DEPARTMENT OF MECHANICAL ENGINEERING AND INDUSTRIAL ENGINEERING

Contact Information
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Mechanical Engineering Program Educational Objectives
The Educational Objectives of Mechanical Engineering Program are to prepare graduates who, after the first few years of their professional career, have:

1. Established themselves as practicing mechanical engineers or advanced their studies through graduate school, and
2. Adapted to ever-changing demands by updating their core knowledge and abilities, and
3. Functioned successfully in their professional responsibilities, which may include economic, environmental, safety, health and ethical aspects, and
4. Established themselves as critical, flexible thinkers and leaders in their profession and in society.

Faculty
Department Faculty
Demirocak, Dervis Assistant Professor, Department of Mechanical and Industrial Engineering; B.S., Middle East Technical University (Turkey); M.S., Middle East Technical University (Turkey); Ph.D., University of South Florida.

Elkassabgi, Yousri Professor, Department of Mechanical and Industrial Engineering; B.S., Alexandria University (Egypt); M.S., University of Waterloo (Canada); Ph.D., University of Houston.

He, Fei Assistant Professor, Department of Mechanical and Industrial Engineering; B.S., Hunan University of Science and Technology (China); M.S., University of Rhode Island; Ph.D., The State University of New York.

Hossain, Mohammad Assistant Professor, Department of Mechanical and Industrial Engineering; B.S., Chittagong University of Engineering and Technology (Bangladesh); M.S., North Carolina A&T State University; Ph.D., Texas A&M University.

Hosur, Mahesh Professor, Department of Mechanical and Industrial Engineering; Associate Dean of Graduate Studies, Frank H. Dotterweich College of Engineering, B.Eng., Karnataka University (India); M.Tech., Indian Institute of Technology (India); Ph.D., Indian Institute of Science (India).

Isensee, Grady Lecturer I, Department of Mechanical and Industrial Engineering; B.S., Texas A&M University; M.S., Texas A&M University-Kingsville.

Jin, Kai Professor, Department of Mechanical and Industrial Engineering; B.S., Nankai University (China); Ph.D., Texas Tech University.

Lee, Sangsoo Associate Professor, Department of Mechanical and Industrial Engineering; B.En., Sogang University (South Korea); M.S., Sogang University (South Korea); Ph.D., Georgia Institute of Technology.

Li, Hua Associate Professor, Department of Mechanical and Industrial Engineering; B.Eng., Tsinghua University (China); Ph.D., Texas Tech University.

Mogiligidda, Rajashekar Lecturer I, Department of Mechanical and Industrial Engineering; B.Tech., Shanmugha Arts, Science, Technology, and Research Academy (India); M.S., Texas A&M University-Kingsville.

Oh, Joon-Yeoul Associate Professor, Department of Mechanical and Industrial Engineering; B.S., Chong-Ju University (South Korea); M.S., Chong-Ju University (South Korea); M.S., New Mexico State University; Ph.D., New Mexico State University.

Omar, Ashraf Visiting Assistant Professor, Department of Mechanical and Industrial Engineering; Ph.D., Old Dominion University.

Ozcelik, Selahattin Professor, Department of Mechanical and Industrial Engineering; B.S., Technical University of Istanbul (Turkey); M.S., Texas A&I University; Ph.D., Rensselaer Polytechnic Institute.

Park, Choongbae Assistant Professor, Department of Mechanical and Industrial Engineering; Bachelors, Kyungpook National University (South Korea); M.S., Purdue University; Ph.D., Purdue University.
Peel, Larry Professor, Department of Mechanical and Industrial Engineering; Chair; B.S., Utah State University; M.S., Virginia Polytechnic Institute and State University; Ph.D., Brigham Young University.

Phadke, Pranav Pradeep Lecturer I, Department of Mechanical and Industrial Engineering; Bachelors, University of Pune (India); M.S, Texas A&M University-Kingsville.

Worek, William Professor, Department of Mechanical and Industrial Engineering; B.S., Illinois Institute of Technology; M.S., Illinois Institute of Technology; Ph.D., Illinois Institute of Technology.

Zhang, Xuewei Assistant Professor, Department of Mechanical and Industrial Engineering; B.S., Tsinghua University (China); M.S., Tsinghua University (China); Ph.D., Massachusetts Institute of Technology.

Zhang, Yue Lecturer I, Department of Mechanical and Industrial Engineering; B.E., Beijing University of Chemical Technology (China); M.S., Texas Tech University; Ph.D., Texas Tech University.

Zhou, Hong Professor, Department of Mechanical and Industrial Engineering; B.S., Northern Jiaotong University (China); M.S., Southeast University (China); Ph.D., Tennessee Technological University.

Courses

General Engineering (GEEN)

GEEN 1201 Engineering as a Career 2 SCH (1-3)
Overview of the history of engineering, its disciplines and professional practice with emphasis on social responsibility and ethical behavior. Introduces each engineering discipline using three-week modules. It also provides basic skills, tools and techniques applied to problem solving, teamwork and communication necessary for academic and professional success.

GEEN 1250 Engineering Math Lab 2 SCH (6)
Introduction to the use of differential and integral calculus with emphasis on engineering applications relevant to the fundamental courses in engineering and computer science. Prerequisite: Credit or registration in MATH 1348 or equivalent placement.

GEEN 4301 Multi-Disc Engr Design I 1-3 SCH (1-3)
Phase one of major project of an original nature carried to completion over a period of two semesters. Completed course sequence may be substituted for senior design sequence (architectural, civil, environmental, and mechanical engineering and computer science) or final senior design course (chemical, electrical, and natural gas engineering) as appropriate to student’s major. Prerequisites: Permission of student’s department chair and senior standing in engineering.

GEEN 4302 Multi-Disc Engr Design II (WI) 2-3 SCH (2-3)
Phase two of a major project of an original nature carried to completion over a period of two semesters. Completed course sequence may be substituted for senior design sequence (architectural, civil, environmental, and mechanical engineering and computer science) or final senior design course (chemical, electrical, and natural gas engineering) as appropriate to student’s major. Prerequisite: GEEN 4301.

Mechanical Engineering (MEEN)

In addition to the listed prerequisites for the following 4000 series courses, a student must have an overall grade point average of 2 or higher.

MEEN 1201 Intro to Mech Eng as a Career 2 SCH (1-3)
The art and practice of mechanical engineering and its role in society. Promotes critical and analytical thinking; gives basic skills for the engineering approach to problem-solving, engineering design process and reverse engineering; and introduces engineering ethics.
Fee: $5.00

MEEN 1310 Engineering Graphics I 3 SCH (2-3)
Introduction to computer-aided engineering design and analysis; principles of graphics, solid modeling, integrated applications of software in engineering drafting, design and problem solving.

MEEN 1320 Elem Num Meth & Engr Prob Solv 3 SCH (2-3)
Engineering problem-solving using high level programming language and numerical computing software. Programming logic; linear algebra and matrices; solutions to systems of linear equations; interpolation and curve fitting; numerical integration and differentiation.

MEEN 2146 Engineering Measurements 1 SCH (3)
Basic experimental techniques and instrumentation commonly found in industry. Experimental planning and analysis. ASTM methods introduced. Data acquisition means studied. Significance of data and presentation (written and oral). Computer usage and report writing emphasized. Prerequisites: PHYS 2325/2125.
Fee: $5.00

MEEN 2302 Mechanics II Dynamics 3 SCH (3-0)
Kinematics of particles and rigid bodies; motion relative to translating and rotating reference frames. Kinetics of particles and rigid bodies: Newton’s second law, work-energy and impulse and momentum. Introduction to vibrations. Prerequisite: CEEN 2301 with a grade of C or higher.
MEEN 2355 Statics and Dynamics 3 SCH (3)
Resultants of force systems. Equilibrium of rigid bodies. Friction. Centroids and moments of inertia. Kinematics and kinetics of particles and rigid bodies. This course cannot be taken for credit by CEEN and MEEN majors. Prerequisites: PHYS 2325/2125 and MATH 2314.

MEEN 3145 Material Science Laboratory 1 SCH (3)
Tensile, impact, fatigue, hardness and Hardenability, creep, phase and microstructure, corrosion testing and microscopic analysis. Ferrous and non-ferrous materials and polymers are studied. ASTM methods are introduced and applied. Introduction to data acquisition and recording. Reporting in both written and oral format. Prerequisite: Credit or registration in MEEN 3344.

MEEN 3344 Materials Science 3 SCH (3)
Atomic and crystal structure of materials. Chemical, mechanical, electrical and thermal properties of engineering materials. Materials selection and design. Prerequisites: CHEM 1311, CHEM 1111 and MATH 2413, and credit or enrollment in PHYS 2326.

MEEN 3347 Thermodynamics 3 SCH (3)
Basic laws governing energy transmission. Thermodynamic properties of liquids and vapors, the ideal gas law and the behavior of ideal gases. Concept of reversible process. Prerequisites: MATH 2414 and PHYS 2325/2125.

MEEN 3348 Heat Transfer 3 SCH (3)
Fundamental laws relating to heat transfer including steady and transient heat conduction, forced, convection, natural convection and radiation. Introduction to heat exchanger design. Prerequisites: MEEN 3347, MEEN 3392, and MATH 3320.

MEEN 3349 Fundamentals of Mfg Processes 3 SCH (2-3)
Selection criteria for manufacturing processes, processing of castings, bulk deformation process, sheet metal working, polymer and polymer-matrix composite production, machining and welding processes. Prerequisites: MEEN 1310 and MEEN 3344.

MEEN 3350 Machine Design I 3 SCH (3-0)
Application of principles of mechanics and physical properties of materials to the design of machine elements such as shafts, springs, power screws and gears. Prerequisites: CHEM 3311, MEEN 2302 and MEEN 3344.

MEEN 3352 Kinematics of Machines 3 SCH (3)
Linkages, mobility analysis, Grashof condition, instant centers, analysis and synthesis of mechanisms, cams, gears and gear trains. Prerequisites: MATH 2414, MEEN 2302.

MEEN 3355 Engineering Design & Sim 3 SCH (3)
Introduction to the engineering design process via team-based projects utilizing commercial Computer Aided Engineering software packages. Engineering design process; problem definition, conceptual design, modeling, analysis, system design and optimization. Communicating the design via drawings, models, verbal and written reports. Prerequisites: MEEN 1310 and MEEN 1320. Corequisites: MEEN 3350 and MEEN 3348.

MEEN 3359 Fluid Mechanics 3 SCH (3)
Basic properties of fluids. Fluid statics. Fluids in motion. Continuity, energy, and linear and angular momentum equations in integral and differential forms. Incompressible viscous flow; Navier-Stokes equations, parallel flow, pipe flow, and the Moody diagram. Introduction to laminar and turbulent boundary layers and free surface flows. Prerequisites: MATH 3320 and credit or registration in MEEN 2302.

MEEN 3360 Comp App in Nuclear Engr 3 SCH (3)
Applications of computer software to solve nuclear engineering problems; nuclear data and cross-section libraries; deterministic and stochastic models; single and multi-objective optimization; applied nuclear engineering codes. Prerequisite: junior standing.

MEEN 4137 Mechanical Engineering Lab 1 SCH (3)
Experimental investigation of mechanical engineering systems: engines, fluid flow, and heat transfer systems used in various mechanical engineering applications. Prerequisites: MEEN 2146 and MEEN 3348.

MEEN 4263 Mech Engr Design Proj I (WI) 2 SCH (1-3)
Capstone design course emphasizing quantitative, analytical/computer and experimental methods, including optimization and simulation, as applied to the design process for a broad range of practical problems in mechanical engineering. Integrates knowledge gained from all required mechanical engineering courses in a major system design project. Prerequisites: senior standing in Mechanical Engineering, MEEN 3350, MEEN 3352, and MEEN 3360.

MEEN 4264 Mech Eng Design Projects II 2 SCH (1-3)
Capstone design course emphasizing the application of analytical/computer and experimental methods to the solution of a broad range of practical problems in mechanical engineering. Integrates knowledge gained from all required mechanical engineering courses via the completion of a system design project. Prerequisite: MEEN 4263. Laboratory fee, $5.

Fee: $5.00
MEEN 4301  Design of Aerospace Structures  3 SCH (3-0)
Advanced strength of materials analysis and design of light-weight elastic structures with aerospace applications. Failure modes and criteria, buckling, matrix methods for analysis, plane truss design. Energy and Castigliano methods for statically determinate and indeterminate structures. Torsion and bending of asymmetrical thin-walled sections. Design project. Prerequisites: senior standing in Mechanical Engineering and credit or enrollment in MEEN 3360.

MEEN 4303  Aerodynamics  3 SCH (3)
Aerodynamics of airfoils and wings in subsonic, transonic and supersonic flight. Laminar and turbulent boundary layers and effects of viscosity on aerodynamic performance. Prerequisites: senior standing in Mechanical Engineering, MEEN 3347 and MEEN 3392.

MEEN 4305  Aerospace Flight Dynamics  3 SCH (3-0)
Three-dimensional rigid body dynamics, aircraft equations of motion, static and dynamic stability, manual flight control design, introduction to aeroelastic phenomena. Attitude and altitude dynamics, interplanetary transfers, altitude coordinates, stability, manual control, and estimation. Prerequisites: senior standing in Mechanical Engineering and MEEN 2302.

MEEN 4307  Aerospace Systems Design  3 SCH (3)
Aircraft/Spacecraft design of systems and subsystems. Preliminary design or study of a complete flight vehicle. Application of mission and spacecraft design principles in developing a space flight mission concept. Prerequisites: senior standing in Mechanical Engineering, MEEN 3352, MEEN 3360, credit or registration in MEEN 4303.

MEEN 4317  Internal Combustion Engines  3 SCH (3)
Thermodynamics of cycles, comparison of characteristics and performance of several forms of internal combustion engines including Otto and Diesel types of piston engines. Fuels, combustion, injection and supercharging. Prerequisites: senior standing in Engineering, MEEN 3392 and MEEN 4341.

MEEN 4335  Special Problems  1-3 SCH (1-3)
Individual solution of selected problems in mechanical engineering conducted under direct supervision of a faculty member. May be repeated for up to 6 semester hours. Prerequisite: senior standing.

MEEN 4336  Selected Topics  1-3 SCH (1-3)
One or more topics of mechanical engineering. May be repeated when topic changes. Prerequisite: senior standing.

MEEN 4341  Appl of Thermodynamics  3 SCH (3)
Design of power and refrigeration systems, mixing (or separation), multiphase, air conditioning and energy conversion processes. Prerequisites: MEEN 3347 and MATH 3415.

MEEN 4343  Dynamics of Systems  3 SCH (3)
Analysis of dynamic-mechanical, electrical, fluid and thermal system elements; modeling, analysis and design of physical, dynamic systems composed of these elements. Prerequisites: senior standing in Mechanical Engineering, MATH 3320, MEEN 1320 and MEEN 2302.

MEEN 4344  Control of Systems  3 SCH (2-3)
Analysis and design of controlled, dynamic, linear mechanical, electrical, fluid and/or thermal systems; introduction to concepts of stability, controllability, observability and to discrete time; sampled data control systems; optimal control systems and nonlinear control theory. Prerequisite: senior standing in Engineering.

MEEN 4345  Engineering Vibrations  3 SCH (3)
Free and forced vibrations, degrees of freedom, energy methods, transients, harmonic analysis, damping. Prerequisites: senior standing in Mechanical Engineering, MATH 3320 and MEEN 2302.

MEEN 4346  Computatnl Methods in Mech Eng  3 SCH (3)
Applications of numerical techniques to the solution of mechanical engineering problems. Prerequisites: senior standing in Mechanical Engineering, MEEN 3320 and credit or registration in MEEN 3348 or MEEN 3350.

MEEN 4347  Hydraulics of Pipeline Systems  3 SCH (3)
Design and select hydraulic machines, pipeline, pressure vessels, pumps and control scheme. Understanding of ASME design codes for power and process piping, series and parallel pipe network and pumping power required, and techniques and tools for controlling pipeline network. Prerequisites: senior standing in Mechanical Engineering, MEEN 3350 and MEEN 3392.

MEEN 4348  Gas Dynamics  3 SCH (3)
Basic concepts and fundamental equations of gas dynamics. Emphasis on the subsonic and supersonic steady flow. Analysis of shock wave phenomena. Prerequisites: senior standing in Mechanical Engineering, MATH 3320 and credit or registration in MEEN 3348.

MEEN 4349  Air Conditioning  3 SCH (3)
Application of factors of temperature and humidity to the design of air conditioning systems. Design and applications of heating and cooling requirements, total energy systems, etc. Prerequisites: senior standing in Mechanical Engineering, MEEN 3392 and MEEN 4341.

MEEN 4351  Machine Design II  3 SCH (3-0)
Design techniques of brakes, clutches, bevel, worm and helical gears, thick cylinders, flywheels, impact and elastic bodies, curved beams, flat plates and cams. Prerequisite: MEEN 3350.

Fee: $5.00

MEEN 4350  Aerospace Structures  3 SCH (3-0)
Advanced strength of materials analysis and design of light-weight elastic structures with aerospace applications. Failure modes and criteria, buckling, matrix methods for analysis, plane truss design. Energy and Castigliano methods for statically determinate and indeterminate structures. Torsion and bending of asymmetrical thin-walled sections. Design project. Prerequisites: senior standing in Mechanical Engineering and credit or enrollment in MEEN 3360.

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Analysis and design of controlled, dynamic, linear mechanical, electrical, fluid and/or thermal systems; introduction to concepts of stability, controllability, observability and to discrete time; sampled data control systems; optimal control systems and nonlinear control theory. Prerequisite: senior standing in Engineering.

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Design and select hydraulic machines, pipeline, pressure vessels, pumps and control scheme. Understanding of ASME design codes for power and process piping, series and parallel pipe network and pumping power required, and techniques and tools for controlling pipeline network. Prerequisites: senior standing in Mechanical Engineering, MEEN 3350 and MEEN 3392.

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Basic concepts and fundamental equations of gas dynamics. Emphasis on the subsonic and supersonic steady flow. Analysis of shock wave phenomena. Prerequisites: senior standing in Mechanical Engineering, MATH 3320 and credit or registration in MEEN 3348.

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Application of factors of temperature and humidity to the design of air conditioning systems. Design and applications of heating and cooling requirements, total energy systems, etc. Prerequisites: senior standing in Mechanical Engineering, MEEN 3392 and MEEN 4341.

MEEN 4351  Machine Design II  3 SCH (3-0)
Design techniques of brakes, clutches, bevel, worm and helical gears, thick cylinders, flywheels, impact and elastic bodies, curved beams, flat plates and cams. Prerequisite: MEEN 3350.

Fee: $2.00
MEEN 4352  Design of Turbomachinery  3 SCH (3)
Design and application of centrifugal and axial flow pumps and turbines, consideration of similarity parameters, real machine performance
c characteristics, materials and methods of construction, selection process for various applications. Prerequisites: senior standing in Mechanical
Engineering, MEEN 3392 and MEEN 4341.

MEEN 4354  Intro to Finite Element Method  3 SCH (3)
Principles and applications of the finite element method. Matrix and vector operations, structure and organization of finite element computer
programs. Structural and nonstructural elements and applications. Prerequisites: MEEN 1320, MATH 3320, CEEN 3311 and senior standing.

MEEN 4355  Robotics I  3 SCH (3)
Multidisciplinary introduction to robotics, combining concepts from the fields of electrical engineering, mechanical engineering and computer science.
Topics include locomotion, maneuverability, actuating, trajectory planning, motion control, and sensing. Prerequisite: senior standing.

MEEN 4371  Introduction to UAVs  3 SCH (3)
Foundations and basic components of Unmanned Aerial Vehicles (UAVs) from a system point of view, design considerations, payloads,
communications, control and stability, navigation, UAV system roles and operations, control stations. Prerequisite: senior standing.

MEEN 4372  Resource Optimization for DHS  3 SCH (3)
Linear Programming, Simplex Method, Duality Theory and Sensitivity Analysis, The Transportation and Assignment Problems, Network Optimization
Models, Dynamic Programming, Integer programming, Game Theory, and Decision Analysis. Prerequisite: senior standing.

MEEN 4373  Info Anal. & Mod. in Sec Eng  3 SCH (3)
Fundamental methods and tools used for information analysis and modeling related to homeland security. It will also introduce engineering and
technical challenges of homeland security, including modeling and analysis, technological issues, command, control and situational awareness and
data integration requirements. Prerequisite: senior standing in Mechanical Engineering, Electrical Engineering, or Computer Science, or approval from
instructor.

MEEN 4385  Manufacturing of Composites  3 SCH (2-3)
Introduction to composites materials and manufacturing processes; hand lay-up, air and oven curing, filament winding and compression molding.
Materials selection and fabrication of marine, aerospace, chemical, and civil structures. Practical case studies and projects. Prerequisites: senior
standing in Mechanical Engineering, CEEN 3311, and MEEN 3344.

MEEN 4395  Therm Hydr of Nuclear Reactors  3 SCH (3)
Thermal hydraulics of nuclear reactor cores; two-phase flow regimes, the boiling curve, dry-out phenomena, natural circulation in reactor core,
transients and instabilities of two-phase flow. Prerequisites: senior standing in Mechanical Engineering, MATH 3320, PHYS 2325, and MEEN 3392.

MEEN 4396  Nuclear Safety & Reliability  3 SCH (3)
Introduction to nuclear safety systems and licensing principles. Design criteria and regulations. Deterministic and probabilistic, and reliability analysis.
Radiological consequences and risk assessment. Design-based accidents and severe-accident management. Implications for advanced reactors.
Prerequisites: senior standing.

MEEN 4397  Intro to Power Plants  3 SCH (3)
Introduction to basic topics in the analysis and design of nuclear power plants. Prerequisites: senior standing in Mechanical Engineering, MATH 3320
and PHYS 2326.

MEEN 4399  Internship in MEEN  1-3 SCH (1-3)
Internships in industry, government or consulting companies, designed to broaden the skills obtained through curricular education. Prerequisites:
senior standing.

Degree Requirements
Major

Minors
- Aerospace Engineering, Minor (https://catalog.tamuk.edu/undergraduate/engineering/minors/aerospace-engineering-minor)
- Nuclear Engineering, Minor (https://catalog.tamuk.edu/undergraduate/engineering/minors/nuclear-engineering-minor)