Ph.D. in Industrial & Management Systems Engineering

The Doctor of Philosophy in Engineering degree is offered through the Norm Asbjornson College of Engineering. The most current information on requirements for the degree can be found on the Graduate School website (http://catalog.montana.edu/graduate/engineering/mechanical-industrial-engineering/phd-industrial-and-management-systems-engineering/ www.coe.montana.edu/graduate_programs.html). Candidates will be admitted to both the Norm Asbjornson College of Engineering and The Graduate School under one of seven options: This Ph.D. option in Industrial & Management Systems Engineering (EIMS) equips students from all backgrounds with advanced skills and tools from engineering and social science to analyze, design and manage complex human-centered systems that promote social justice. This degree is accomplished with a dissertation.

Program Learning Outcomes

- Design inclusive systems that support user needs, respect community culture, and protect the environment. ;
- Develop manage systems to support user needs, respect community culture, and protect the environment. ;
- Analyze and model relevant data to inform design decisions and evaluate management effectiveness.

Grounded in engineering and the social sciences, our graduate program in Industrial and Management Systems Engineering (IMSE) equips students with traditional and contemporary skills to design, manage, and analyze complex human-centered systems. Graduate students pursue advanced technical topics to design, analyze and manage systems that can improve the effectiveness and efficiency of businesses, non-profit organizations, and governments. Since all these systems involve humans and impact the social and physical environment, these systems are most successful when they combine technical solutions with social responsibility, defined as transparent and ethical behavior that contributes to sustainable development, ensures health and welfare of society, incorporates stakeholder expectations, complies with international laws and norms, and is integrated across all systems that impact society and the environment. Thus, the vision of the program is to integrate technical depth with social awareness from a multidisciplinary (i.e., systems) point of view.

Industrial and Management Systems Engineering

All students earning a doctoral degree from MSU must complete a minimum of sixty (60) credit hours post-baccalaureate, of which eighteen (18) to twenty-eight (28) must be dissertation credits. The satisfactory completion of certain courses is stipulated by the department. In this case, Ph.D. students must complete all core courses in the IMSE graduate program specified for the Master of Science, and are recommended to choose from the listed elective courses.

Only those courses listed on an approved Graduate Program of Study (http://www.montana.edu/gradschool/policy/degreq_doctoral.html#doc_pos) are applicable toward graduate degree credit requirements.

A maximum of thirty (30) credits from a previously earned master's degree (from MSU or another accredited University) may be applied toward the sixty (60) credit minimum required for the doctoral degree, subject to approval by the student's graduate committee. Students who have previously earned a master's degree must take at least twelve (12) additional coursework credits beyond the master's degree and eighteen (18) to twenty-eight (28) dissertation (690) credits. A minimum of thirty (30) credits must be taken from MSU.

The requirements for the IMSE Option of the Ph.D. in Engineering degree are summarized below:

ENGR 610	Introduction to Doctoral Studies	3
ENGR 694	Seminar	2
EIND 500	Engineering Organizational Change and Innovation	3
EIND 574	Management Engineering Systems	3
EIND 510	Usability and Inclusive Design	3
EIND 511	Advanced Human Factors	3
EIND 554	DOE for Engineers	3
EIND 557	Regression & Multivar Analysis	3
Elective Courses		as needed
EIND 690	Doctoral Thesis	18 Minimum
TOTAL CREDITS		60 Minimum

EIND 490, EIND 492, EIND 499, EIND 575 and EIND 590 cannot be used towards the Ph.D. course requirements. EIND 592 may be counted as an EIND 4xx-level course.

Qualifying Examination: The exam will be administered on the second Tuesday in February of the Spring semester. Students will be examined on the following three Industrial Engineering topics: engineering probability & statistics (e.g. EIND 354 (http://catalog.montana.edu/search/?P=EIND%20354)), work design & analysis (e.g. EIND 313 (http://catalog.montana.edu/search/?P=EIND%20313)), and engineering economy (e.g. EGEN 325 (http://catalog.montana.edu/search/?P=EGEN%20325)). Additionally, students will choose from one of the following Industrial Engineering topics: principles of operations research (e.g. EIND 364 (http://catalog.montana.edu/search/?P=EIND%20364)), ergonomics and human factors engineering (e.g. EIND 413 (http://catalog.montana.edu/search/?P=EIND%20413)), or engineering management & ethics (EIND 300 (http://catalog.montana.edu/search/?P=EIND%20300)). The exam will be 5 hours duration in an open book, open notes format. Each problem set will be graded by the faculty member who most recently taught the course. The results will be analyzed by the Industrial Engineering Ph.D. Option Coordinator, and each candidate will receive a grade of Pass (P), Fail (F) or Remediate (R). Students will not be given the test back in order to protect the questions from dissemination. In cases where remediation in certain topic areas is required, the Ph.D. advisor will develop a problem-solving-based plan with the Ph.D. candidate to prepare for a retest on the identified topic areas. The retest must occur prior to the next fall semester and will be overseen by the Ph.D. Advisor.

Comprehensive Examination: The public research seminar will include 40 minutes for the student's presentation and 10 minutes for questions from the audience. This will be followed immediately by a closed-session oral examination of 45-90 minutes by the student's Ph.D. committee and additional remediation may be required at this point.