

# COLLEGE OF ENGINEERING

Dean: Farshad Fotouhi

## College Mission Statement

The College of Engineering has three important missions: teaching, research, and outreach — serving the region, State and nation as part of an urban comprehensive research university. Students are prepared for professional practice, graduate study, lifelong learning, and for leadership roles in society. Faculty members develop the scientific and technological base for the engineering profession, and disseminate advanced technical knowledge to engineers, other professionals, and the public. A balance among the three missions is sought through a partnership built among students, faculty, staff, alumni, government, and private industry. This is achieved by maintaining an academic environment that is both intellectually stimulating and supportive of all of its constituents, regardless of race, gender, or ethnic background.

## College Organization

The academic programs of the College of Engineering are organized into two Divisions: Engineering and Engineering Technology.

The Division of Engineering includes seven academic departments:

- Biomedical Engineering
- Chemical Engineering and Materials Science
- Computer Science
- Civil and Environmental Engineering
- Electrical and Computer Engineering
- Industrial and Manufacturing Engineering
- Mechanical Engineering

Programs leading to the Bachelor of Science, Master of Science, and Doctor of Philosophy degrees in engineering are offered by these departments. Five programs leading to a Bachelor of Science in Engineering Technology and a Master of Science in Engineering Technology are offered in the Division of Engineering Technology.

## Profession of Engineering

Engineering requires people of imagination who can plan and create. Engineers design, simplify, refine and economize. They are pragmatists serving the needs of society through the development and improvement of technology. The engineer's resources include an intimate knowledge of scientific laws and their applications to engineering problems as well as ability to use mathematics and computers and, above all, an imaginative and an inquiring mind.

Engineers can start their careers in many functional roles — designer, test engineer, manufacturing engineer, sales engineer, researcher, or a combination of these and other roles. Engineering has become a profession that often leads to executive management positions. As more and more of the decisions of management in government and business are based on technical considerations, engineers with the necessary background are called upon to make these choices. Engineers do not devote their attention solely to innovations in technology. In all of these roles they look beyond their inventions and conceptions to consider the societal effect of their work, including its economic, aesthetic, safety, and environmental aspects.

At present, the minimum education required for general competence in the practice of engineering is a bachelor's degree in one of the

fields of engineering. However, many engineering positions require an additional year or two of education at the graduate level leading to the master's degree. Whenever possible, students are urged to continue their education to this point. For engineering research or teaching, and in some areas of practice, the doctoral degree is recommended. For further information about graduate programs in engineering, consult the Wayne State University Graduate Bulletin.

For all engineers, continuing professional competence in the midst of our constantly changing technology requires educational renewal and a life-long dedication to continuing education. The College offers seminars, institutes and off-campus programs to meet this need. In addition, regular College courses are available on an elective, post-degree basis.

## Engineering Technologist

The evolution of our civilization has always been closely associated with technology and science. Now, and in the future, this association will become even more important. New knowledge has inspired advances in technology, resulting in new career opportunities. Far-reaching developments in communications and instrumentation technology, highly sophisticated machine tools and manufacturing processes, new energy sources and new man-made materials, and computer applications have all revolutionized the techniques of industrial manufacturing and management.

This on-going expansion of scientific and engineering knowledge has changed the make-up of the engineering team through the inclusion of the engineering technologist. The engineering technologist, in cooperation with the engineer, organizes people, materials and equipment to design, construct, operate, maintain and manage technical engineering projects. He or she should have a commitment to that technological progress which will create a better life for everyone. Because of the increasing challenges in this information age, it is no longer possible for one person to master all of the knowledge and skills necessary to execute technical projects. Quite often, a team effort is required — with each member of the team highly trained in a specific area. Today's engineering teams involve engineers and engineering technologists and may also include technicians, scientists, physicians, craftsmen, and other specialists.

Engineering technology supports engineering activities through a combination of scientific and professional knowledge with technological skills and concentrates on the industrial applications of engineering. Because of the extensive variety of functional opportunities, and the wide variety of industrial enterprises available to the engineering technologist, there has been a great deal of specialization. An engineering technologist can specialize in three related ways: discipline, function and industry.

For example, the discipline could be mechanical, the function could be design, and the industry could be automotive; or the discipline could be electrical, the function field installation, and the industry electric power generation. Through its undergraduate and graduate programs, the Division of Engineering Technology allows students to gain the specialization that they desire to contribute to interdisciplinary teams as engineering technologists.

## College Facilities

The College of Engineering's facilities include five separate buildings with almost 300,000 square feet of classroom, office, and laboratory space. The newest of these is the Marvin I. Danto Engineering Development Center, featuring research and educational space that is dedicated to interdisciplinary work in areas of nanotechnology, automotive engineering, urban infrastructure, and alternative energies. Among the

lege's facilities are multimedia classrooms, a comprehensive computer center, electronics and machine shops, student project space, dedicated teaching laboratories, and sophisticated research laboratories. The four multimedia classrooms support innovative course delivery techniques, including interactive distance learning with classrooms at a variety of sites within Wayne State, at other colleges and universities, and at industrial sites. The PACE Teaming Center is designed to promote interdisciplinary project work with links to real-world engineering problems. The computer facilities include dedicated computer graphics, design, and personal computing hardware and software.

The Division of Engineering Technology is housed in a dedicated building of approximately 24,000 square feet, located at 4855 Fourth Street.

The undergraduate laboratories provide facilities in such areas as computer graphics, fluid mechanics, thermal sciences, system dynamics, statistical computation, materials science, and rapid prototyping. Some specific laboratories associated with departmental engineering specializations include: chemical measurements; chemical unit operations; materials testing and processing; nanomaterials synthesis, characterization, and device manufacturing; electron microscopy; optical metallography; soil mechanics; environmental and hydraulic engineering; roadway and building materials; structural modeling; analog and digital communications systems; computer systems; control systems; analog circuits; digital systems; microcomputers and microprocessor applications; power systems; electronics; optics; computer vision; artificial neural networks; integrated circuits fabrication; automotive engineering; human factors engineering; computer aided manufacturing; 3D printing, 3D CNC; robotics; sand casting and testing; and stress analysis.

These laboratories are used for instructional and research purposes along with such research facilities as a molecular beam laboratory; a clean room facility for device materials research; a biomechanics accelerator and impact laboratory; an acoustics and noise control laboratory; and a structural behavior laboratory. All of these are available for experimentation and research in connection with the undergraduate curricula on a college-wide basis.

The College provides support for the various instructional and research laboratories in the construction, modification, repair, calibration and installation of experimental equipment. In addition, the College offers sophisticated assistance in the design of electronic and instrumentation equipment and devices. Qualified students are encouraged to use these facilities under the supervision of trained professionals.

Many undergraduate and graduate students pursue their studies in the College while working in local industry, either full-time or part-time, where unique research facilities unavailable on campus may be found. In such situations, students are encouraged to pursue their college-credit research at the employment site, where they work under the joint supervision of their faculty advisor and a company representative. Such research can take the form of undergraduate directed study courses, Master of Science theses, or Ph.D. dissertations.

## Accreditation

In addition to the accreditation of Wayne State University by the Higher Learning Commission of the North Central Association of Colleges and Secondary Schools, the undergraduate programs listed below are accredited by ABET Inc. In the Division of Engineering, the programs below that lead to a Bachelor of Science degree are accredited by the Engineering Accreditation Commission (EAC) of ABET Inc. The Electrical/Electronic Engineering Technology program and the Mechanical

Engineering Technology program, offered by the Division of Engineering Technology, are accredited by the Technology Accreditation Commission (TAC) of ABET. Program accreditation is based upon careful, periodic appraisal of the faculty, curriculum, and facilities of the College. This approval provides assurance of an up-to-date, high quality education pertinent to the engineering profession. Such accreditation is recognized by other universities, prospective employers, and state professional licensing agencies.

DIVISION OF ENGINEERING (undergraduate)

Bachelor of Science Programs in:

- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering

are accredited by the:

Engineering Accreditation Commission of ABET  
111 Market Place, Suite 1150  
Baltimore MD 21202-4012  
(Telephone 410-347-7700).

DIVISION OF ENGINEERING TECHNOLOGY (undergraduate)

Bachelor of Science Programs in:

- Electrical/Electronic Engineering Technology
- Mechanical Engineering Technology

are accredited by the:

Technology Accreditation Commission of ABET  
111 Market Place, Suite 1150  
Baltimore MD 21202-4012  
(Telephone 410-347-7700)

## Location of the College

The College is located in the heart of Detroit, Michigan, renowned as a center of automotive engineering and production. The Michigan economy is in transition, with new focus on the emerging fields of biomedical and alternative energy technologies. This industrial center provides a wealth of examples of modern engineering practice and opportunities to explore the latest in vehicle design and production, automation design, transportation planning, telemetry, hydraulic and pneumatic controls, electric power generation, and computer design and production. The research and educational strengths of Wayne State's College of Engineering mesh well with the traditional and new engineering industries within Michigan, preparing students for those fields. The many industries of southeastern Michigan provide engineering students with rich and varied work experiences through full or part-time employment or through the Cooperative Education Program (<http://bulletins.wayne.edu/undergraduate/college-engineering/bs>).

The College is affiliated with the eleven other schools and colleges of the University which, with its 29,000 students, provides a broad selection of educational opportunities on an interdisciplinary basis.