

Industrial, Systems and Manufacturing Engineering

The department of industrial, systems and manufacturing engineering (ISME) at WSU is committed to instruction and research in design, analysis and operation of manufacturing and other integrated systems of people, material, equipment and capital. The ISME department prepares students to be life-long learners and global citizens with successful careers in design, research, improvement and management of systems in manufacturing and service organizations. The graduate programs are directed toward both full-time and part-time students with a special emphasis on providing training and experience in performing independent research on topics with theoretical as well as applied interest. Students are encouraged to conduct research or take courses on topics that overlap several disciplines.

The ISME department offers three graduate degree programs and five certificate programs. The ISME department offers Master of Engineering Management (MEM), Master of Science and Doctor of Philosophy degree programs in industrial engineering (MSIE and PhDIE, respectively). The concentrations in the ISME graduate programs are data analytics, operations research and systems engineering, production and supply chain analytics, quality and reliability, manufacturing engineering and automation, and human systems engineering.

The ISME department has certificate programs in additive manufacturing, foundations of six sigma and quality improvement, lean systems, systems engineering and management, and supply chain management (offered jointly with the W. Frank Barton School of Business).

Facilities

The following facilities used in teaching and research are available for graduate students:

Collaborative Robotics Lab

Focuses on fundamental research and training in the areas of collaborative robotics, automation, smart manufacturing, Industry 4.0, artificial intelligence, machine vision and control systems. The lab capabilities include programming and simulation of industrial robots and PLCs, sensor integration, signal processing and data acquisition. The lab owns state-of-the-art industrial equipment including a UR10e collaborative robot, a SICK Ranger-E 3D vision camera, Siemens S7-1200 PLCs, Siemens IoT 2040 gateway devices, and materials handling end effectors.

Manufacturing Laboratory

Supports all courses offered in the areas of manufacturing engineering, tool design, advanced and nontraditional machining, composite machining, and computer-aided manufacturing. The lab is also used by other departments.

Reliability and Maintenance Engineering Laboratory

Provides students with hands-on experiences in modeling accelerated life testing and degradation testing, optimal design of testing plans, robust reliability design, system reliability optimization, condition-based maintenance and engineering risk assessment. To carry out these teaching-related activities, the lab hosts accelerated life/degradation testing equipment and several test beds for CBM.

Human Performance and Design Laboratory

Supports teaching and research in fields related to industrial ergonomics.

Advanced Manufacturing Process Lab

Focuses on research in machining, sheet metal forming, and supports manufacturing engineering courses.

Laboratory for Sustainable Engineered Systems

Promotes the advancement of knowledge, understanding and education of environmentally sustainable engineered systems in health care and the environment, life cycle analysis, green manufacturing and production systems. The lab conducts research in energy efficiency, health care and the environment, life cycle analysis, green manufacturing and sustainability.

Health Systems Engineering Laboratory

Provides resources and expertise for the design, analysis and improvement of health care systems, and supports teaching and research in health care analytics, operations, quality and risk management, and medical decision making.

Curriculum and Research Concentrations

The teaching and research concentrations in ISME are clustered around the following six areas.

Operations Research: modeling and analysis of complex systems in manufacturing and service systems, optimization theory and methods, multi-criteria decision making and stochastic systems.

Systems: management of engineering enterprises, design and analysis of complex systems, decision analysis, application of intelligent systems and simulation in manufacturing, activity-based costing and project management.

Production and Supply Chain Analytics: design and control of manufacturing systems, facilities planning, supply chain management, scheduling and analytics applications.

Quality and Reliability: design of experiments, Total quality management, quality control, prognostics, risk management, data driven analysis and big data.

Manufacturing Engineering: manufacturing processes, CAD/CAM/ CIM systems, measurement/inspection, GD&T, forming, composites manufacturing, and free form surfaces manufacturing.

Human Systems Engineering: emphases include industrial ergonomics, biomechanics, human-machine systems, occupational safety and other industrial hygiene issues, and ergonomics and human factors issues in aviation/space systems.

Master of Science in Industrial Engineering

The Master of Science in industrial engineering (MSIE) degree enhances the skills of degreed engineers by providing advanced knowledge and skills that are needed to design, model, analyze and manage modern complex systems in order to increase the effectiveness of manufacturing and service sector organizations. Students have opportunities to enhance their knowledge on technical skills such as optimization, production planning, quality, supply chain management, simulation, analytics, reliability, ergonomics, systems engineering, manufacturing engineering, and also on nontechnical skills required for success in their careers. Recent graduates have obtained positions in manufacturing, services and consulting companies.

Master of Engineering Management

The Master in Engineering Management (MEM) program educates engineering, science and business graduates in the skills and knowledge to increase the effectiveness of manufacturing and service sector organizations in planning, decision making and complex problem solving to increase the effectiveness of manufacturing and service

sector organizations. Students should consider the MEM program if they find that they need to use (or develop) skills in decision making and management of teams, projects and organizations. The MEM program is structured for practicing technical professionals. Engineering management is for professionals who are interested in becoming managers while remaining engineers.

Doctor of Philosophy

The PhD in industrial engineering (PhDIE) program trains engineers to perform independent research and educates in advanced knowledge in the concentrations offered by the ISME program. Recent graduates have obtained positions in academic institutions, manufacturing, services and consulting companies.

Certificate Programs

The ISME department offers graduate certificate programs in additive manufacturing, supply chain analytics, supply chain management, foundations of six sigma and quality improvement, lean systems, and systems engineering and management. Students seeking any of these certificates must be admitted to the Graduate School:

1. In one of the degree programs offered by the department, or
2. In nondegree, Category A status.

All Graduate School policies relative to admissions apply. International students will not be issued an I-20 for pursuing a certificate program only. They may obtain a certificate only while concurrently pursuing a graduate degree.

Students pursuing a graduate certificate must notify the program coordinator (in a written memo) that they wish to complete the certificate. This notification must occur before half of the required credit hours are completed. Via the submitted plan of study, requests to complete the certificate are reviewed by the program faculty and the dean of the Graduate School.

Students may apply certificate coursework toward a degree program. An overall graduate grade point average of at least 3.000 must be maintained for all courses comprising the certificate program with no grades below C.

Programs in Industrial, Systems and Manufacturing Engineering

- PhD in Industrial Engineering (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/industrial-engineering-phd/>)
- MEM - Master of Engineering Management (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/master-engineering-management-mem/>)
- MS in Industrial Engineering (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/industrial-engineering-ms/>)
- Dual/Accelerated Bachelor's to Master's in Industrial Engineering (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/dualaccelerated-bs-ms-industrial-engineering/>)
- Dual/Accelerated Bachelor's to Master's in Engineering Management (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/dualaccelerated-bachelors-masters-engineering-management/>)

Certificates in Industrial, Systems and Manufacturing Engineering

- Certificate in Additive Manufacturing (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/certificate-additive-manufacturing/>)
- Certificate in Foundations of Six Sigma and Quality Improvement (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/foundations-six-sigma-quality-improvement-certificate/>)
- Certificate in Lean Systems (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/lean-systems-certificate/>)
- Certificate in Supply Chain Analytics (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/certificate-supply-chain-analytics/>)
- Certificate in Supply Chain Management (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/certificate-supply-chain-management/>)
- Certificate in Systems Engineering and Management (<http://catalog.wichita.edu/graduate/engineering/industrial-manufacturing-engineering/system-engineering-management-certificate/>)

Courses in Industrial and Manufacturing Engineering

- Industrial and Manufacturing Engineering (IME) (<http://catalog.wichita.edu/graduate/courses/ime/>)

Note: For all graduate programs in ISME, some IME courses may require programming skills as a prerequisite, and some IME courses may require Linear Algebra or Calculus III as a prerequisite.