ENERGY SYSTEMS ENGINEERING

Track Description

All useful devices, from cell phones to cars to nuclear submarines, require energy to make them work. Energy, whether derived from fossil or nuclear fuels, the sun, the wind, or heat from the earth's core, must be converted from one form to another, and integrated into the design of the ultimate application. This technical track builds on the student's core courses in thermodynamics, fluid mechanics, and heat transfer to address problems in the design, operation, and maintenance of complex multi-component systems and provides a sound basis for advanced study in these core areas.

Required Courses

ME 343 Thermal Fluid Systems

Other Undergraduate Elective Courses (select three)*

ME 337C Introduction to Nuclear Power Systems
ME 360N Intermediate Heat Transfer
ME 363M Energy Technology and Policy
ME 374C Combustion Engine Processes
ME 374F Fire Science
ME 374T Renewable Energy Technology
ME 378E Nanotechnology for Sustainable Energy
ME 379M Development of Solar-Powered Vehicle
ME 379M Viscous Fluid Flow
ME 377K Projects in Mechanical Engineering

Faculty Mentors

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Organizations & Societies

AIAA, APS, ASME-AESD, SAE, SFPE

For course descriptions visit the University Catalog.
* Please contact faculty mentors to petition other courses.
** Recommended for students interested in graduate school.

The University of Texas at Austin
Walker Department of Mechanical Engineering
Cockrell School of Engineering

Industry Applicability

This certificate program area is appropriate to prepare mechanical engineers for jobs in industry that deal with one or more of the following:

- Design of centralized electric generation facilities to optimize overall system efficiency and minimize cost of operation
- Design of powerplants for vehicles and mass transportation: cars, trucks, trains, planes
- Managing the operation of complex systems such as power generating and distribution facilities to miminize fuel consumption and environmental impact
- Design and operation of building environmental control systems (heating, ventilation, air conditioning, and air and water quality)
- Design of systems for conversion of primary energy sources to various forms needed for specific applications, and delivery of the final energy product (oil and gas refining, pipelines, nuclear fuel reprocessing and waste management)
- Design of renewable energy storage and conversion systems: fuel cells, batteries, supercapacitors, catalysis, and other related sustainable energy systems

Selected Examples

1. Automotive engineering: Automobiles utilize a variety of energy systems. They include the type of energy source to be used for propulsion (gasoline, diesel, electric or hybrid power system, cooling for engine, transmission, and air-conditioning, induction and routing of air distribution, and auxiliary electric power for starting, ignition, navigation, and battery recharging). All of these examples involve interaction of electrical, thermal, and mechanical devices, and successful engineering of the overall vehicle is therefore highly interdisciplinary.

2. Renewable energy systems: As the global environmental impacts of conventional fossil-based electric power generation and vehicular propulsion become increasingly severe, the need for alternatives to fossil-fuels becomes more pressing. The demand for engineers with specialized knowledge concerning design, manufacturing, installation, operation and maintenance of solar and wind energy conversion systems as well as energy storage systems such as batteries and fuel cells is steadily increasing.

3. Aerospace applications: Many of the examples described in the above section on Automotive Engineering are equally relevant to the design and operation of transport aircraft. The special demands placed on military aircraft, rockets, and spacecraft introduce additionall problems of supersonic and hypersonic aerodynamics, cooling of critical electronic systems, and life support for humans in operating in extreme environments.