

JAMES AND PATRICIA ANDERSON COLLEGE OF ENGINEERING

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Graduate education is important to the engineer interested in keeping pace with rapid growth in science and technology and in preparing for changes in job responsibilities. In the midst of greater Detroit's large community of professional engineers, Wayne State University's James and Patricia Anderson College of Engineering has an important mission to provide opportunities for study in contemporary areas and the latest developments in technology.

The James and Patricia Anderson College of Engineering is a leading research institution in Michigan and the nation. This is reflected in its instructional programs, which are supported both by its own research and by that of other institutions, and in the suitability of its industrial/educational environment for advanced study. Engineering graduate students are drawn both from the upper ranks of graduating seniors in various disciplines and from established engineers interested in pursuing advanced degrees. Criteria for admission are restrictive, and a high standard of performance is expected of successful candidates. In short, the challenges are great, but the potential rewards are equally promising.

The James and Patricia Anderson College of Engineering offers the Master of Science and Doctor of Philosophy degrees in biomedical, chemical, civil, computer science, electrical, industrial, mechanical, and materials science and engineering. In addition, a Master of Science may be earned in alternative energy technology, electric-drive vehicle engineering, engineering management, engineering technology, and manufacturing engineering. Graduate certificate programs are also available in a number of areas for additional specialization after completion of an undergraduate or graduate engineering degree. These programs are described generally below and specifically in the subsequent, departmental sections.

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 use these facilities under the supervision of trained professionals.

Excellent research programs are available in this college; graduate students can write a thesis or dissertation based on their participation in these programs to fulfill part of their degree requirements.

Many graduate students pursue their studies in the College while working full or part-time in local industry, where they have available to them unique facilities not found within the University. Students in such situations are encouraged to pursue their graduate research at their places of employment, under the joint supervision of the faculty advisor and a company representative. Such research may be applicable as credit earned for directed study courses, master's theses, or doctoral dissertations. However, after completion of a Bachelor of Science degree and one or more years of on-the-job experience, additional training at the graduate level is often desirable without participation in a research program, and the College provides an optional master's degree program without a thesis research requirement.

Research Centers

Opportunities exist at both the graduate and advanced undergraduate levels for students to participate in the programs of the research centers.

Bioengineering Center

The Bioengineering Center is an interdisciplinary group engaged in biomedical research, utilizing the principles of mechanical, chemical, electrical, and computer engineering. Faculty members from the James and Patricia Anderson College of Engineering collaborate with colleagues from the Wayne State Medical School in joint efforts to solve both basic and clinical problems. The principal area of research in the Center is injury biomechanics, with major areas of research include trauma biomechanics, the mechanical basis for low back pain, human locomotion studies, and orthopedic biomechanics. Other activities include the development of advanced anthropometric test dummies and impact studies using horizontal accelerator test sleds.

Center for Automotive Research

The Center for Automotive Research coordinates a variety of programs in different automotive areas, such as combustion engines, dynamics, acoustics, vibrations, and electronic controls. The engine research deals with the basic processes of thermodynamics, heat transfer, mass transfer and chemical kinetics which affect the performance, fuel economy, startability and emissions of different types of engines. A fully-instrumented cold room is used for some of these studies. Research is also conducted on diesel engine combustion and alternate fuels. The research consists of extensive theoretical analysis, supported by experimental investigations. The Center combines expertise from the Departments of Mechanical, Chemical, and Electrical and Computer Engineering.

Facilities of the College

Wayne State University has been identified as a PACE Partner, a group of fifty universities world-wide who have been selected by the PACE (Partnership for the Advancement of Collaborative Engineering Education) consortium to offer educational programs that are centered around the concepts of product life cycle management and the design, analysis, and planning processes in the artifice of virtual worlds with relevance to real world situations. PACE provides Wayne State students with access to the same state-of-the-art computer software and tools that are used in industry. In addition, opportunities for collaborative project development exist within the College, with other PACE institutions in Michigan, and with universities across the globe. This provides James and Patricia Anderson College of Engineering students with an advantage when entering the workforce or when transitioning to new roles following their graduate education.

Stimulating productive research and teaching methods are the goals of the Engineering Computer Center. These goals are met by providing and supporting the latest technologies in computer hardware, software, and networking including those associated with PACE. All curricula are designed to take advantage of these advancements and students feel the impact of these tools in their coursework. The latest in simulation, analysis, and design software are provided for students to use and master.

James and Patricia Anderson College of Engineering facilities include five separate buildings with over 330,000 square feet of classroom, office and laboratory space. The primary home of the James and Patricia Anderson College of Engineering is a three-story office building directly attached to a laboratory wing and connected to the Engineering Development Center. This has created a stimulating and productive research and teaching facility for the College. Among these facilities are multimedia classrooms, a comprehensive computer center, electronics and machine shops,

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 WSU, at other colleges and universities, and at industrial locations. The computer facilities include dedicated computer graphics, design, and personal computing hardware and software. The Marvin I. Danto Engineering Development Center, which opened in 2009, provides 80,000 square feet of space dedicated to advanced research and student collaborative projects. This includes the PACE Teaming Center, a classroom that is designed to support student team-based collaboration. The Division of Engineering Technology is housed in a separate building of approximately 24,000 square feet, located at 4855 Fourth Street. This recently remodeled facility houses labs and classrooms, including a teaching machine shop.

Research Facilities

The College oversees a wide range of undergraduate, graduate, and faculty research laboratories and excellent support facilities, housed in its five-building complex. The Bioengineering Center operates in close collaboration with Wayne's Medical School, employing unique equipment, in particular its own massive horizontal accelerator, to conduct impact studies emphasizing biomechanics. The College's Manufacturing Engineering Building (MEB) is home to the Department of Industrial and Systems Engineering. The most striking feature of MEB is its multi-story High Bay Lab, Wayne's largest research space, capable of accommodating full-scale production machinery. The MEB includes eighteen other labs currently in use by faculty from several departments. The Marvin I. Danto Engineering Development Center, which opened in 2009, provides significant new research space that focuses on interdisciplinary research and collaboration. EDC laboratories are focused on the urban infrastructure, alternative energy and advanced propulsion systems, nanotechnology, and smart sensors. The main Engineering Building, one of the largest structures on campus, houses specialized labs of many types. The Center for Automotive Research conducts interdisciplinary investigations of diesel and gasoline engines in a series of specialized test cells, including the engineering cold room a fully-instrumented lab capable of reaching a temperature of minus-40 C. The College's anechoic chamber is a walk-in scale facility dedicated to advanced research on vibrations and noise, particularly in automobiles. Other labs house research on diesel and gasoline combustion, structures and earthquake systems (utilizing the two-story structures lab, capable of testing multi-ton building components), soil mechanics, pollution and remediation models, polymers and composite materials, environmental kinetics, electron microscopy, catalysis, surface science, biomedical sciences, high-performance computing, neural networks, communication and information systems, materials/ fluids/metallurgy testing, solid-state electronics, robotics and computer-aided manufacturing, microprocessors, optical computing, and molecular beams and laser light scattering. Of particular note is the nano-fabrication (n-Fab) Laboratory, along with a Class 10 clean room, built with a \$7.0 million equipment grant from Delphi Automotive and a \$3.0 million investment by Wayne State University for infrastructure development. This investment provides the James and Patricia Anderson College of Engineering with one of the nation's leading nano-fabrication research laboratories. The College's research equipment is maintained, modified, and, in many cases, constructed by its in-house electronics shop and machine shop.

Accreditation

All of the undergraduate curricula of the Division of Engineering leading to a Bachelor of Science degree in engineering are accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board

for Engineering and Technology (ABET) (415 North Charles Street, Baltimore, MD 21201, 410-347-7700).

Electrical/Electronic Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Electrical/Electronic(s) Engineering Technology Program Criteria.

Mechanical Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Mechanical Engineering Technology Program Criteria.

Details of these programs are provided in the Undergraduate Bulletin. Curriculum accreditation is based upon careful periodic appraisal of the faculty, educational program, 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.