A History of Excellence ...

The College of Engineering was founded in 1934 as one of the key partners with Michigan’s industrial base to train the technically literate work force needed to support the state’s growth. From a foundation in mechanical and electrical engineering, the College has developed programs that continue to grow and change to meet the needs of the community. Programs have been added, updated, and retired in response to and in anticipation of changes in the Michigan economy. Biomedical engineering and alternative energy technology have supplanted programs in aeronautical and metallurgical engineering -- and the College continues to produce a significant portion of the engineers working in the State of Michigan.

Throughout its history, the College has worked to prepare its students to "hit the ground running" when they enter engineering practice. Over the life of the College, engineering tools have transitioned from slide rules to punch cards to super computers and computer aided engineering (CAE) -- and throughout that time period, WSU Engineering students have applied these tools to solving real world problems. In 2007, WSU was named one of 50 PACE Partners worldwide and received an in kind donation of software, hardware, and training valued at over $407 million. The PACE Program provides all students with access to industry-standard tools for collaboration, CAD, and engineering analysis -- thus giving them a jump start on their competition when pursuing job opportunities as an intern or after graduation.

Over the past 75 years, the College has continued to work with Michigan companies to identify areas that need new or continued attention -- in terms of both research and education. The newest programs focus on interdisciplinary efforts in alternative energy, biomedical engineering, sustainability, systems, and engineering management.

In 2009, the College started the next leg of its journey with the opening of the Marvin I. Danto Engineering Development Center. This new facility provides 80,000 square feet of space dedicated to collaborative education and research. The state of the art laboratories, which focus on alternative energy, nanotechnology, smart sensors, and applications to translational medical research, will allow the faculty and students of Wayne State to continue to advance the frontiers of engineering.

The College of Engineering seeks to meet the continuously changing needs of Michigan, the US, and the international economy by developing new educational programs and research collaborations. Through partnerships with industry, governmental agencies, and other academic institutions, the faculty and administration of the College will continue to drive engineering education and research to meet the new challenges of the 21st century in the areas of alternative energy, infrastructure, advanced vehicle development, and the interface between medicine and engineering.

... Leading the Way to the Future
ACADEMIC PROGRAMS

Undergraduate Programs
The College of Engineering offers a variety of BS programs in Engineering and Engineering Technology, all of which combine the theoretical foundation of engineering with opportunities for real world problem solving.

Engineering Programs
Chemical Engineering
Civil Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering

Engineering Technology Programs
Computer Technology
Construction Management
Electrical/Electronic Engineering Technology
Electromechanical Engineering Technology
Mechanical Engineering Technology

Undergraduate Certificates
Control Systems

Undergraduate students have the opportunity to apply their classroom knowledge to the solution of real world problems through a variety of mechanisms.

Internships and Co-ops: While not required, over 90 percent of undergraduate students in the College of Engineering complete temporary or permanent placements in engineering positions during their years of study. WSU Engineering courses are offered on a later schedule, particularly for junior and senior level courses, in order to coordinate with a work schedule. Many of these work experiences lead to full time job offers after graduation.

Undergraduate Research: All Engineering students can take advantage of the strong research enterprise within the College. By joining a faculty member’s research team, students can apply their engineering knowledge to the solution of cutting edge problems. Funding is available through several sources, or students can participate in research for academic credit or as a volunteer.

National Design Competitions: Professional engineering societies have developed several national or international design programs that allow students to tackle projects in competition with students from other universities. Wayne State currently fields teams for the Concrete Canoe competition and Formula SAE. These, and similar opportunities, allow students to gain important skills related to teamwork and communication in addition to engineering -- all while having fun.

Graduate Programs
Combining its status as a strong Research University with its long time connection to industry, WSU’s College of Engineering offers two different forms of graduate education. The first, through Graduate Certificate (GC) and Master of Science (MS) programs, provide engineers with an advanced education that is immediately applicable to their career goals. The PhD programs, by contrast, prepare students to conduct independent research -- in an academic, government, or industrial setting.

All of the graduate programs are built upon the foundation of the College’s research programs, which allow the faculty to maintain and expand their knowledge -- staying at the top of their fields nationally and internationally.

All graduate programs can be completed on a full time or part time basis. Most graduate courses are offered in the late afternoon and evening for the benefit of working students. MS programs can be designed with a thesis or based solely on coursework. Thesis and dissertation projects can be developed in partnership with a student’s employer if desired.

Graduate Program Options
Alternative Energy (GC and MS)
Biomedical Engineering
Chemical Engineering
Civil Engineering
Computer Engineering
Electrical Engineering
Engineering Management (GC and MS)
Engineering Technology (MS)
Industrial Engineering
Injury Biomechanics (GC)
Lean Six Sigma Black Belt (GC)
Lean Six Sigma Master Black Belt (GC)
Manufacturing Engineering (MS)
Materials Science
Mechanical Engineering
Polymer Engineering (GC)
Sustainable Engineering (GC)
Systems Engineering (GC)

Programs offer MS and PhD options unless otherwise specified. As new programs are currently being developed, please visit www.eng.wayne.edu for the latest offerings.
IMAGES OF THE COLLEGE OF ENGINEERING AND CAMPUS
The College of Engineering is part of one of the premier urban research universities in the US. WSU is ranked by the National Science Foundation as one of the top 50 publicly funded research universities in terms of research expenditures. The College has had over $15 million in annual research expenditures since 2003. Research in the College is built on two equally important foundations: 1) collaboration and interdisciplinary approaches; and 2) addressing current problems of society and industry. The collaborative nature of research within Engineering at Wayne State is evident inside the new Marvin I Danto Engineering Development Center. Multidisciplinary laboratories with connecting facilities promote the interaction of faculty from different departments. The COE faculty are encouraged to partner with scientists and engineers from the other WSU schools and colleges, local medical institutions, government agencies, and international companies to develop research programs and projects that address real world problems.

**RESEARCH**

**BIOMEDICAL ENGINEERING**

Addressing the challenges of medicine through the application of engineering, the faculty and students of the BME program and related departments seek to minimize the occurrence of injury, develop new diagnostic techniques and treatment modalities, and assist with the improvement of clinical medicine. With applications of chemical, electrical, industrial, and mechanical engineering, the research efforts address a wide variety of areas: injury and forensic biomechanics, tissue engineering and biomaterials, smart sensors and neurophysiology, development of enabling technologies, and biomedical imaging. Engineering faculty collaborate with medical and health science faculty from the WSU School of Medicine and surrounding hospitals, the Eugene Applebaum College of Pharmacy and Health Science, and the College of Nursing to translate basic science to clinical practice.

**INFRASTRUCTURE**

With an urban campus located just 2 miles from the Detroit River and Great Lakes system, WSU has the perfect laboratory to focus on water, transportation systems, and improving the urban infrastructure. Teams of faculty and students work together to: assess and model water quality and develop systems for efficient water processing; design intelligent transportation systems and improve traffic safety; improve construction and facilities management systems; and investigate the effect of ground contaminants on water quality and the overall environment. Together, these WSU researchers are working to develop the 21st century city that can provide residents with a safe and sustainable environment.

**PROGRAMS**

**SMART SENSORS AND INTEGRATED MICROSYSTEMS**

Using non-silicon based systems that are perfect for harsh environments, the SSIM Center has developed unique sensors that have addressed critical needs in the medical, automotive, and homeland security arenas. Facilities at WSU allow for design, prototype manufacturing and characterization of sensors on site, providing tremendous opportunities for innovation. Center includes faculty from numerous engineering departments, as well as Chemistry, Physics, and regional medical centers. Efforts have also expanded into robotic enhanced surgery, which provides surgeons with improved perception and accuracy during delicate procedures.

Researchers in the SSIM Clean Room develop the next generation of ground breaking microsensor systems.

**RESEARCH LEADING TO ENTREPRENEURSHIP**

Over the past five years, several WSU Engineering faculty have worked to translate their research success to business success. Companies have been formed to commercialize advances in acoustic sensing (SenSound LLC), nanomaterials (nanoScience Engineering Corp.), and MEMS and wireless sensing (Visca LLC), among others. Many of these start-ups have taken advantage of the incubator facilities at TechTown, Wayne State’s research and technology park located immediately adjacent to campus. Through the University’s Technology Transfer Office and the supportive environment of TechTown, WSU Engineering faculty and students are encouraged to see the broader possibilities of their research and designs. The entrepreneurial spirit is transferred to WSU students as well, through the Engineering Ventures Program that is being developed to provide knowledge and practical experience to students interested in starting their own companies or bringing entrepreneurial thought to their current job.

Carol Miller, PhD, Chair of Civil and Environmental Engineering, addresses the water quality of the Detroit River.

Sean Wu, PhD, Distinguished Professor of Mechanical Engineering, shows off his patented acoustic holography system in WSU’s own anechoic chamber.
RESEARCH PROGRAMS

ALTERNATIVE ENERGY
Solar, hydrogen, wind, biofuels -- development of these new energy sources has been identified as a national priority. Wayne State has been a key player in alternative energy for several years -- establishing the first degree program in alternative energy technology in the US in 2004. The National Biofuels Energy Laboratory (NBEL) is a joint effort between WSU and NextEnergy and is in the process of developing and characterizing biofuels to provide a sustainable and stable source of fuel to the country. Parallel work focuses on the development of hydrogen fuel cells for advanced vehicle systems, the infrastructure necessary to support alternative energy sources, and appropriate safety systems for new energy systems.

Professor Simon Ng, of the Department of Chemical Engineering and co-director of the Alternative Energy Technology Program, explains the development of flexible fuel mobile generators for military and disaster relief operations to former President Bill Clinton on a visit to NextEnergy.

CENTER FOR AUTOMOTIVE RESEARCH
This multidisciplinary group works to characterize and improve engine performance, in particular with the application of novel fuels technologies and propulsion systems. Numerous test cells allow for engine research to be conducted in extreme conditions to simulate actual use environments, including a state of the art cold room. Next steps include developing a graduate curriculum that prepares engineers for the new paradigm in cars and trucks -- electric drive vehicles. The new educational programs are being provided with federal government support of $5 million from the Department of Energy.

NANOTECHNOLOGY
A multidisciplinary approach to nanotechnology allows WSU’s faculty and students to tackle challenges related to tissue engineering, drug delivery, waste minimization, and the development of new materials for biomedical and industrial applications. Material characterization systems, including atomic force microscopy, are located adjacent to facilities for molecular simulation and computation, material synthesis, and cell or tissue culture development. This collaborative environment has recently produced engineered tissues for heart valves and small vessels, dendrimer-based targeted pharmaceuticals, and new aerosol systems for inhalers.

Professor Howard Matthew, Department of Chemical Engineering and Materials Science, and his students examine tissue engineered systems for treating human disease.

STANDING OUT IN A CROWD
The state of Michigan produces more engineers than any other state in the US -- giving students many options to choose from when selecting an educational program. The southeastern region of the state alone boasts 3 public research universities and 6 other public and private universities that offer undergraduate engineering programs. What makes Wayne State College of Engineering stand out from the other engineering programs in the area?

• Wayne State is the only urban research university in the State of Michigan -- combining the highest caliber research with a focus on solving current, real world problems.
• WSU’s College of Engineering is a small community within a larger University. With only 1100 undergraduate students, class sizes are kept small -- allowing more chances for interaction between students and faculty. The larger WSU community provides students with the full opportunities of campus life.
• In the College of Engineering, lecture courses are taught by doctoral-level faculty, not TA’s. This provides students with access to world leaders in engineering, starting with their freshman year. WSU faculty don’t just teach from text books - they write the text books.
• The historical link between the College of Engineering and industry provides students with hands-on learning opportunities and a foundation for their study based on current industry needs and trends.

• Wayne State University boasts the largest single campus medical school in the US. Along with partner hospitals, including the Detroit Medical Center and the Henry Ford Health System, this provides students and faculty with infinite opportunities to collaborate on applying engineering to solve medical challenges -- all within one mile of main campus.
• Wayne State’s Accelerated Graduate Program (AGRADE) allows exceptional students to earn their MS degree with one additional year of course work. Students can pursue their graduate degree in their undergraduate major or in one of WSU’s interdisciplinary graduate engineering programs -- the sky is the limit. AGRADE students save time and money on the way to an advanced education.
• Wayne State’s campus is the most diverse in the state of Michigan, including students from over 90 countries. Students from all ethnic groups will find a welcoming environment on campus, and the diversity provides a tremendous opportunity for an education on global culture -- all from the mid-town campus.
• The College of Engineering programs provide students with the flexibility to complete requirements in preparation for medical school, law school, or business school in addition to graduate work in engineering. Students use engineering as the key to opening doors to their future -- with complete choice as to where that door may lead.
VITAL STATISTICS

1100 Undergraduate Students
800 Graduate Students
85 Faculty

5 BS Engineering Programs
6 BS ET Programs
1 Undergraduate Certificate Program in Control Systems
7 Interdisciplinary Graduate Certificate Programs
12 MS Programs
7 PhD Programs

Over $17 million in annual research expenditures

More than 15,000 alumni worldwide

Celebrated its 75th Anniversary in 2009