CHEMICAL ENGINEERING AND MATERIALS SCIENCE

Over the next century, a much larger percentage of chemicals, materials, and fuels will be produced from bioresources. There will be an emphasis on alternative sources of energy, conservation, energy storage, and new energy conversion devices. Chemical and materials engineers will lead this transformation.

Chemical Engineering and Materials Science at MSU has two excellent degree programs that include new opportunities in microelectronics, biomaterials, environmentally friendly materials, nanotechnology, and novel energy conversion devices.

Our programs educate students to become innovative engineers on a foundation of mathematics, physics, chemistry, life sciences, and engineering science. Faculty excel in both the research and teaching of chemical processes, materials evaluation and design, and biotechnology. Students enjoy access to outstanding laboratories for biochemical engineering, composite materials processing, and characterization of metals, ceramics, and polymers.

Chemical engineering and materials science students have gone on to careers in automotive, aerospace, manufacturing, pharmaceutical, design and construction, paper, petrochemical, food processing, specialty chemical, microelectronic, electronic and advanced materials, polymer, business services, biotechnology, environmental, and safety industries.

UNDERGRADUATE PROGRAM

Undergraduates receive excellent support at MSU, including opportunities to work on research projects with faculty and the use of state-of-the-art facilities. The department awarded $102,100 in undergraduate scholarships in 2008/2009.

GRADUATE PROGRAM

Graduate students can expect a highly stimulating environment due to new collaborations and shared experimental facilities between chemical engineering and materials science faculty. We offer a unique program to bridge non-traditional students into the graduate program.

The department provided significant financial support to graduate students last year through paid teaching and research positions: $277,164 to fund teaching assistants; $2.4 million from external grants to support research assistantship positions; and $193,767 to fund fellowships.
MAJOR RESEARCH PARTNERS

- A123Systems
- Air Force Office of Scientific Research
- Argonne National Laboratory
- Boeing
- BSST LLC
- Cargill
- Chrysler
- Cytec Industries
- Dow Chemical Company
- Dow Corning Corporation
- DuPont
- Eastman Chemical Company
- Ford Motor Company
- General Motors Corporation
- GlaxoSmithKline
- Huntsman Chemical Company LLC
- Hybrid Plastics
- Kellogg Company
- Kimberly-Clark
- Lockheed Martin Corporation
- Mascoma Corporation
- Metabolix, Inc.
- Michigan Agricultural Experiment Station
- Michigan Economic Development Corporation
- NASA
- National Corn Growers Association
- National Science Foundation
- Office of Naval Research
- Paradigm Optics, Inc.
- POET
- Primix Corporation
- Schlumberger
- Shell Oil Company
- Syngenta
- Technova Corporation
- U.S. Army Research Laboratory
- U.S. Department of Agriculture
- U.S. Department of Education
- U.S. Department of Energy
- U.S. Environmental Protection Agency
- Verenium Corporation

PHYSICAL FACILITIES HIGHLIGHTS

The Composite Materials and Structures Center is one of the largest integrated facilities for polymer and composites research and development in a non-industrial environment. With $9 million in equipment, the facility provides processing equipment and rheological, mechanical, adhesion, and surface evaluation. Contact Larry Drzal, drzal@egr.msu.edu, (517) 353-7759, or visit http://www.egr.msu.edu/cmsc/.

Electron microscopy facilities include a scanning electron microscope and a 200 kV transmission electron microscope. Microanalytical characterization is available using energy dispersive x-ray analysis while microcrystallographic analysis can be carried out using electron back-scattered diffraction and/or selected area electron channeling patterns. Contact Martin Crimp, crimp@egr.msu.edu, (517) 355-0294, or visit www.chems.msu.edu/php/faculty.php?user=crimp.

A Protein Expression Laboratory was funded by the Michigan Life Sciences Corridor. The mission is to use genetically engineered microbes to manufacture proteins needed for research. The lab has two 10-L computer-controlled bioreactors and a 100-L bioreactor. Contact Mark Worden, worden@egr.msu.edu, (517) 353-9015, or visit http://www.egr.msu.edu/pel/.

Our 4,000-square-foot Biomedical Engineering Laboratory consists of wet lab space for tissue scaffold fabrication and characterization of cell and tissue function; a tissue culture room used to maintain osteoblasts, hepatocytes, fibroblasts, and neuronal cells; and a separate class-10,000 clean room used for preparing dust-free surfaces for cell-surface studies. Contact Melissa Baumann, mbaumann@egr.msu.edu, (517) 432-1243; Kris Chan, krischan@egr.msu.edu, (517) 432-4530; or Patrick Walton, spwalton@egr.msu.edu, (517) 432-8733.
**PROGRAM HIGHLIGHTS**

- We host an annual research forum to highlight our faculty and graduate student research.
- The Cooperative Engineering Education Program provides students with hands-on experience in internships that pay well.
- The average starting salary for department graduates in 2009 was about $54,000.
- Our students receive prestigious awards. Kendell Pawelec won a Gates Cambridge Scholarship, and Logan R. Matthews has been named one of 17 incoming students at Michigan State University as an Alumni Distinguished Scholar.
- We hold the nation’s best record for placing in the AIChE National Design Competition over the past 35 years.
- Freshmen Brian LaFleur and Jonathan Roney are among the College of Engineering’s four Von Ehr Scholars for 2009-2010.

**RESEARCH**

Department faculty members are active in a wide range of research. Current research areas include:
- Advanced metallic systems
- Biotechnology and biomaterials
- Colloid and interface science
- Polymers and composites
- Multiphase transport phenomena
- Electronic and ceramic materials
- Biobased materials resource utilization
- Nanotechnology
- Energy

**FACULTY AND STAFF**

- Our faculty earn more patents than any other department in the university.
- Professor S. Pat Walton received the Teacher-Scholar Award, a university-wide award, in 2010.
- Professor Donald Morelli is leading an Energy Frontier Research Center funded by DOE at the level of $12.5 million.
- Professor Lawrence Drzal is leading a Center for Alternative Energy Storage Research and Technology funded by the U.S. Army with $1.5 million.

**NUMBERS AT A GLANCE**

- Faculty .......................................................... 30
- Undergraduates .................................................. 419
- MS students ....................................................... 8
- PhD students ..................................................... 102
- Degrees awarded (08/09)
  - BS ............................................................... 63
  - MS .............................................................. 6
  - PhD ............................................................. 6
- Funded research projects ........................................ 83
- Research expenditures (FY08/09) ....................... $10,700,000
- Patents awarded .................................................. 5
- Peer-reviewed publications .................................... 157

**FOR MORE INFORMATION**

Martin Hawley, Chairperson
Department of Chemical Engineering & Materials Science
Michigan State University
2527 Engineering Building • East Lansing, MI 48824-1226
Phone: (517) 355-5135 • Fax: (517) 432-1105
E-mail: chems@egr.msu.edu • Web site: www.chems.msu.edu