

MECHANICAL ENGINEERING TECHNOLOGY, MINOR

Program Requirements

This minor is designed to serve students who are interested in supplementing their major with technical skills in alternative energy technologies. A minimum of 12 hours must be taken at Texas A&M University-Corpus Christi. For additional information contact an academic advisor in the College of Science and Engineering.

Code	Title	Hours
Required Courses		
ENTC 3302	Manufacturing Processes	3
ENTC 2325	Statics	3
ENTC 2326	Dynamics	3
ENTC 3415	Circuit Analysis II	4
ENTC 3320	Thermodynamics	3
ENTC 4335	Energy Conversion	3
Total Hours		19

Courses

ENTC 2325 Statics

3 Semester Credit Hours (3 Lecture 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).

ENTC 2326 Dynamics

3 Semester Credit Hours (3 Lecture 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.

Prerequisite: (ENTC 2325).

ENTC 2414 Circuit Analysis I

4 Semester Credit Hours (4 Lecture Hours)

FUNDAMENTAL ASPECTS OF DC CIRCUIT ANALYSIS: CHARGE, VOLTAGE, RESISTANCE, CURRENT, AND POWER; OHM'S LAW; METHODS OF ANALYSIS; SERIES AND PARALLEL CIRCUITS; KIRCHHOFF'S VOLTAGE AND CURRENT LAWS; THEVENIN AND NORTON THEOREMS; ELECTRICAL MEASUREMENT INSTRUMENTS; AND USE OF ANALYSIS SOFTWARE.

Prerequisite: MATH 2413.

Co-requisite: PHYS 2426, SMTE 0099.

TCCNS: ENGT 1401

ENTC 2490 Special Topics

1-4 Semester Credit Hours (1-4 Lecture Hours, 3 Lab Hours)

SUBJECT MATERIAL VARIABLE. MAY BE REPEATED FOR DIFFERENT TOPICS.

ENTC 3220 Thermal-Fluids Laboratory

2 Semester Credit Hours (4 Lab Hours)

APPLICATION OF MEASUREMENT INSTRUMENTATION AND EXPERIMENTAL TECHNIQUES UTILIZED IN THERMODYNAMICS AND FLUID MECHANICS. EXPERIMENTS AND PROJECT IN HYDROSTATICS, HYDRODYNAMICS, AND THERMODYNAMICS.

Prerequisite: (ENTC 3306 or 3306*) and (ENTC 3320 or 3320*).

* May be taken concurrently.

Co-requisite: SMTE 0099.

ENTC 3302 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 and (ENTC 3308 and 2326) or (ENGR 2326).

Co-requisite: SMTE 0099.

ENTC 3306 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: (ENTC 2326 or ENGR 2326).

ENTC 3308 Strength of Materials

3 Semester Credit Hours (3 Lecture Hours)

CONCEPTS IN STRENGTH OF MATERIALS, STRESS, STRAIN; TORSION; DEFORMATION UNDER LOAD; DIRECT, SHEAR, AND COMBINED STRESSES; SHEAR AND MOMENT DIAGRAMS; MOHR'S CIRCLED; STRESS CONCENTRATIONS, BENDING STRESSES AND TORSIONAL SHEAR STRESSES, DEFLECTION IN BEAMS AND SHAFTS; COLUMNS, CONNECTIONS, AND PRESSURE VESSELS.

Prerequisite: (ENTC 2325 or ENGR 2325) and (ENTC 3410).

ENTC 3320 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.

ENTC 3323 Robotics and Automation

3 Semester Credit Hours (3 Lecture Hours)

AUTOMATION IN A MANUFACTURING AND ASSEMBLY SETTING, MATERIAL HANDLING SYSTEMS, REMOTE GUIDED VEHICLES, AUTOMATED STORAGE AND RETRIEVAL SYSTEMS, COMPUTER NUMERICAL MACHINE TOOLS, ROBOTICS.

Prerequisite: ENTC 3415.

Co-requisite: SMTE 0099.

ENTC 3350 Human Factors Engineering

3 Semester Credit Hours (3 Lecture Hours)

APPLICATION OF HUMAN FACTORS ENGINEERING PRINCIPLES UTILIZED IN MECHANICAL SYSTEM AND PRODUCT DESIGN. OVERVIEW OF HUMAN CHARACTERISTICS AND RESEARCH AND DESIGN TECHNIQUES.

Prerequisite: (ENTC 3302 or 3302*).

* May be taken concurrently.

ENTC 3406 FLUID MECHANICS AND FLUID POWER**4 Semester Credit Hours (4 Lecture Hours)**

FLUID MECHANICS Fluid properties, fluid statics, dynamics, and kinematics, conservation of energy and momentum incompressible, laminar and turbulent flow. Similitude and dimensional analysis, and viscous flow.

ENTC 3408 STRENGTH OF MATERIALS**4 Semester Credit Hours (4 Lecture Hours)**

Concepts in strength of materials, stress, strain; torsion; deformation under load; direct, shear, and combined stresses; shear and moment diagrams; mohr's circle; stress concentrations, bending stresses and torsional shear stresses, deflection in beams and shafts; columns, connections, and pressure vessels.

ENTC 3410 Material Science**4 Semester Credit Hours (4 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.

ENTC 3415 Circuit Analysis II**4 Semester Credit Hours (4 Lecture Hours)**

AC CIRCUIT ANALYSIS PRINCIPLES: AC GENERATION, PERIODIC FUNCTIONS, COMPLEX NUMBERS, PHASORS, IMPEDANCE AND ADMITTANCE, NETWORK THEOREMS, POWER, FREQUENCY RESPONSE, FILTERS, TRANSFORMERS, AND BALANCED THREE-PHASE SYSTEMS; AND USE OF ANALYSIS SOFTWARE.

Prerequisite: ENTC 2414.

Co-requisite: SMTE 0099.

ENTC 3416 Digital Fundamentals**4 Semester Credit Hours (4 Lecture Hours)**

INTRODUCES THE PRINCIPLES OF DIGITAL LOGIC ANALYSIS AND DESIGN: LOGIC FUNCTIONS; LOGIC GATES, NUMBER SYSTEMS AND CONVERSIONS; BOOLEAN ALGEBRA; LOGIC SIMPLIFICATION, COMBINATIONAL CIRCUITS, PROGRAMMABLE LOGIC DEVICES, SEQUENTIAL CIRCUITS, AND USE OF ANALYSIS AND SIMULATION SOFTWARE.

Co-requisite: ENTC 2414, SMTE 0099.

ENTC 3418 Microprocessors/Microcontrollers**4 Semester Credit Hours (4 Lecture Hours)**

INTRODUCTION TO MICROPROCESSOR ARCHITECTURE, ASSEMBLY LANGUAGE PROGRAMMING, AND INTERFACING. TOPICS INCLUDE COMPUTER ORGANIZATION, ADDRESSING MODES, INSTRUCTION SET, INTERRUPTS, TIMING, MEMORY, AND INTERFACING.

Prerequisite: (COSC 1330 or 1435).

Co-requisite: SMTE 0099.

ENTC 3420 THERMODYNAMICS**4 Semester Credit Hours (3 Lecture Hours, 3 Lab 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.

ENTC 3444 Electronic Devices and Circuits I**4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

AN INTRODUCTION TO SEMICONDUCTOR THEORY; SOLID STATE DEVICES, INCLUDING DIODES, BIPOLAR JUNCTION TRANSISTORS, JFETS, AND MOSFETS; PRINCIPLES OF OPERATIONAL AMPLIFIERS; TRANSDUCERS AND SENSORS.

Prerequisite: ENTC 3415.

Co-requisite: SMTE 0099.

ENTC 3450 Electronic System Design**4 Semester Credit Hours (4 Lecture Hours)**

PRINCIPLES OF ENGINEERING DESIGN OF ELECTRONIC CIRCUITS AND SYSTEMS; TIME AND FREQUENCY RESPONSES; NETWORK ANALYSIS; SYSTEMS SPECIFICATIONS; EVALUATION, TESTING, AND VERIFICATION; USE OF ELECTRONIC DESIGN AUTOMATION TOOLS.

Prerequisite: EEEN 3345.

Co-requisite: SMTE 0099.

ENTC 3455 Solid Modeling and Finite Elements**4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)**

USE OF COMPUTER AIDED DESIGN AND SOLID MODELING TOOLS IN ENGINEERING DESIGN AND MANUFACTURING INCLUDING: SOLID MODELING, STRESS, FLOW AND HEAT TRANSFER ANALYSIS USING FINITE ELEMENT METHODS, AND RAPID PROTOTYPING.

Prerequisite: ENTC 3308.

ENTC 4210 Solid Mechanics Laboratory**2 Semester Credit Hours (4 Lab Hours)**

EXPERIMENTAL PRINCIPLES FROM STRENGTH OF MATERIALS, AND EXPERIMENTS AND COMPUTER-BASED ANALYSIS OF MACHINE ELEMENTS AND STRUCTURES FOR STRENGTH OF MATERIAL AND SOLID MECHANICS.

Prerequisite: (ENTC 4330*).

* May be taken concurrently.

Co-requisite: SMTE 0099.

ENTC 4320 Heat Transfer**3 Semester Credit Hours (3 Lecture Hours)**

FUNDAMENTAL STUDY OF CONVECTION, CONDUCTION AND RADIATION AS APPLIED TO HEAT TRANSFER, HEAT EXCHANGERS, BOILERS, OTHER HEAT TRANSFER EQUIPMENT.

Prerequisite: ENTC 3306 and 3320.

ENTC 4322 Programmable Logic Controllers**3 Semester Credit Hours (3 Lecture Hours)**

INTRODUCTION TO PLCs AND THEIR USE IN INDUSTRIAL AUTOMATION. TOPICS INCLUDE PROGRAMMING, COUNTERS, TIMERS, INTERRUPTS, AND PROCESS CONTROL APPLICATIONS.

Prerequisite: ENTC 3416.

Co-requisite: SMTE 0099.

ENTC 4330 Solid Mechanics**3 Semester Credit Hours (3 Lecture Hours)**

STRESS ANALYSIS OF DEFORMABLE BODIES AND MECHANICAL ELEMENTS; STRESS TRANSFORMATION; COMBINED LOADING; FAILURE MODES; MATERIAL FAILURE THEORIES; FRACTURE AND FATIGUE; DEFLECTIONS AND INSTABILITIES; THICK CYLINDERS; CURVED BEAMS; DESIGN OF STRUCTURAL/MECHANICAL MEMBERS; DESIGN PROCESSES FOR SHAFTS, BEARINGS, SPRINGS, FASTENERS, AND MECHANICAL JOINTS.

Prerequisite: ENTC 3308.

ENTC 4331 Unit Processes**3 Semester Credit Hours (3 Lecture Hours)**

PRINCIPLES AND METHODS FOR STAGED SEPARATION PROCESSES INCLUDING DISTILLATION, ABSORPTION AND STRIPPING, EXTRACTION, AND ADSORPTION SYSTEMS. OFFERED IN FALL AND SPRING

Prerequisite: ENTC 4320.

ENTC 4332 Process Modeling and Control**3 Semester Credit Hours (3 Lecture Hours)**

PROCESS MODELING, DYNAMICS, AND FEEDBACK CONTROL. LINEAR CONTROL THEORY. APPLICATION OF LAPLACE TRANSFORMS AND FREQUENCY RESPONSE TO THE ANALYSIS OF OPEN-LOOP AND CLOSED-LOOP PROCESS DYNAMICS. DYNAMIC RESPONSE CHARACTERISTICS OF PROCESSES. STABILITY ANALYSIS AND GAIN/PHASE MARGINS. DESIGN AND TUNING OF SYSTEMS FOR CONTROL OF LEVEL, FLOW, AND TEMPERATURE. OFFERED FALL AND SPRING.

Prerequisite: ENTC 3306.

ENTC 4333 Chemical Reaction Engineering**3 Semester Credit Hours (3 Lecture Hours)**

FUNDAMENTAL PRINCIPLES OF CHEMICAL REACTION ENGINEERING AND APPLICATION TO DESIGN AND ANALYSIS OF BASIC CHEMICAL REACTORS CONTAINING BOTH HOMOGENEOUS AND HETEROGENEOUS REACTIONS. OFFERED FALL AND SPRING.

Prerequisite: ENTC 4331 and 4332.

ENTC 4335 Energy Conversion**3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)**

INSTALLATION, DESIGN CHARACTERISTICS, OPERATIONAL PERFORMANCE, AND MAINTENANCE OF MOTORS, TURBINES, PUMPS AND COMPRESSORS. INTRODUCTION TO GLOBAL ENERGY CONCERNS; FOSSIL AND NUCLEAR FUELS; ENERGY CONSUMPTION ANALYSIS; ENERGY MANAGEMENT AND CONSERVATION TECHNIQUES; RENEWABLE AND ALTERNATIVE ENERGY SOURCES. MODERN ENERGY CONVERSION DEVICES SUCH AS FUEL CELLS, PHOTOVOLTAIC CELLS, AND MICRO-POWER TURBINES.

Prerequisite: ENTC 3320.

ENTC 4350 Capstone Projects**3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE ALLOWS STUDENTS TO EMPLOY THE KNOWLEDGE ATTAINED IN OTHER COURSES TO IMPLEMENT (INCLUDING BUILDING, TESTING, AND DOCUMENTING) THE PROJECT APPROVED IN ENTC 4415 - PROJECT JUSTIFICATION AND MANAGEMENT, WITHIN BUDGET AND ON SCHEDULE. COURSE REQUIREMENTS INCLUDE A WRITTEN REPORT AND ORAL PRESENTATIONS. NORMALLY TAKEN IN THE STUDENT'S LAST SEMESTER.

Prerequisite: ENTC 4415.

Co-requisite: SMTE 0099.

ENTC 4360 Mechanical System Design**3 Semester Credit Hours (3 Lecture Hours)**

ANALYSIS, MANAGEMENT AND COST, TEAM WORK, OPTIMAL DESIGN, AND COMPUTER SIMULATION OF MECHANICAL SYSTEMS AND COMPONENTS; APPLICATIONS IN FLUID FLOW AND HEAT TRANSFER, MACHINE ELEMENTS, AND STRESS ANALYSIS. SELECTED COURSE TOPICS ARE ASSIGNED AS PROJECTS.

Prerequisite: ENTC 3308.

ENTC 4415 Project Justification and Management**4 Semester Credit Hours (3 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, CRITICAL PATH. STUDENTS PREPARE PROPOSALS, INCLUDING SPECIFICATIONS, TIMELINES, SCHEDULE, AND BUDGET, FOR PROJECTS TO BE IMPLEMENTED IN ENTC 4350 - CAPSTONE PROJECTS. PREREQUISITE: SENIOR STANDING. THIS COURSE SHOULD BE TAKEN THE SEMESTER PRECEDING ENTC 4350 - CAPSTONE PROJECTS.

Co-requisite: SMTE 0099.

ENTC 4420 Embedded Systems**4 Semester Credit Hours (4 Lecture Hours)**

CHARACTERISTICS OF EMBEDDED SYSTEMS, SYSTEM DESIGN, INTERFACE DEVICES, MEMORY MANAGEMENT, INTERRUPT SUPPORT, INPUT/OUTPUT APPLICATIONS, SOFTWARE-HARDWARE CO-DESIGN, MODULAR PROGRAMMING, MULTITASKING, SIMULATION, AND CONTROL OF EXTERNAL DEVICES.

Prerequisite: (ENTC 3416 or 3418).

Co-requisite: SMTE 0099.

ENTC 4435 POWER PROTECTION SYSTEMS**4 Semester Credit Hours (4 Lecture Hours)**

Course topics include safety, reliability and availability in power systems; breaker operation; relay operation and relay circuit design; fault tolerance; cost analysis; control systems and system surveillance.

ENTC 4446 Control Systems I**4 Semester Credit Hours (4 Lecture Hours)**

INTRODUCTION TO CONTROL SYSTEMS; OPEN AND FEEDBACK; LAPLACE TRANSFORM AND FREQUENCY RESPONSE; CONTROL VALVES; ELECTRIC MOTORS; P, PI, AND PID MODES OF CONTROL; ANALOG AND DIGITAL CONTROLLERS PROCESS CHARACTERISTICS; ANALYSIS OF CONTROL SYSTEMS; GAIN AND PHASE MARGIN; STABILITY.

Prerequisite: ENTC 2414.

ENTC 4490 Selected Topics**1-4 Semester Credit Hours (1-4 Lecture Hours)**

SUBJECT MATERIAL VARIABLE. MAY BE REPEATED FOR DIFFERENT TOPICS.

ENTC 4496 Directed Independent Study**1-4 Semester Credit Hours**

REQUIRES A FORMAL PROPOSAL OF STUDY TO BE COMPLETED IN ADVANCE OF REGISTRATION, APPROVAL OF SUPERVISING FACULTY AND CHAIRPERSON.