semester Credit Hours (3 Lecture Hours)
PROVIDES THE FOUNDATIONS TO INTERPRET, PROCESS, AND APPLY REMOTELY SENSED DATA ACQUIRED BY SATELLITES AND SUB-ORBITAL PLATFORMS (AIRCRAFT, UAVS) FOR MAPPING AND ANALYSIS OF OUR NATURAL AND BUILT ENVIRONMENT. PRINCIPLES OF ELECTROMAGNETIC ENERGY-MATTER INTERACTION, REMOTE SENSING SYSTEMS AND DATA CHARACTERISTICS, DIGITAL IMAGE PROCESSING, AND INFORMATION EXTRACTION METHODS WILL BE COVERED. INCLUDED IS TREATMENT OF: AERIAL PHOTOGRAMMETRY; MULTISPECTRAL, THERMAL, AND HYPERSPECTRAL SENSING; EARTH OBSERVATION SATELLITES; RADAR AND LIDAR; EMERGENT TOPICS. EMPHASIS WILL BE ON THEIR USE FOR GEOSPATIAL AND ENVIRONMENTAL APPLICATIONS. OFFERED FALL.
Prerequisite: PHYS 2425 and GISC 3300.

CEEN 4304 Civil and Construction Materials
3 Semester Credit Hours (3 Lecture Hours)
(3:0) THE COURSE PROVIDES INSTRUCTION ON CIVIL AND CONSTRUCTION ENGINEERING MATERIALS USED IN THE CONSTRUCTION OF HIGHWAY STRUCTURES SUCH AS PAVEMENTS, BRIDGES, RETAINING WALLS, BOX CULVERTS, ETC. IN PARTICULAR, THE COURSE CONCENTRATES ON THE ENGINEERING PROPERTIES OF AGGREGATES, METALS, PORTLAND CEMENT CONCRETE (PCC) AND HOT-MIX ASPHALT (HMA) AS WELL AS THE MIXTURE DESIGN OF PCC AND HMA. THE COURSE TARGETS THOSE INTERESTED IN CIVIL ENGINEERING OR CONSTRUCTION ENGINEERING AND MANAGEMENT.
Prerequisite: ENGR 3320.

CEEN 4306 Transportation Engineering
3 Semester Credit Hours (3 Lecture Hours)
(3:0) THIS COURSE WILL GIVE AN INTRODUCTION TO THE BASIC CONCEPTS, THEORY, AND PRACTICE OF TRANSPORTATION ENGINEERING AS RELATED TO PLANNING, DESIGN, AND OPERATIONS OF THE TRANSPORTATION SYSTEM. THE TOPICS TO BE COVERED IN THIS CLASS INCLUDES: FUNDAMENTAL PRINCIPLES IN PLANNING, DESIGN AND OPERATION OF TRANSPORTATION SYSTEMS; ISSUES AND CHALLENGES IN TRANSPORTATION; DRIVER AND VEHICLE PERFORMANCE CAPABILITIES; HIGHWAY GEOMETRIC AND PAVEMENT DESIGN PRINCIPLES; TRAFFIC ANALYSIS AND TRANSPORTATION PLANNING.
Prerequisite: CEEN 2315.

CEEN 4310 Water Resources Engineering
3 Semester Credit Hours (3 Lecture Hours)
(3:0) THIS COURSE WILL GIVE AN OVERVIEW OF THE BASIC CONCEPTS, ANALYSIS METHODS, AND DESIGN PROCEDURE. THE TOPICS TO BE COVERED INCLUDES: HYDRAULIC PROCESSES, HYDROLOGICAL CYCLE, STREAMFLOW PREDICTION, UNCERTAINTY ANALYSIS, WATER DEMANDS, WATER DISTRIBUTION SYSTEMS, RESERVOIR AND DAMS, URBAN STORMWATER DRAINAGE, AND WATER RESOURCES PLANNING AND MANAGEMENT.
Prerequisite: ENGR 3315.

CEEN 4312 Principles of Hydraulics and Hydrology
3 Semester Credit Hours (3 Lecture Hours)
(3:0) THIS COURSE WILL GIVE AN INTRODUCTION TO THE BASIC CONCEPTS, THEORY, AND ANALYTIC METHODS OF HYDRAULICS AND HYDROLOGY. THE TOPICS TO BE COVERED IN THIS CLASS INCLUDES: WATER FLOW THROUGH PIPES AND PUMPING SYSTEMS, WATER FLOW THROUGH OPEN CHANNELS AND HYDRAULIC STRUCTURES, WATERSHED HYDROLOGY, AND URBAN SEWER SYSTEMS.
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 THE 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.
TCCNS: ENGR 1201

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*.
* May be taken concurrently.
Co-requisite: ENGR 2305, SMTE 0099.

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, sheer, and combined stresses concentrations, bending stresses and torsional sheer 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, forgoing, 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; Kirchoff'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)
Prerequisite: (COSC 1330 or 1435) and (ENGR 2460 and MATH 2414).
Co-requisite: SMTE 0099.

ENGR 2460 Circuit Analysis
4 Semester Credit Hours (3 Lecture Hours, 3 Lab 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.
TCCNS: ENGR 2305

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.

ENGR 4420 Engineering Lab Measurements
4 Semester Credit Hours (2 Lecture Hours, 4 Lab Hours)
PRINCIPLES OF PHYSICAL MEASUREMENTS; STANDARDS, CALIBRATION, ERROR ESTIMATION; STATIC AND DYNAMIC PERFORMANCE OF MEASURING SYSTEMS; LABORATORY EXPERIENCE, EXPERIMENT PLANNING, REPORT WRITING. THE PURPOSE OF THIS COURSE IS FOR STUDENTS TO GAIN PROFICIENCY IN DESIGNING, ASSEMBLING, AND OPERATING AN EXPERIMENT; AND ANALYZING AND PRESENTING EXPERIMENTAL RESULTS. THIS ENCOMPASSES SKILLS SUCH AS AN UNDERSTANDING CONTROL AND DATA ACQUISITION ELECTRONICS, OPERATION AND LIMITATION OF MODERN SENSORS, CALIBRATION AND ERROR ANALYSIS, ASSESSING APPLICABILITY OF THEORY AND THE IMPACT OF SECONDARY EXPERIMENTAL VARIABLES, AND WRITING AND PRESENTING REPORTS AND ANALYSIS. OFFERED FALL AND SPRING.
Prerequisite: ENGR 2460.
Co-requisite: SMTE 0099.

ENGR 4444 Engineering Measurements
4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)
A VERY SIGNIFICANT PART OF DESIGNING ELECTRONIC INSTRUMENTS INVOLVES SELECTING THE APPROPRIATE PHYSICAL DEVICES TO TRANSLATE QUANTITIES TO BE MEASURED INTO VOLTAGES OR CURRENTS THAT CAN BE SENSED WITH ELECTRONIC CIRCUITS. THE RANGE OF SENSORS AND TRANSDUCERS AVAILABLE WILL BE STUDIED WITH EXAMPLES FROM INDUSTRY AND MEDICAL INSTRUMENTATION. THE COURSE WILL EXPLORE IN SOME DETAIL THE USE OF ANALOG TO DIGITAL (A/D) AND DIGITAL TO ANALOG (D/A) CONVERTERS AND THEIR APPLICATIONS. STUDENTS WILL ALSO LEARN TO USE COMPLETE A/D-MICROPROCESSOR-D/A SYSTEMS SINCE THESE ARE PART OF NEARLY ALL INSTRUMENTS NOW. IN THIS COURSE STUDENTS WILL LEARN TO BUILD A COMPLETE INSTRUMENT BY COMBINING ANALOG AND DIGITAL COMPONENTS AND USING ADVANCED ALGORITHMS. WE WILL REVIEW THE BASIC CONCEPTS FROM ANALOG ELECTRONICS AND REAL-TIME EVENT DRIVEN PROGRAMMING ONE NEEDS TO UNDERSTAND IN ORDER TO CONSTRUCT SUCH INSTRUMENTS AND EXPERIMENT THROUGH A SERIES OF LABS.
Prerequisite: (EEEN 2306 and 3315).
Co-requisite: SMTE 0099.