Mechanical Engineering

Master of Science in Engineering
Doctor of Philosophy

For More Information

Campus address: Engineering Teaching Center II (ETC) 5.204, phone (512) 471-1136, fax (512) 471-8727; campus mail code: C2200

Mailing address: The University of Texas at Austin, Graduate Program, Department of Mechanical Engineering, 204 East Dean Keeton C2200, Austin TX 78712-1591

E-mail: go@me.utexas.edu

URL: https://www.me.utexas.edu/academics/graduate-program

Objectives

The graduate program in mechanical engineering is designed to educate engineers who will be in the forefront of the mechanical engineering profession, leading the way to new and improved engineering systems to transform energy, materials, and information to meet the needs of society. To achieve this objective, the program offers a breadth of research and study areas and facilities. The faculty values creativity, the novel application of fundamental engineering science, interdisciplinary activities, the development of future leaders and a community of scholars, professionalism, and excitement in discovery. The program is designed to enhance these values, drawing upon the diverse interests and experience of the faculty. The major areas of emphasis are described below.

Areas of Study and Facilities

Acoustics. The Walker Department of Mechanical Engineering and the Chandra Department of Electrical and Computer Engineering offer an interdisciplinary course of study in this field. Research projects are carried out in physical acoustics, industrial acoustics, electroacoustics, nonlinear acoustics, underwater acoustics, and biomedical acoustics. Major experimental facilities include a general-purpose acoustics laboratory, a transducers laboratory, an anechoic chamber, a reverberation chamber, waveguides for high-intensity sound, a computer-controlled water tank for ultrasonics, and extensive underwater sound facilities at the Applied Research Laboratories.

Biomechanical engineering. This concentration provides studies for application of mechanical engineering principles to biological and medical problems. Areas of study are physiology, bioheat transfer, biomaterials, biorheology, health physics, biosignal analysis, biomechanics, ultrasonics, and biomedical computing. Supporting courses and facilities are also provided through the Department of Biomedical Engineering.

Dynamic systems and control. This concentration offers intensive study in the analysis, design, and control of engineered and natural systems. Areas of study include applied mechanics, biomedical engineering, constitutive modeling of materials, electromechanics, information and control theory, mechanisms and robotics, mechatronics, modeling of multienergy domain systems, multibody dynamics, simulation and analysis of system dynamics, tribology, and vibrations. Laboratories and facilities are available for research in acoustics, biomechanics, control systems, mechatronics, robotics, system dynamics, and tribology.

Manufacturing and decision systems engineering. Manufacturing and decision systems engineering (MDSE) embraces the broad spectrum of knowledge required by decision makers in the realms of manufacturing and service systems. Courses in MDSE cover topics drawn from mechanical systems and design, thermal and fluid systems, materials science and engineering, operations research and industrial engineering, and leadership and entrepreneurship. Major research facilities are available for graduate students in this field.

Manufacturing and design. The concentration in manufacturing and design offers state-of-the-art programs in innovative manufacturing processes, product design and development, and supporting technologies. Areas of study include product design methods, layer-based manufacturing (solid freeform fabrication), machine design, unit manufacturing processes, robotics, contemporary prototyping, reverse engineering, optimization techniques, computer-aided design and manufacturing (CAD/CAM), computational geometry, machine intelligence, and design for people with disabilities. Well-equipped laboratories are available for research in solid freeform fabrication (including selective laser sintering), product modeling and simulation, unit manufacturing processes, robotics, one-off prototyping (such as CNC processes, woodworking equipment, power tools, and product measurement equipment), scaled manufacturing (from macro to meso to micro), biomedical device fabrication, and laser-based processes. These laboratories are part of the Advanced Manufacturing Center.

An alternatively scheduled master's degree program in advanced manufacturing engineering, a subarea of manufacturing and design, also exists but is inactive. More information is available from the graduate advisor.

Materials engineering. This concentration encompasses graduate study in the fields of materials development, characterization and processing, and in structure-property-performance relationships. Areas of study include ceramics, physical metallurgy, mechanical behavior, materials processing, fuel cells, high-energy density batteries, new materials development, nanomaterials and nanotechnology, corrosion, and microelectronics packaging. Laboratory facilities include scanning and transmission electron microscopes; X-ray scattering, metallographic, laser processing, thermal analysis, and thin-film characterization facilities; and mechanical, electrical, magnetic, and electrochemical property measurement equipment. The Walker Department of Mechanical Engineering is also a primary participant in the interdisciplinary materials science and engineering graduate degree program.

Nuclear and radiation engineering. This concentration provides graduate study and research in nuclear radiation science, analysis and design of nuclear systems, and experimental techniques in nuclear technology. Emphasis is on radiation transport and measurements, neutron physics, health physics and dosimetry, transport and disposal of nuclear wastes, and nuclear material safeguards and disposition. The Nuclear Engineering Teaching Laboratory is equipped with a 1.1-MW TRIGA pulsing nuclear reactor; a cold neutron source with prompt gamma analysis; neutron radiography equipment; neutron activation analysis equipment, including a pneumatic transfer system; californium-252 neutron sources; a low-level gamma-ray counting system and many radiation detection systems; and extensive computational capabilities.

Thermal/fluid systems. This concentration offers graduate study and research in the areas of thermodynamics, heat and mass transfer, fluid mechanics, combustion, energy conversion, energy conservation, alternative energy, microscale heat transfer, microfluidics, advanced laser-materials processing, and thermoelectrics. Experimental facilities include subsonic wind tunnels, three-dimensional laser-Doppler anemometry, a micro/nano fabrication facility, scanning probe microscopy, a cryogenic measurement facility, instrumentation calibration facilities for semiconductor rapid thermal processing, fundamental combustion research facilities, engine and emission test

facilities, solar energy components and systems, and various fluid mechanics and heat transfer equipment. The University's computational resources for numerical investigations are state-of-the-art and extensive.

Graduate Studies Committee

The following faculty members served on the Graduate Studies Committee (GSC) in the spring 2023 semester.

Farshid Alambeigi
Narayana R Aluru
Vaibhav Bahadur
Jonathan F Bard
Joseph J Beaman Jr
Adela Ben-Yakar
J Eric Bickel
George Biros
David G Bogard
Raghu Bollapragada
Maura Borrego
Chih-Hao Chang
William S Charlton
Dongmei Chen
Kevin Clarno
Richard H Crawford
Michael Arthur Cullinan
Ashish Deshpande
Kenneth R Diller
Dragan Djurdjanovic
Janet L Ellzey
Ofodike A Ezekoye
Eric P Fahrenthold
Donglei Emma Fan
Nicholas P Fey
Omar Ghattas
John B Goodenough
Derek A Haas
Michael Richard Haberman
Matthew J Hall
Neal Hall
Mark F Hamilton
John J Hasenbein
Robert E Hebner
Tanya Hutter
Hadi Khani
Dale E Klein
Desiderio Kovar
Erhan Kutanoglu
Sheldon Landsberger
Benjamin D Leibowicz
Wei Li
Yuanyue Liu
Raul G Longoria
Nanshu Lu
Ann Majewicz Fey
Filippo Mangolini
Arumugam Manthiram
Alexander Marras
David Mitlin
Robert D Moser
Richard R Neptune
Mitchell W Pryor
Varun Rai
Christopher G Rylander
Marissa N Rylander
Michael S Sacks
Carolyn Conner Seepersad
Luis Sentis
Zhenghui Sha
Li Shi
Donald Jason Siegel
S V Sreenivasan
Venkat Subramanian
James Samuel Sulzer
Eric M Taleff
Mehran Tehrani
Eric van Oort
Junmin Wang
Yaguo Wang
Jamie Warner
Michael Webber
Preston S Wilson
Guihua Yu
Yuebing Zheng
Jianshi Zhou
Lei Zhou

Admission Requirements

To enter the graduate program in mechanical engineering, a student should have an undergraduate degree in engineering or in an equivalent quantitative field of study. Students who do not meet this requirement may have to take additional courses at the discretion of the graduate advisor. Admission to the integrated Bachelor of Science in Mechanical Engineering and Master of Science in Engineering (BSME/MSE) program is only open to current Mechanical Engineering undergraduate students.