Message from the Department Head

Dear Prospective Graduate Student,

We are delighted that you are considering the UIC Department of Mechanical and Industrial Engineering (MIE) to pursue your advanced studies. We offer outstanding and well-balanced research-oriented programs of study leading to master's and doctoral degrees in two disciplines—Mechanical Engineering and Industrial Engineering. In this brochure, we have tried to provide an overview of our educational and research programs.

This is a very exciting time for all of us in the department. We have undergone tremendous growth and development in the past few years. Most recently, we have added four new faculty including two members of the National Academy of Engineering, integrated the Energy Resources Center into the department, nearly doubled our research funding to over $6 million per year, and strengthened our partnerships with the local industry.

In order to address contemporary and emerging research issues of national and international importance, we have strengthened and structured the ongoing research efforts in the department into four major interdisciplinary research areas of emphasis: Biotechnology and Biomedical Systems, Microsystems and Nanotechnology, Computing and Information Technology, and Energy and Environmental Technology. Within each emphasis area, a broad range of cutting-edge interdisciplinary topics is available for graduate research.

Our faculty members are academic leaders in their research fields and well known nationally and internationally. The faculty includes members of the National Academy of Engineering, fellows of professional societies, editors of various international journals, and winners of prestigious research awards such as the National Science Foundation CAREER Award and the Office of Naval Research Young Investigator Award.

Aside from an outstanding faculty, the department prides itself in the state-of-the-art research laboratories, first-rate computational and experimental facilities and a congenial atmosphere that it provides for graduate studies.

I encourage you to learn as much as you can about our programs. Visit the department and look over our faculty research profiles on our website, talk to our faculty and meet with our students. I hope you will find that MIE offers the breadth and vision in its graduate programs that you seek, and I invite you to consider becoming a part of this talented and dynamic community.

With my best wishes,

William M. Worek

Professor and Head
UIC Department of Mechanical and Industrial Engineering
Department and Graduate Programs

The University of Illinois at Chicago is one of the three campuses of the University of Illinois system and ranks in the top 50 research universities in the country.

The Department of Mechanical and Industrial Engineering is one of the six departments in the UIC College of Engineering. Currently the department has 23 core faculty members, 10 lecturers, nine full-time research faculty, 160 graduate students and 390 undergraduate students. The department offers graduate programs leading to Master of Science and Doctor of Philosophy degrees in two disciplines: Mechanical Engineering (ME) and Industrial Engineering (IE). Typical durations of MS and PhD degree programs for students entering with a bachelor's degree are two and five years respectively.

Admissions

While students are admitted with both MS and PhD as degree objectives, the graduate study in the department is highly oriented toward the PhD with emphasis on scholarship and research. Applicants must have earned a baccalaureate degree in engineering from an American Board of Engineering Technology accredited college or university or equivalent with a grade point average of at least 3.00 (3.50 is preferred for PhD applicants) on a scale of 4.00. Although most of our PhD applicants typically have a master's degree, a significant number of applicants pursue our doctoral programs directly after their bachelor's degree.

Financial Aid

The department, as a general policy, provides financial aid in the form of fellowships, research and teaching assistantships to nearly all PhD students in good standing for the duration of their studies. Support for students seeking an MS degree is limited and such students must be prepared to support themselves during their studies.

Graduate Research

The PhD programs in both ME and IE are research-oriented and require a thesis. The MS bound students have the option of pursuing either a thesis or course work only towards their degree. The whole system of graduate study in the department is set up to give you more freedom with few course requirements to fulfill. You will work closely with your faculty advisor who will guide you on a course of action that is tailored to your individual needs and research interests and best prepares you for your future career. For your graduate research, you will find a rich array of topics of contemporary interest grouped under the four multidisciplinary research areas of emphasis in the department described in the following pages.
The research in this emphasis area is focused on development of new concepts and techniques that may lead to a better understanding of basic mechanisms in disease and development of novel technologies and implantable devices that may help solve problems in medicine and biology through a multidisciplinary approach integrating mechanical engineering science, human physiology and clinical environment. Faculty and students in this group collaborate with experts in biological and physical sciences and medical doctors in various departments at UIC, as well as at other major academic medical centers and hospitals in the Chicago area. The research is sponsored by the federal agencies such as the National Institutes of Health (NIH), the National Science Foundation (NSF), the U.S. Department of Energy (DOE) and the National Institute of Standards and Technology (NIST), as well as private foundations such as the Whitaker Foundation, and several private industries.

**Research Thrusts**

**Biofluids**  
Over the last two decades, fluid mechanics has come to be appreciated by medical investigators as a key factor in the fundamental understanding of both arterial disease and the regulation of cellular biology. Professor Francis Loth’s research group at UIC, in collaboration with physicians at the University of Chicago and scientists at Argonne National Laboratory, is investigating the unique aspects of biological fluid motion and applying the knowledge to develop new modeling tools to help diagnose vascular diseases as well as neural disorders.

**Biomechanics**  
Biomechanics research, directed by Professor Farid Amirouche in collaboration with surgeons at UIC Orthopedics, is focused on developing new surgical techniques and tools, providing deeper insight into the mechanical workings of the body, and ultimately improving the lives of patients. The researchers are using miniaturized sensors to gather real time readings inside cadaver knees, hips, spines, and hands. They are also applying advanced computational modeling tools to understand the basic mechanisms of injuries for designing better prosthetics. The research is sponsored by several private industries such as Baxter, Depuy, Johnson and Johnson, and Zimmer.

**Rehabilitative and Assistive Technologies**  
Professor Michael Scott’s research group is a major partner at the UIC Rehabilitation Engineering Research Center RecTech, with funding from DOE and NIH. In collaboration with colleagues from Disability and Human Development and Physical Therapy, the group is developing cutting-edge technology to enable access to exercise for people with disabilities. The work is user-centered, and the effects of these technological innovations are studied to ensure that they are helping people to exercise more and attain a higher quality of life.
BioMEMS—BioMEMS—the emerging area of research involving application of microelectromechanical systems (MEMS) and nanotechnology to biological and medical problems—is leading a revolution in medicine and patient healthcare. Professor Laxman Saggere’s research group is developing new technologies integrating MEMS and microfluidics technologies with biomimetic design concepts to advance BioMEMS applications in collaboration with neuroscientists in UIC Bioengineering and medical experts elsewhere. Examples of current projects, funded by NSF and NIH, include development of a novel retinal prosthesis technology and enhancement of flexible neural electrode technology for a cortical auditory prosthesis.

Medical Imaging Novel sonic imaging techniques for medical diagnosis are being developed in the Acoustics and Vibrations Laboratory of Professor Tom Royston in collaboration with other engineering and medical researchers in Chicago. These techniques use audible frequency sound (not ultrasound), either by itself, such as in multi-sensor monitoring of lung or heart sounds, or complimentary to another conventional medical imaging technique. For example, a bimodal sonic and ultrasonic technique utilizes ultrasound to construct an image of geometry in greyscale and beamforms on sonic output from turbulent blood flow caused by dangerous constrictions to overlay a color-coded indication of a problem. In magnetic resonance (MR) elastography, sonic shear waves sent through biological tissue are imaged via MR to identify anomalies, such as increased stiffness due to a tumor, which locally alters shear wave motion.

Virtual Reality for Medical Education Virtual reality and haptics are opening doors for students to explore applications in medical and dental anatomy as well as interactive simulations which were previously possible by using physical models and instruments. The research directed by Professor Prashant Banerjee and funded by NSF, NIST, and the UIC Colleges of Engineering, Dentistry and Medicine is enabling the creations of unique tools and techniques for medical education.

The MIE graduate program has provided me the level of both professional and academic experience needed to not only succeed, but also excel in my career. In addition, professional development opportunities are also available through strong ties with both industry and government research facilities in the Chicago area. For me specifically, obtaining research experience at Argonne National Laboratory has provided me with a tremendous advantage in my current career.

Microsystems and Nanotechnology Emphasis Area

Professors Aggarwal, Amrouche, Kennedy, Lilley, Mashayek, Megaridis, Saggere, Worek and Yarin

The research conducted in the Microsystems and Nanotechnology area is concerned with design, fabrication, characterization, and study of fundamental science of structures and devices with dimensions ranging from a few nanometers to several hundred micrometers. The research in this area spans a wide range of topics in the emerging technologies including MEMS, microfluidics and nanofluidics, synthesis of nanotubes, nanoparticles, micro/nano manipulation, and molecular dynamics simulations. State-of-the-art resources are available for research in this area through the UIC Nanotechnology Core Facility and the UIC Research Resources Center. The research in this area is sponsored by the National Science Foundation (NSF).

Research Thrusts

**MEMS Transducers and Mechanisms**

Novel MEMS devices and structures for energy transduction and motion at small-scales for engineering applications are being developed in the Microsystems and Devices Laboratory of Professor Laxman Saggere. These devices are enabled by a synergistic synthesis of MEMS technology with active materials, microfluidics and compliant mechanisms design concepts. The ongoing active research projects include development of a novel micromachined mechanism for coordinated manipulation of objects at micro- and nano-scales for applications in microassembly and manipulation of biological cells, optically powered thin-film piezoelectric microactuators and micropumps for various applications.

**MEMS Testing and Characterization**

Standardized methods to measure the reliability of a MEMS device are critical for successful design and commercialization of MEMS devices. Professor Carmen Lilley’s group is developing experimental techniques for direct-load and remote testing of MEMS structures to study effects of fabrication and aging on the mechanical properties. In particular, the effects of annealing, chemical and/or crystalline structure of thin films, interfaces between layers, stress, aging and failure mechanisms for reliability assessment are being studied.

Mandar Deshpande, ME graduate student, fabricating thin-film piezoelectric microactuators in the UIC Nanotechnology Core Facility.

Sandeep Krishnan, ME graduate student, is characterizing the performance of a novel micromanipulator seen in the inset.

Professor Carmen Lilley and ME graduate student, Vijay Thimmapuram, are conducting experiments in mechanical testing of MEMS.
Nanofluidics and Microdroplet Technology  Professor Constantine Megaridis’ group, in collaboration with researchers from Drexel University, the University of Pennsylvania, and ETH-Zurich is investigating the behavior of multiphase fluids in nanoenclosures (e.g., nanotubes) in a program funded by NSF. Fluid transport and phase change phenomena induced by external stimuli are monitored in real time, and the dynamics of the relevant processes is being analyzed. The group is also investigating the fundamental transport phenomena in microdroplet dispensing. This process involves high-precision placement of minute amounts of fluid materials, as required in electronic component manufacturing to fabricate fine-line circuit interconnects with characteristic features as fine as 100 micrometers and other industrial applications.

Nanoparticle Coating Technology  Nanoparticles of various materials are building blocks and important constituents of ceramics, composites, pharmaceutical and food products. The ability to manipulate the surface properties of these nanoparticles through deposition of one or more materials can significantly enhance their applicability. Professor Farzad Mashayek’s group, in collaboration with Professor Alexander Yarin and researchers at the Penn State University, is developing a low-pressure, non-equilibrium plasma process to deposit nano-layers of various materials on the surface of nanoparticles with the goal of modifying the behaviors of these nanoparticles.

Nano-Scale Thermodynamics and Flow Processes  A fundamental understanding and characterization of thermodynamics and transport processes in the rapidly emerging nanodevices, such as those based on carbon nanotubes and nanoparticles, is vital to nanotechnology. Professor Suresh Aggarwal’s group, in collaboration with Professor Sohil Murad of UIC Chemical Engineering and Professor Ishwar Puri at the Virginia Polytechnic Institute and State University, is developing efficient multiscale approaches to simulate transport processes in nanodevices. Continuum-based and molecular dynamics simulations are being used to investigate fundamental phenomena associated with both flame synthesis of functionalized nanotubes and wetting and lubrication of moving surfaces and solid-fluid interactions in nanomachines.

Synthesis of Carbon Nanomaterials  Carbon nanotubes (CNTs) are materials of the future and synthesis techniques for their high quality production at commercial rates are very sought after. Well-characterized methods to produce carbon nanomaterials are arc discharges, pulsed laser vaporization, and chemical vapor deposition. Professor Lawrence Kennedy’s research group is investigating techniques using oxy-flames as a relatively inexpensive, robust, pyrolysing carbon source for growing tubular nanomaterials. This is the first observation of multiple forms of nanostructures generated in a single process and selectively harvested.

As a graduate student at UIC, I was a part of a remarkable team of researchers, who had a major impact on my work output. We wrote numerous articles and traveled to many conferences, which contributed extensively to my overall experience. I was very impressed by the excellent environment for graduate study in the MIE Department. The research and educational training that I received at UIC greatly helped me achieve my goal of pursuing an academic career.

Almila Yazicioglu, PhD, ME, 2004
Assistant Professor, Mechanical Engineering Department, Middle East Technical University, Turkey
Professor Prashant Banerjee is exploring regions inside a brain using a virtual reality and haptic device, ImmersiveTouch™, that was invented by his research group and patented by the university.

Lusine Baghdasaryan and Maryam Haji, IE graduate students, are conducting experiments in supervisory control of mobile robots in the Discrete Event Systems Control Lab.

**Computing and Information Technology Emphasis Area**

*Professors Aggarwal, Banerjee, Budyn, Cetinkunt, Darabi, He, Mashayek, Scott and Shabana*

The Computing and Information Technology research group is engaged in a wide range of exciting interdisciplinary projects involving theoretical and numerical modeling and computer simulations applied to enhance the quality and productivity in manufacturing and design of complex mechanical systems. The information technology oriented core areas of research include: Virtual Reality, Design and Analysis of Manufacturing Control Systems, Mechatronics, and Computational Intelligence for Prognostics and Diagnostics of Manufacturing Systems. The computing oriented research is focused on Computational Design and Simulation of Dynamic Systems. Support for research in this emphasis area comes from several sources including the Federal Railroad Administration, the U.S. Army Research Office (ARO), the National Science Foundation (NSF) and private industries such as Caterpillar, Motorola, Ford Motors, and BF Goodrich.

**Research Thrusts**

**Virtual Reality**  Research focused on extending the virtual reality (VR) technology for industrial and manufacturing processes especially design models, facilities planning, logistics, transportation and distribution decision support is being conducted in the Industrial Virtual Reality Institute directed by Professor Prashant Banerjee. He and his students recently developed a novel high-performance haptic-augmented VR system, called ImmersiveTouch™, which finds a variety of applications that appeal to multiple stimuli: audio, visual, tactile, and kinesthetic. Specific problems being currently investigated include real-time interactive collision detection between convex and non-convex objects, dynamic scripting architectures for VR and haptic training systems.

**Manufacturing and Service Information/Control Systems**  Today's manufacturing and service information systems involve highly complex decision making processes. To develop systematic methods for modeling of complex manufacturing information systems, Professor Houshang Darabi’s research group is developing models and conducting experiments of engineering problems applied to re-configurable and scalable enterprise planning systems, and control of discrete event systems. The research in this area, supported by external funding, involve collaborations with several industrial partners and researchers in government laboratories.
Professor Michael Scott, who is seen adjusting the mechanism of an exercise bike, applies platform design methods to products from automobiles to exercise equipment.

Development of virtual computer models of vehicles, such as the one seen above, is one of the main research goals in the Dynamic Simulation Laboratory.

Professor Ahmed Shabana and his students are conducting research to develop virtual computer models for design, dynamic analysis and performance evaluation of complex mechanical, aerospace, and biomechanical systems that consist of interconnected rigid and flexible components. Examples of current projects sponsored by federal and private sources such as ARO, Federal Railroad Administration, Ford Motors, and Dana Corporation include simulation of multi-body railroad vehicle/track dynamics, large deformation dynamics and control with application to robot arms.

Mechatronics The research in mechatronics laboratory is focused on various aspects of motion control of mechanical systems such as electric servo motor control for robotics applications, electro-hydraulic valve control for earth moving equipment applications and piezo-electric actuator control for ultra precision machine tool applications. Some of the ongoing research projects include Control-By-Wire Electrohydraulic Control Systems and Applications in Construction Equipment Industry, Steer-By-Wire Control System for Electrohydraulic Powered Articulated Vehicles, High Bandwidth Electrohydraulic Pilot Valve Actuator, and Nanometric Accuracy Positioning Servo Mechanisms.

Intelligent Systems Modeling Deployments of industrial and military equipment systems are highly reliant on effective and efficient systems modeling and analysis technologies. Professor David He’s research group is developing several intelligent computational tools in Diagnostics and Prognostics, Condition-Based Maintenance, Statistical Quality Control, Systems Reliability Modeling and Analysis, Manufacturing, Production Planning, and Scheduling. An example of ongoing research in this area is the development of the prognostics capability in the BF Goodrich’s Integrated Mechanical Diagnostics-Health and Usage Management Systems (IMD-HUMS) that is currently being used by the U.S. Army for helicopter health monitoring.

Computational Design Professor Michael Scott’s research group is developing formal, computable models for engineering design, exploring the shifting boundary between the portion of design that can be formally computed and the part of design that must be handled intuitively. These formal decision models are significant for conceptual design and concept selection, set- and preference-based design methods, multi-resolution modeling, and mechanical design compilation. Applications include design for manufacturing, concurrent engineering, robust design, product platform design, and interdisciplinary product development. Funding is from both government and industry.

Mohamed Abd-Elaziz and Ralf Gomm, ME graduate students, working on an electrohydraulic control experiment in the Mechatronics Laboratory.

The graduate program in Industrial Engineering at UIC offers a distinctive and unique research opportunity blending traditional and emerging areas. The graduate research and teaching experience at UIC prepared me for a successful academic career.

Amarnath Banerjee, PhD, IE, 1999
Associate Professor, Department of Industrial and Systems Engineering, Texas A&M University
Energy and Environmental Technology Emphasis Area

Professors Aggarwal, Baranescu, Brezinsky, Cha, Chakrabarti, Kennedy, Mashayek, Megaridis, Minkowycz, Worek and Yarin

The researchers in this emphasis area are engaged in numerous projects addressing national challenges in the energy and environmental science area. The group is engaged in development of techniques that can help engine manufacturers provide cleaner burning diesel engines while exploring new ideas for alternative energy sources, including better use of indigenous coal resources in the country, with the goal of providing energy independence. In addition, research is being conducted on efficient use of energy through the integration of combined heat and power systems, energy conservation technologies and systems, and the development and implementation of renewable fuel sources. The research activities in this emphasis area is sponsored by various federal agencies such as the National Science Foundation (NSF), the U.S. Department of Energy (DOE), the Office of Naval Research (ONR), the National Aeronautics and Space Administration (NASA), Argonne National Laboratory (ANL), and the Gas Technology Institute (GTI).

Research Thrusts

Combustion Chemistry High temperature gas phase chemical kinetics related to combustion processes with a special emphasis on relevance to environmental impact is being studied in the High Pressure Shock Tube Laboratory of Professor Kenneth Brezinsky. For this research, his group has designed and built a very high pressure single pulse shock tube, a unique device for investigating key reactions in combustion chemistry at extreme conditions. Other environmentally related studies at less extreme conditions focus on heterogeneous catalytic reactions.

Optical Flow-Field Measurements Latest advances in laser experimentation and instrumentation are being applied to study flow, heat, and combustion phenomenon in the Opto-Mechanical Technology Laboratory of Professor Soyoung Cha. Current activities are centered around three-dimensional, three-components velocimetry including conventional particle/image velocimetry, tomographic interferometry for three-dimensional reconstruction of scholarly field properties, automated optical testing, and spectroscopy, all for gross flow-field measurements.

Large-Scale Simulation of Complex Flows Advanced computational techniques for prediction of various particle/droplet-laden turbulent flows with or without chemical reaction are being developed by Professor Farzad Mashayek’s research group. This research, sponsored by ONR and NSF, is being implemented to investigate, in particular, liquid-fuel combustors for control of combustion and design of advanced combustors based on counter-current shear concept.
Advanced Cooling Systems and Boiling Heat Transfer  With the aim of designing high-performance, thermally activated cooling systems capable of better moisture control than conventional cooling systems, Professor William Worek’s research group is investigating fundamental heat and mass transfer and sorption processes that occur in solid and liquid desiccants. In addition, experimental investigations are being conducted into fundamental flow and transport processes that occur in the combined heat and mass-transfer processes when water is absorbed by a flowing, liquid-desiccant film. Professor Worek and his group are also investigating the effect of nanoparticles in enhancing boiling heat transfer. Professor Constatine Megaridis is directing a program that investigates the use of fluid-filled nanotubes as phase change materials in coolants, with the goal to produce heat transfer fluids with extremely high cooling capacity.

Air Pollution Control and Nanoparticle Formation  Volatile organic compounds (VOC) are a class of air pollutants subject to environmental regulations due to their toxicity, carcinogenic effects and odor. The research group led by Professor Lawrence Kennedy is employing pulsed non-equilibrium atmospheric plasma to remove VOC. In this process, electrical energy is selectively directed to stimulate specific reactions rather than heating the whole gas stream as in thermal plasmas or other thermal oxidation technologies. Filtration combustion techniques are also being employed to control H₂S emissions and generate hydrogen. Professor Constatine Megaridis’ group conducts experimental investigations of the chemical transformation of incipient soot particles to carbonaceous aggregates in laminar jet diffusion flames using well-characterized gas-jet diffusion flames and thermophoretic sampling for the extraction of soot samples from precise flame locations for subsequent morphological/chemical analysis.

Multi-Phase Reacting Flows  The Flow and Combustion Simulation research group, led by Professor Suresh Aggarwal, is developing physical and CFD-based numerical models for multiphase reacting flows. These models are being employed to simulate and investigate a variety of fluid flow and combustion phenomena that are of direct relevance in propulsion, energy conversion, and nano-fluid devices. Some of the current projects include simulations of partially premixed flames burning a variety of fuels, high-pressure combustion, fuel atomization and spray phenomenon, fire suppression, syngas combustion, and novel strategies to reduce emissions.

The MIE Department has highly respected faculty members and excellent research facilities and teaching environment. Specifically for me, the ME graduate program provided in-depth knowledge and research experience in the areas of Computational Fluid Dynamics and Combustion during my PhD studies. And I still miss the great view of Lake Michigan from Lake Shore Drive in beautiful downtown Chicago.

Tae W. Park, PhD, ME, 1996
Propulsion Research Engineer, Air Force Research Laboratory, Edwards Air Force Base, California
The Department of Mechanical and Industrial Engineering operates two major research centers, the Energy Resources Center and the Manufacturing Research Center, which provide research and training experience to graduate students as well as serve the local industries and the state of Illinois.

**Energy Resources Center**  
*Director: Professor William Worek*

The Energy Resources Center (ERC), established over 35 years ago at UIC, is a fast-response team of experts with a mission to provide comprehensive technical expertise, advice, and professional assistance to Illinois’ industrial, residential, and commercial sectors. It not only meets the mandate of the University of Illinois to provide public service, but, in the process, also offers numerous educational opportunities to our graduate students for supplementing their fundamental research with real life applied engineering projects in the field.

Two examples of important ongoing initiatives at ERC include a buildings technology program under the National Center for Energy Management in Building Technologies, and the energy technology program. As part of the buildings technology program, professional engineers and graduate students assess and monitor the behaviors of mechanical systems and indoor environmental quality in homes, schools and commercial buildings under varying conditions. A state-of-the-art facility is now being built to study and evaluate filtration processes and their impact on indoor environment quality, energy conservation, and security. In the energy technology program, graduate students participate in fieldwork to determine and implement appropriate application and installation of high efficiency technologies such as Combined Heat and Power (CHP).

ERC also operates and manages the Midwest Application Center (MAC) whose primary purpose is to implement new efficient energy technology utilizing heat recovery from electric generation processes. MAC has regularly sponsored MS and PhD thesis work for students who choose cutting-edge topics in this area.

**Manufacturing Research Center**  
*Director: Professor Sabri Cetinkunt*

The Manufacturing Research Center (MRC), founded in 1988 and jointly run by two campuses of the University of Illinois (Chicago and Urbana), works on various state-of-the-art manufacturing technology–related projects involving a team of faculty and student experts drawn from various departments in the university and the member companies. The major member companies include Motorola, General Motors, Ford Motors, Caterpillar, John Deere, Ingersoll Milling, Rockford Acromatic and Sun Micro Systems. The current annual operating budget of MRC is approximately $1 million. The sponsored research projects in MRC provide numerous interdisciplinary research opportunities to graduate students in the college of engineering. The graduate students participating in the research projects often work as liaisons between the sponsor companies and the faculty researchers and find internships and full-time employment in the sponsor companies upon graduation.
Research Laboratories and Facilities

Departmental Laboratories
The MIE departmental resources for graduate research include the following 20 well-equipped, state-of-the-art laboratories, each under the direct supervision of a faculty member.

- Acoustics and Vibrations Laboratory
- Biofluids Laboratory
- Biomechanics Research Laboratory
- Computational Mechanics Laboratory
- Computational Multiphase Transport Laboratory
- Discrete Event Systems Control Laboratory
- Droplet and Particle Technology Laboratory
- Dynamic Simulation Laboratory
- Energy Systems Laboratory
- Engineering Design and Decision Laboratory
- Flow and Combustion Simulation Laboratory
- Heat and Mass Transfer Laboratory
- Industrial Virtual Reality Institute
- Intelligent Systems Modeling & Development Laboratory
- High Pressure Shock Tube Laboratory
- Mechatronics Laboratory
- MEMS Test and Characterization Laboratory
- Micro- and Nanofluidics Laboratory
- Microsystems and Devices Laboratory
- Opto-Mechanical Technology Laboratory

Nanotechnology Core Facility
The Nanotechnology Core Facility (NCF) is a comprehensive Micro/Nano fabrication facility under the UIC College of Engineering providing access to advanced equipment and tools, training, service, and process guidance on fabrication and characterization equipment to all campus researchers, as well as users from local non-profit institutions and private industries. NCF is housed in the same building as the MIE department and has cleanrooms with ratings of Class 100 and Class 1000 encompassing an area of 3000 square feet. NCF has very versatile equipment for photolithography, e-beam lithography/SEM, thin film deposition (PVD, CVD, and PECVD), wet and dry etching including RIE and DRIE for silica and silicon, surface characterization, mask generation, sample characterization, dicing, and lead attachment. In addition, CAD stations with specialized software for MEMS design and mask making are also available.

Research Resources Center
The Research Resources Center (RRC) is a division of the UIC Office of the Vice Chancellor for Research. It provides equipment, training, and a variety of research support services for campus investigators. Its research support services consist of confocal microscopy, flow cytometry, electron microscopy including scanning (SEM), transmission (TEM) microscopy, surface analysis (XPS), oxide film growth (MBE) and vibrational spectroscopy (Raman), NMR spectroscopy and micro-imaging, mass spectrometry, a DNA laboratory, a genomics facility, a protein laboratory, and a macromolecular structure facility. In addition, RRC provides technical support in the form of a scientific electronics shop, scientific instrument shop, scientific computing support and a storeroom operation.
Faculty

Our award-winning faculty includes:

- Two members of the National Academy of Engineering
- Two Chaired Professorships
- Twelve Fellows of Professional Societies
- Two University Scholars
- Four University Teaching Excellence Awardees
- Four Editors of International Journals
- Three NSF CAREER Awardees and one ONR Young Investigator
- Many Professional Society Awardees

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Flow and Combustion Laboratory

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Research: Multibody dynamics, Spine mechanics, Biomechanics of human joints, Smart implants.
Biomechanics Research Laboratory

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Industrial Virtual Reality Institute

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High Pressure Shock Tube Laboratory

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Research: Mechatronics, Automatic control, Robotics, Automation, CAD/CAM.
Mechatronics Laboratory

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Research: Fluid structure interaction, Hydrodynamics, Floating body dynamics.

Soyoung S. Cha
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Research: Laser experimentation and instrumentation for fluid flow, Heat/mass transfer.
Opto-Mechanical Technology Laboratory

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Discrete Event Systems Control Laboratory

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Energy Systems Laboratory

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Research: Characterization of thin films and MEMS, Integration of nanostructures and MEMS.
MEMS Test and Characterization Laboratory

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Computational Mechanics Laboratory
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Research: Failure and reliability analysis of manufacturing systems.  
Intelligent Systems Modeling and Development Laboratory

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Biofluids Laboratory

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Research: Turbulence, Combustion, Plasma, Two-phase flow, Free-surface flow, and CFD.  
Computational Multiphase Transport Laboratory

Constantine M. Megaridis  
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Droplet and Particle Technology Laboratory

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James P. Hartnett Professor; PhD, University of Minnesota, 1965  
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Computational Multiphase Transport Laboratory

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Acoustics and Vibrations Laboratory

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Research: MEMS, BioMEMS, Microfluidics, Biomimetics, Micro/Nano manipulation.  
Microsystems and Devices Laboratory

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Research: Design theory and optimization, Interdisciplinary product design and development, Rehabilitative and assistive technologies.  
Engineering Design and Decision Laboratory

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Dynamic Simulation Laboratory

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Living in Chicago

Chicago, known worldwide as the Windy City, is located in Illinois along the western shores of Lake Michigan with a famous skyline and a fabulous lakefront adjacent to a vibrant downtown. Chicago is the third largest city in the nation and is renowned for its cultural and ethnic diversity.

The University of Illinois at Chicago is the largest institution of higher learning in Chicago. The campus is located in the heart of the city. Within a few miles of the campus, there are numerous options for world-renowned shopping, dining, museums, architecture, art galleries and exhibits, theater, music, and a wide range of outdoor and sporting activities.

The greater Chicago area is also the home to many small and large-scale industries such as Boeing, Motorola, Northrop Grumman, and Abbott Laboratories, as well as the Argonne National Laboratory and the Fermi National Accelerator Laboratory. The Mechanical and Industrial Engineering Department’s relationships with these companies and institutions present numerous opportunities for internships and full-time employment to our graduate students.