Mechanical Engineering : MECH

A Bachelor of Science degree in Mechanical Engineering prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of physical systems used in manufacturing and end-product systems used for specific uses, including machine tools, and other manufacturing equipment; stationary power units and appliances; engines; self-propelled vehicles; housings and containers; hydraulic and electric systems for controlling movement; and the integration of computers and robotics with operating systems.

In accordance with the standards set forth by the Engineering Accreditation Commission (EAC) of ABET, graduates from a Mechanical Engineering program 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.

Input from mechanical engineering industry and research were utilized in the development of the Mechanical Engineering curriculum. As a means of validation, the East Texas A&M degree was benchmarked against curricula from the ABET Mechanical Engineering accredited schools, as well as the ABET Mechanical Engineering curriculum requirements, and the Fundamentals of Engineering (FE) examination.

Core Curriculum Courses		
See the Core Curriculum Requirements (https://coursecatalog.tamuc.edu/undergrad/core-curriculum-requirements/)		42
Required courses in the major		
ENGR 110	Introduction to Engineering and Technology	3
ENGR 1304	Computer-Aided Design (CAD)	3
ENGR 2304	Computing for Engineers	3
ENGR 213	Engineering Probability and Statistics	3
ENGR 2308	Engineering Economic Analysis	3
EE 220	Circuit Theory I	3
ME 210	Statics	3
ME 211	Dynamics	3
ME 320	Thermodynamics I	3
ME 321	Thermodynamics II	3
ME 330	Fluid Mechanics	3
ME 340	Materials Science	3
ME 350	Heat Transfer	3
ME 360	Mechanical Systems Design	3
ME 420	System Dynamics and Control	3
ME 430	Manufacturing Processes	3
ME 471	Senior Capstone Design Project II	3
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Required Support Courses:		
CHEM 1311 & CHEM 1111	General and Quantitative Chemistry I and General and Quantitative Chemistry Laboratory I (*)	4
MATH 2413	Calculus I (*)	4
MATH 2414	Calculus II	4
MATH 2415	Calculus III	4
MATH 2320	Differential Equations	3
MATH 2318	Linear Algebra	3
PHYS 2425	University Physics I (*)	4

PHYS 2426	University Physics II	4
ECO 2302	Principles of Micro Economics	3
Technical Electives		9
Total Hours		**127**

* Counts towards the Core Curriculum Requirements

ENGR 1304 - Computer-Aided Design (CAD)
Hours: 3
This is an introductory course in computer-aided drafting/design. Students will be taught basic CAD commands, tools, multi-view drawing and dimensioning techniques.

ENGR 2301 - Statics
Hours: 3
General principles of mechanics; concurrent force systems; statics of particles; equivalent force/moment systems; centroids and center of gravity; equilibrium of rigid bodies; trusses, frames, internal forces in structural members; friction; second moments of areas. Prerequisites: PHYS 2425.

ENGR 2302 - Dynamics
Hours: 3
Kinematics and kinetics of individual particles and systems of particles utilizing Newton's Laws of Motion, the Principle of Work and Energy, and the Principle of Impulse and Momentum; steady and variable mass flow. Prerequisites: MATH 2414 with a minimum grade of C.

ENGR 2303 - Engineering Mechanics- Statics and Dynamics
Hours: 3
This course will focus on equilibrium of particles and rigid bodies; centroids and center of gravity; internal forces of trusses, frames, and machines; internal forces in structural members; friction; second moment of areas; kinematics and kinetics of individual and systems of particles; principles of work and energy, and impulse and momentum; steady and variable mass flow. Prerequisites: PHYS 2425 with a minimum grade of C.

ENGR 2304 - Computing for Engineers
Hours: 3
The purpose of this class is to introduce students to the fundamentals of how to identify, formulate and analyze problems based on the knowledge of mathematics, science and engineering by using modern computing techniques. Concepts gained will pave the way to more advanced problem framing and selection of appropriate programming computing approaches. Prerequisites: MATH 2413 with a minimum grade of C.

ENGR 2308 - Engineering Economic Analysis
Hours: 3
Emphasizes the systematic evaluation of the costs and benefits associated with proposed technical projects. The student will be exposed to the concepts of the "time value of money" and the methods of discounted cash flow. Students are prepared to make decisions regarding money as capital within a technological or engineering environment. Prerequisites: ENGR 2304 for TMGT, CONE, and IE majors, EE 200 for EE majors with a minimum grade of C.

ENGR 102 - Introduction to Engineering
Hours: 3
An introduction to engineering with emphasis on development and design processes. Interpretation of product/customer specifications, concept development, engineering drawings, design for prototyping, and manufacturing will be introduced through a hands-on team-based engineering project design.

ENGR 110 - Introduction to Engineering and Technology
Hours: 3
This course provides a solid foundation in fundamental skills needed for freshmen and transfer students to academically succeed and professionally prepare them for challenges within the disciplines of Engineering and Technology Management. The project-based assignments will provide students with opportunities to apply mathematics to solve engineering problems, acquire team working skills, practice written and verbal communication skills, and enhance problem solving and design skills. Early understanding of these skills will assist students throughout their undergraduate experience. Prerequisites: MATH 2312 with a minimum grade of C, or concurrent enrollment.

ENGR 113 - Product Design and Development
Hours: 3
This course includes the study of product development and design processes and methods, including product specifications, concept development, engineering drawings, design for prototyping, and manufacturing.

ENGR 213 - Engineering Probability and Statistics
Hours: 3
This course covers the role of statistics in engineering, probability, discrete and continuous probability distributions, joint probability distributions, random sampling and data description, point estimation, statistical intervals. Prerequisites: MATH 2414 with a minimum grade of C or concurrent enrollment.

ENGR 411 - Engineering Management
Hours: 3
Techniques relating to managing engineering activities; project management with Pert/CPM; engineer's transition into management; engineering managerial functions; productivity assessment/improvement; managing the quality function and communications. Prerequisites: IE 471 with a minimum grade of C, or concurrent enrollment.

ENGR 490 - H Honors Thesis
Hours: 3
Honors Thesis. Three semester hours.

ENGR 491 - H Ind Honors Readings
Hours: 3
Individual Honors Readings. Three semester hours.

ME 210 - Statics
Hours: 3
Basic theory of engineering mechanics, using calculus, involving the description of forces, moments, and couples acting on stationary engineering structures; equilibrium in two and three dimensions; free-body diagrams; friction; centroids; centers of gravity; and moments of inertia. Prerequisites: MATH 2414 with a C or better; PHYS 2425 with a C or better.

ME 211 - Dynamics
Hours: 3
Basic theory of engineering mechanics, using calculus, 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. Prerequisites: ME 210 with a C or better.

ME 320 - Thermodynamics I
Hours: 3
Basic concepts and definitions, properties of pure substances, work and heat, first law of thermodynamics, second law of thermodynamics, entropy, thermodynamics of gases, vapors, and liquids in various nonflow and flow processes, and irreversibility and availability. Prerequisites: A C or better in the following: CHEM 1311, 1111, Math 2425, PHYS 2426.

ME 321 - Thermodynamics II
Hours: 3
Availability, power, refrigeration and heat pump cycles (both gas and vapor), property relations and equations of state, ideal gas mixtures, mixtures of gases and vapors, psychrometrics, adiabatic flame temperature, thermochemical equilibrium, and compressible flow. Emphasis is on applying these topics to thermal systems design. Prerequisites: ME 320 with a C or better.

ME 330 - Fluid Mechanics
Hours: 3
Fundamental concepts of fluid mechanics leading to the development of both the integral and differential forms of the basic conservation equations. Application of the integral conservation equations to engineering problems in fluid dynamics including buoyancy and other hydrostatics problems. Dimensional analysis and similitude are also discussed. Prerequisites: A C or better in the following: ME 211, ME 320.

ME 340 - Materials Science
Hours: 3
Introduction to the atomic bonding, crystal structure, defects in materials, diffusion processes, phase diagram and phase transformation, and their relation to the mechanical, electrical, optical and thermal properties of metals, semiconductors, ceramics, polymers and composites. Prerequisites: Junior level standing.

ME 350 - Heat Transfer
Hours: 3
This course focuses on steady state and time-dependent conduction in one- and two-dimensions; forced convection, internal and external flows; heat exchangers; introduction to radiation; elements of thermal system design. Prerequisites: A grade of C or better in the following: ME 321 and ME 330.

ME 360 - Mechanical Systems Design
Hours: 3
Design of machine elements, characteristics of prime movers, loads and power transmission elements as related to mechanical engineering design. Prerequisites: Junior Standing. Departmental approval.

ME 420 - System Dynamics and Control
Hours: 3
This course introduces the fundamental concepts to model dynamic systems and to design basic control systems. The students will learn how to perform optimal and robust control design of dynamic systems. Prerequisites: A grade of C or better in the following: ME 360, ME 350.

ME 430 - Manufacturing Processes
Hours: 3
Manufacturing processes, material fabrication, and nontraditional processing. Prerequisites: ME 420 with a C or better.

ME 470 - Senior Capstone Design Project I
Hours: 3
This course represents the first part of the senior engineering capstone design project. In this course, student will work in groups and will be engaged in a preliminary engineering design process including: design constraints, interaction with clients, identification of engineering problems, development of a design proposal, identification of design criteria, cost estimating, planning, and scheduling. This course requires Senior Classification, ME Majors only, must be scheduled in the fall semester prior to the final spring semester before graduation. and instructor's consent. Prerequisites: Senior Classification, ME Majors only.

ME 471 - Senior Capstone Design Project II
Hours: 3
This is the second part of the senior engineering capstone design project. This course requires completing the capstone senior design projects from concept through problem statement, project analysis, final design, prototype, technical report, project demo, and final oral presentation. Students will work in groups and apply the skills and knowledge they have acquired to demonstrate their mastery of the discipline through a successfully working porotype project. Prerequisites: Senior Classification, ME Majors only. Course must be scheduled the final spring semester of graduation and Instructor's consent.