MECHANICAL AND AEROSPACE ENGINEERING

https://mae.coe.miami.edu/index.html

Dept. Code: MAE

Introduction

Engineering is the art of applying the knowledge of science for the benefit of humanity. Mechanical Engineering is the most broadly based area of engineering. It is concerned with the analysis, design, development and application of equipment for such diverse fields as energy conversion, transportation, production machinery, consumer goods, and environmental control. Today's advanced technology is largely a result of the skill of mechanical engineers who are heavily represented in most fields of modern industry.

Because of the varied careers and opportunities which are available to the Mechanical Engineering graduates, the curriculum emphasizes education in the fundamentals of the physical, mathematical, and engineering sciences, including materials science, solid mechanics, fluid mechanics and thermodynamics. These basic subjects are followed by courses in their application to the design and analysis of engineering devices and systems. Computers are utilized for analysis and design throughout the curriculum.

Aerospace Engineering is concerned with the analysis, design and development of a wide variety of aircraft and space vehicles and systems. The undergraduate aerospace engineering program is designed to provide a broad based foundation in aeronautics and astronautics, including topics such as aerodynamics, propulsion, aerospace structures and materials, flight dynamics, control and performance.

In the junior and senior years, the student is assisted in choosing technical electives in preparation for a degree of professional specialization or for further study in engineering, law, business or medicine. With the aid of an advisor and the concurrence of the department chairman, the student may select courses compatible with a variety of career goals.

The department offers two undergraduate degrees:

- Bachelor of Science in Mechanical Engineering and
- Bachelor of Science in Aerospace Engineering.

Within the Bachelor of Science in Mechanical Engineering program, sequences of courses are available to provide advanced knowledge in such traditional areas as electromechanical design, heat transfer, solid mechanics, fluid mechanics, and materials science. There are concentrations in:

- Aerospace Engineering and
- Internal Combustion Engines.

Advanced Writing and Communication Skills

Mechanical & Aerospace Engineering students satisfy the University's Advanced Writing and Communication Skills requirement by completing a set of classroom courses, laboratory courses and design courses where they learn effective oral, graphical and technical writing skills. Mechanical & Aerospace Engineering students acquire Advanced Writing and Communication skills in the following core courses:

Code	Title	Credit Hours
MAE 112	Introduction to Engineering II	2
MAE 241	Measurements Laboratory	3
MAE 351	Mechanics Laboratory	2
MAE 404	Experimental Engineering Laboratory	2
MAE 442	Capstone Design Project-I	3
or MAE 444	Capstone Aerospace Design Project-I	
MAE 443	Capstone Design Project-II	3
or MAE 445	Capstone Aerospace Design Project-II	

Graduate Studies

Graduate programs leading to the degrees of Master of Science and Doctor of Philosophy are offered by the Department with options in various engineering and interdisciplinary fields. Detailed information is available in the Bulletin of the Graduate School (https://bulletin.miami.edu/graduate-academic-programs/engineering/mechanical-aerospace-engineering/).

Dual B.S./M.S. Degrees in Mechanical and Aerospace Engineering

- B.S. in Aerospace Engineering and B.S. in Mechanical Engineering Dual Degree (https://bulletin.miami.edu/undergraduate-academic-programs/engineering/mechanical-aerospace-engineering/aerospace-engineering-bs-mechanical-engineering-bs-dual-degree/)

- B.S. and M.S. in Mechanical Engineering (https://bulletin.miami.edu/undergraduate-academic-programs/engineering/mechanical-aerospace-engineering/mechanical-engineering-bs-ms/)
- B.S. in Mechanical Engineering/M.S. in Biomedical Engineering (https://bulletin.miami.edu/undergraduate-academic-programs/engineering/mechanical-aerospace-engineering/mechanical-engineering-bs-biomedical-engineering-ms/)
- B.S. in Mechanical Engineering/M.S. in Civil Engineering (https://bulletin.miami.edu/undergraduate-academic-programs/engineering/mechanical-aerospace-engineering/mechanical-engineering-bs-civil-engineering-ms/)
- B.S. in Mechanical Engineering/M.S. in Industrial Engineering (https://bulletin.miami.edu/undergraduate-academic-programs/engineering/mechanical-aerospace-engineering/mechanical-engineering-bs-industrial-engineering-ms/)
- B.S. in Mechanical Engineering/M.S. in Software Engineering (https://bulletin.miami.edu/undergraduate-academic-programs/engineering/mechanical-aerospace-engineering/mechanical-engineering-bs-software-engineering-ms/)
- B.S. in Mechanical Engineering/M.S. in Sports Engineering (https://bulletin.miami.edu/undergraduate-academic-programs/engineering/mechanical-aerospace-engineering/bs-mechanical-engineering-ms-sports-engineering/)

MAE 100. Introduction to Mechanical and Aerospace Engineering. 3 Credit Hours.
Basic principles of automobile engines and engine efficiency. Introduction to robots and controls. Basic concepts of solar engineering and solar energy utilization. Principles of fuel cells and hydrogen energy. Introduction to aerospace engineering encluding the aspects of aerodynamics, propulsion and flight dynamics. Introduction to Aerodynamics of air planes and rockets.
Components: LEC.
Grading: GRD.
Typically Offered: Summer.

MAE 111. Introduction to Engineering I. 3 Credit Hours.
Use of engineering tools and computer techniques for problem solving. Data acquisition, analysis, presentation, software design, and computer aided drafting are covered. Development of design skills through several design and building competitions. Introduction to professional ethics and intellectual property rights. Introduction to use of MATLAB, AutoCAD, and programming in C++.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 112. Introduction to Engineering II. 2 Credit Hours.
Introduction to engineering design and the design process. Course topics include safety, reliability, human and environmental factors, economic analysis, and cost estimation. Professional ethics, product liability, solid modeling, machine shop orientation, and practice are also included. Group design projects.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 202. Dynamics. 3 Credit Hours.
Discussion of motion description and analysis, application of Newton's laws, energy, and momentum principles to mechanical systems. Introduction to mechanical vibrations.
Prerequisite: CAE 210.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 207. Mechanics of Solids II. 3 Credit Hours.
Discussion of displacements, instability, flexural, shear, torsional, and principle stresses. Introduction to statically indeterminate analysis.
Prerequisite: CAE 210.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 241. Measurements Laboratory. 3 Credit Hours.
Introduction to experimental mechanical engineering. Basic principles of measurement, data interpretation, and uncertainty analysis are covered. Laboratory exercises in mechanical engineering areas are included.
Prerequisite: ISE 311 AND WRS 107 OR WRS 106 AND Corequisite: MAE 207.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 301. Engineering Materials Science. 3 Credit Hours.
Introduction to the physics and chemistry of the solid state including the structure and properties of metals, polymers, and ceramics.
Prerequisite: PHY202 or PHY 223 or PHY 230 or EGN 233.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 302. Mechanical Behavior of Materials. 3 Credit Hours.
Application of metallurgy and mechanics to the study of the plastic deformation and fracture of metals, ceramics, and plastics.
Prerequisite: MAE 207.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 303. Thermodynamics. 3 Credit Hours.
Thermodynamic properties of materials; the first and second laws of thermodynamics; application to thermodynamic processes; introduction to heat transfer.
Prerequisite: PHY 222 OR PHY 230 AND MTH 162 or MTH 172.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

MAE 309. Fluid Mechanics. 3 Credit Hours.
Course topics include fluid statics, fluid flow concepts, dynamics of inviscid and viscous fluids, closed and open channel flow, and compressibility effects.
Prerequisite: CAE 210 and PHY 222 OR PHY 230 OR EGN 233.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

MAE 310. Heat Transfer. 3 Credit Hours.
Application of elementary methods of solution to heat transfer problems involving steady and unsteady state conduction, radiation, and convection. Introduction of meaningful experimental data is also included.
Prerequisite: MAE 303 And MTH 311 OR EGN 319.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 341. Mechanical Design I. 3 Credit Hours.
Concepts and software for kinematics, solid modeling, and project management. Fundamentals of mechanical design: stresses in and failure of mechanical elements. Individual and group design projects.
Prerequisite: MAE 202 AND MAE 207.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 342. Mechanical Design II. 3 Credit Hours.
Review of the design process and creativity in design. Topics include design and reliability of gears, shafts, etc. Individual and group design projects are included.
Prerequisite: MAE 341.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 351. Mechanics Laboratory. 2 Credit Hours.
Exercises in the experimental determination of the mechanical properties of materials and the static and dynamic characteristics of mechanical and structural elements. Lecture, 1 hour; laboratory, 3 hours.
Prerequisite: MAE 302.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 362. Computer Analysis of Mechanical and Aerospace Engineering Problems. 3 Credit Hours.
Exploration of physical systems behavior using discrete models. Topics include numerical analysis, solid modeling, and software evaluation. Students solve engineering problems using student-developed and existing software.
Prerequisite: MAE 341 and MTH 211 OR EGN 318. Corequisite: MAE 310.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 371. Aerodynamics. 3 Credit Hours.
Course discusses the history of flight. Topics include fundamental variables, the atmosphere, basic equations, their approximations, compressibility, viscosity, flow regimes potential flow, and aerodynamics of airfoil and wing.
Prerequisite: MAE 309.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 399. Cooperative Education. 1 Credit Hour.
Practical application of classroom theory through alternating semester or summer employment with firms offering positions consistent with the student's field of study. Course may be repeated.
Components: THI.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

MAE 404. Experimental Engineering Laboratory. 2 Credit Hours.
Experimental analysis of problems in fluid mechanics, thermodynamics, and other areas of engineering. Lecture, 1 hour; laboratory, 3 hours.
Prerequisite: MAE 309 and MAE 310.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 408. Heating, Ventilating, and Air Conditioning. 3 Credit Hours.
Principles and procedures for the analysis and design of heating, ventilating and air conditioning (HVAC) systems, including moist air properties and conditioning processes, heating and cooling load calculations, building energy consumption, thermal comfort, and indoor air quality. Not available for students having taken MAE 405.
Prerequisite: MAE 303.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 412. System Dynamics. 3 Credit Hours.
Course topics include dynamic modeling of mechanical and thermo-fluid systems. Laplace transforms, transfer functions, energy concepts, causality, linearity, linear graph models, energy transducing system elements, frequency domain methods.
Prerequisite: ECE 201 or ECE 205 and MAE 202 and MAE 309.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 415. Automatic Control. 3 Credit Hours.
Introduction to system theory, transfer functions, and state space modeling of physical systems. Course topics include stability, analysis and design of PID, Lead/Lag, other forms of controllers in time and frequency domains, root locus Bode diagrams, gain and phase margins, Nichols chart, Nyquist criterion, and systems with time delay.
Senior Standing.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 420. Applied Thermodynamics. 3 Credit Hours.
Cycle irreversibility; energy. Power and refrigeration cycles. Behavior of mixtures and solutions. Chemical thermodynamics, including combustion fundamentals. Compressible fluids. Advanced energy systems.
Prerequisite: MAE 303.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 441. Design of Fluid and Thermal Systems. 3 Credit Hours.
Course topics include thermal and fluid systems design fundamentals, piping systems, selection of pumps, piping system design practices, classification of heat exchanges. Basic design methods of heat exchange equipment is also included.
Prerequisite: MAE 309 and MAE 310.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 442. Capstone Design Project-I. 3 Credit Hours.
Lectures and classroom discussions cover (i) legal, ethical, and societal responsibilities of engineers, (ii) design factors such as product safety, reliability, life cycle costs, and manufacturability, and (iii) other aspects such as global market, contemporary issues, and continuous learning process. Students are required to select group design projects from the breadth of mechanical engineering activity and present project to serve as the basis for MAE 443.
Senior Standing or Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 443. Capstone Design Project-II. 3 Credit Hours.
Continuation of the Capstone Design Project-I course. A mechanical system is designed, implemented, documented, and presented.
Prerequisite: MAE 442 or Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 444. Capstone Aerospace Design Project-I. 3 Credit Hours.
Lectures and classroom discussions cover (i) legal, ethical and societal responsibilities of engineers, (ii) design factors such as product safety, reliability, life cycle costs and manufacturability, and (iii) other aspects such as global market, contemporary issues and continuous learning process. Students are required to select group design projects from the breadth of aerospace engineering activity and present project proposals to serve as the basis for MAE 445.
Senior Standing or Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 445. Capstone Aerospace Design Project-II. 3 Credit Hours.
Continuation of the Capstone Aerospace Design Project-I course. An aerospace system/subsystem is designed, implemented, documented and presented.
Prerequisite: MAE 444 or Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

MAE 446. Aircraft Design. 3 Credit Hours.
Concepts of aircraft design emphasizing on design layout including the airfoil geometry selection, propulsion integration, configuration layout, payload and landing gear system. Corequisite: MAE 471.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 470. Introduction to Aerospace Structures. 3 Credit Hours.
Course topics include mechanics of thin-walled aerospace structures, load analysis, virtual work, energy principles, stability of aerostructures, and finite element methods.
Prerequisite: MAE 202 AND MAE 207.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 471. Flight Dynamics. 3 Credit Hours.
Course topics include aerodynamic performance, stability, control, propulsion systems, and structures. Case Studies of Aerospace Systems are also included.
Prerequisite: MAE 371.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 472. Design of Aerospace Structures. 3 Credit Hours.
Design Philosophy and principles of aerospace structures. Detailed design of wing box structure, fuselage, landing gear mechanism, fasteners and structural joints. Application of composite materials.
Prerequisite: MAE 202 AND MAE 207.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 473. Aerospace Propulsion. 3 Credit Hours.
Definition of the atmosphere, propulsion basics, rocket fundamentals, turbine fundamentals, gas turbine cycles, component matching, math and computer models, aircraft missions, cycle section, reliability, and durability are analyzed.
Prerequisite/co-requisite: MAE 303 And MAE 371.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 490. Undergraduate Research. 1-3 Credit Hours.
Research Projects. Individual investigation of current problems.
Components: THI.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

MAE 501. Methods of Engineering Analysis. 3 Credit Hours.
Analysis of engineering systems in equilibrium and motion. Examples considered from mechanical, electrical, thermal and fluids engineering. Mathematical theory and computer methods for obtaining numerical solutions are developed for various cases involving discrete and continuous systems. Lecture, 3 hours.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 502. Vibrations. 3 Credit Hours.
Basic theory of free and forced vibrations of mechanical systems with and without damping. Applications to systems with one and several degrees of freedom are included.
Prerequisite: MAE 202 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 503. Internal Combustion Engines. 3 Credit Hours.
Course discusses engine types, characteristics, and operation. Topics include performance factors, fuel combustion, power cycles, knock and engine variables, exhaust emissions, fuel metering, compressors, and turbines.
Prerequisite: MAE 303 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 504. Orbitals Mechanics. 3 Credit Hours.
Analysis of orbits in an inverse-square gravitational field; elementary rocket dynamics, impulsive orbit transfer and rendezvous, and Lambert's Theorem with applications; patched-conic trajectories, planetary gravity-assist maneuvers, and linearized orbit theory with application to simplified analytical models;perturbations
Prerequisite: MAE 202 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 505. Design for Manufacturability. 3 Credit Hours.
Manufacturing concerns at design stage. Design theory and methodology. Statistical considerations in geometric dimensioning, tolerances, reliability-based design, and quality control. Producibility, design for assembly, and value engineering. Life cycle costs and optimum design using nonlinear programming and Taguchi approaches. Hands on projects on machine tools.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 506. Nuclear Engineering. 3 Credit Hours.
Course topics include a review of neutron physics, chain reactions, reactor theory, steady state operation, and reactor kinetics. Control, long term reactivity changes, materials, heat transfer, and shielding are also included. Lecture, 3 hours.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 507. Advanced Mechanics of Solids. 3 Credit Hours.
Courses discusses the basic elements of elasticity, plasticity, and viscoelasticity. Application to mechanical systems at rest and in motion are included.
Prerequisite: MAE 207 AND MAE 302 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 508. Intermediate Heat Transfer. 3 Credit Hours.
Course discusses steady and unsteady heat transfer by conduction, convective heat transfer in laminar and turbulent fluid flow, natural convection, and heat transfer by radiation.
Prerequisite: MAE 310 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 509. Turbomachinery Aero-thermodynamics. 3 Credit Hours.
Basic concepts of turbo machinery principle and thermo aerodynamic design , including gas-turbine engine cycles, compressor and turbine cascade, energy transfer in turbomachines, velocity diagrams, design and prediction of axial-flow compressors and turbines, radial-flow turbomachines, etc
Prerequisite: MAE 371 AND MAE 303 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 510. Fundamentals of Solar Energy Utilization. 3 Credit Hours.
Fundamentals basic to the design and performance analysis of thermal systems for the capture and utilization of Solar Energy.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 512. Intermediate Fluid Mechanics. 3 Credit Hours.
Course topics include conservation of mass, momentum, and energy, potential flow, viscous laminar and turbulent flows, the Reynolds analogy, and Boundary-layer approximations. Gas dynamics are also discussed.
Prerequisite: MAE 309 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 514. Advanced Internal Combustion Engines Experimental Studies. 3 Credit Hours.
Experimental mechanical engineering as it pertains to internal combustion engines. The principal measurements necessary to analyze the operation of an internal combustion engine are covered. Emphasis is placed on experiment planning, data interpretation, and error analysis.
Prerequisite: MAE 303 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 516. Introduction to Composite Materials. 3 Credit Hours.
Course provides an introduction to composite materials and terminology. Topics include advantages offered by composite materials, current aerospace, automotive, and bio-mechanics applications, experimental results, analytical models, and effects of impact and fatigue loads. The environment's impact on composite materials' performance and design procedures are discussed. Case studies examining composite materials as efficient replacements are also included.
Prerequisite: MAE 301 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 521. Exhaust Emission Control. 3 Credit Hours.
Course topics include automotive emissions, air pollution, combustion of homogeneous mixtures, emission control systems, Federal emission standards, and emission instrumentation and measurement. Lecture, 2 hours; Laboratory, 3 hours.
Senior Standing or Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 528. Fuel Cells. 3 Credit Hours.
Introduction to fuel cells, thermodynamics of fuel cells, electrochemical kinet ics in fuel cells, transport phenomena in fuel cells, introduction to various t ypes of fuel cells.
Prerequisite: MAE 310 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 531. Scientific and Engineering Foundations of Additive Manufacturing. 3 Credit Hours.
This course introduces the AM technologies and covers the core materials science and manufacturing engineering fundamentals upon which the technologies are built. Advantages and limitations of the AM technologies are highlighted, along with future opportunities.
Prerequisite: MAE 301 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 532. Additive Manufacturing of Engineering Materials. 3 Credit Hours.
This course focuses on teaching the processing, structure, and property relationships in metals, polymers, polymer-based composites, and bio-compatible materials fabricated using additive manufacturing (AM). Students will be exposed to conventional and advanced applications of AM technologies.
Prerequisite: MAE 301 OR Permission of Instructor.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 539. Heating, Ventilating and Air Conditioning System Design. 3 Credit Hours.
Course topics include basic HVAC systems, multizone systems, dual-duct systems, terminal reheat systems, variable air volume systems, induction and induction reheat systems, special applications, hydronic systems, unitary and heat pump systems, hydronic heat recovery systems, cooling and heating load calculation duct and piping design, overall system design, and integration.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 540. Energy Conversion. 3 Credit Hours.
Course topics include energy conversion, utilization, present and projected consumption of energy, thermodynamic principles, nuclear energy, fission and fusion reactions, hydroelectric power, and solar energy. Alternative energy sources, the hydrogen economy, and the energy-environment-economy system are also discussed.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 551. Special Problems. 1-3 Credit Hours.
Project course introducing methods of research through an individual investigation of current problems. Offered by special arrangement only.
Components: THI.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

MAE 552. Special Problems. 1-3 Credit Hours.
Project course introducing methods of research through an individual investigation of current problems. Offered by special arrangement only.
Components: THI.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

MAE 587. Fundamentals of Microfabrication. 3 Credit Hours.
MEMS technology and applications have grown at a tremendous pace, while structural dimensions have grown smaller and smaller, reaching down even to the molecular level. With this movement have come new types of applications and rapid advances in the technologies and techniques needed to fabricate the increasingly miniature devices that are literally changing our world. This course describes the science of miniaturization and brings an understanding of manufacturing options, material choices, and applications that have emerged recently.
PHY 223 OR PHY 230 OR EGN 233.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 588. Traffic Accident Reconstruction I. 3 Credit Hours.
The course will provide necessary skills to reconstruct a traffic crash from on-scene evidence and properly document the findings. Specifically, measurement techniques and photographing will be discussed; scale diagramming will be shown and practiced. An introduction to methods for accident reconstruction will be provided to analyze the collected information and determine what happened before, during and after the collision.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 589. Traffic Accident Reconstruction II. 3 Credit Hours.
The course will provide analytical skills to conduct a traffic crash analysis and properly document the findings. Specifically, derivation and origin of the commonly used mathematical formulas used for reconstruction will be discussed. Vehicle speed at impact, in-line and eccentric collisions, direction of travel, initial contact and position of vehicles on the roadway, and delta V will be analyzed. Critical speed calculations, lane changes and turn-away equation and airborne analysis will be presented. Introductions to measurement techniques and photographing will be discussed; scale diagramming will be shown and practiced. An introduction to commercial vehicle and motorcycle dynamics in collision will be provided.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MAE 590. Special Topics. 1-4 Credit Hours.
Subtitles describing the topics will be shown in parentheses in the class schedule, following the "Special Topics."
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MAE 591. Special Topics. 1-4 Credit Hours.
Subtitles describing the topics will be shown in parentheses in the class schedule, following the "Special Topics."
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 592. Special Topics. 1-4 Credit Hours.
Subtitles describing the topics will be shown in parentheses in the class schedule, following the "Special Topics."
Components: THI.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

MAE 599. Cooperative Education. 1 Credit Hour.
Practical application of classroom theory through alternating semester or summer employment with industries offering positions consistent with the student's field of study. Course may be repeated. Periodic reports and conferences are required.
Components: THI.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.