Industrial and Management Systems Engineering

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.

The Master of Science degree in Industrial and Management Systems Engineering degree may be accomplished under the thesis option or professional option. Under either option, a program of study is arranged for each student according to their particular goal.

Admission

The minimum requirement for admission is a Bachelor of Science degree and evidence of an ability to maintain a minimum 3.0 grade point average while pursuing a graduate degree. Applicants without a degree in Industrial Engineering (or similar) are eligible to apply, but may be required to make up subject matter deficiencies upon admission. For complete information, refer to the Admission Policies and Application Requirements sections in the department website. Successful applicants are accepted into both the department and The Graduate School.

Below are the GRE and TOEFL scores the graduate committee uses as guidelines in admissions decisions. The committee will consider lower scores with other excellent qualifications, but these higher scores indicate a better chance of success in this program.

- GRE average scores: GRE-V = 149, GRE-Q = 155, GRE-A = 3.7
- GRE preferred scores: GRE-V = 152, GRE-Q = 156, GRE-A = >3.8
- TOEFL average score: 84
- TOEFL preferred score: 99
- IELTS minimum score: 6.5

Degree Requirements

Students complete the M.S. degree in Industrial and Management Systems Engineering under the thesis option (Plan A) or professional option (Plan B). Plan A requires a research experience culminating in a master’s thesis. Students following Plan B choose additional coursework and a graduate project or internship in lieu of completing a thesis. Plan B students complete the graduate project or internship under the supervision of a professor, culminating in a written report and oral presentation. All candidates for the M.S. degree must pass an oral comprehensive examination near the completion of their graduate program. Specific requirements for each plan are outlined below.

Accelerated M.S. Plan

The Accelerated Master of Science degree program is designed to allow qualified Industrial & Management Systems Engineering (IMSE) students and Financial Engineering (EFIN) students (EFIN students must also complete the Engineering Management Minor) to complete the IMSE Master of Science degree requirements by extending their period of study one additional year past the traditional four-year period of undergraduate study.

The IMSE Accelerated Masters program can be completed by integrating both graduate and undergraduate course requirements in the final two years of the combined period of study. Per the Board of Regents approval, this integration allows up to 12 credits to be reserved towards the M.S. while the student is still an undergraduate and it allows up to six credits of 400-level IMSE courses to satisfy credit requirements of both the B.S. undergraduate degree and the M.S. graduate degree.

The B.S. and B.S. with minor degree requirements must be completed before completion of the M.S. degree. A student who enters the program, but does not complete it in accordance with the simultaneous enrollment policies of the Graduate School will default to the standard M.S. degree program and loses the ability to count EIND 400 level courses taken as an undergraduate towards any future graduate degree at MSU.

Plan A - Thesis Option

Students chose a focus area of Inclusive Design, Management Systems or Data Analytics; and a thesis topic consistent with that focus area. Then, students complete a minimum 31 credits in the chosen focus area (12 credits from core course list + 10 credits of thesis + 9 credits from elective course list).

NOTE: EIND 490, EIND 492, EIND 499, EIND 575, and EIND 598 cannot be used towards Plan A course requirements. The final graduate plan of study must comply with Graduate School Policy (http://www.montana.edu/gradschool/policy/degreq_general.html) including the requirement that the number of 5xx-level course credits must be equal to two-thirds (2/3) of the total graded coursework, including Thesis Research credits (590 (http://catalog.montana.edu/search/?P=EIND+590)).

FOCUS AREA: INCLUSIVE DESIGN

Core Courses: (22 credits)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIND 510</td>
<td>Usability and Inclusive Design</td>
<td>3</td>
</tr>
<tr>
<td>EIND 511</td>
<td>Advanced Human Factors</td>
<td>3</td>
</tr>
<tr>
<td>EIND 500</td>
<td>Engineering Organizational Change and Innovation</td>
<td>3</td>
</tr>
<tr>
<td>or EIND 574</td>
<td>Management Engineering Systems</td>
<td></td>
</tr>
<tr>
<td>EIND 554</td>
<td>DOE for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>or EIND 557</td>
<td>Regression &amp; Multivar Analysis</td>
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<tr>
<td>EIND 590</td>
<td>Master’s Thesis</td>
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Elective Courses: (9 credits)

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>EIND 410</td>
<td>Interaction Design</td>
<td>3</td>
</tr>
<tr>
<td>&amp; EIND 411</td>
<td>and Interaction Design Project</td>
<td></td>
</tr>
<tr>
<td>EIND 413</td>
<td>Ergonomics &amp; Human Factors Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EIND 513</td>
<td>Human Factors in Complex Systems</td>
<td>3</td>
</tr>
<tr>
<td>EIND 592</td>
<td>Independent Study</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 461</td>
<td>Indust &amp; Organic Psych</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 477</td>
<td>Science of Psych Well-Being</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 562</td>
<td>Psychology of Prejudice, Stereotypes, Discrimination and Stigma</td>
<td>3</td>
</tr>
<tr>
<td>CHTH 503</td>
<td>Community-Based Participatory Research: Research, Practice, and Policy</td>
<td>3</td>
</tr>
<tr>
<td>NRS 610</td>
<td>Health Care Informatics</td>
<td>3</td>
</tr>
</tbody>
</table>
FOCUS AREA: MANAGEMENT SYSTEMS

Core Courses: (22 credits)
- EIND 500 Engineering Organizational Change and Innovation
- EIND 574 Management Engineering Systems
- EIND 510 Usability and Inclusive Design
- or EIND 511 Advanced Human Factors
- EIND 554 DOE for Engineers
  - or EIND 557 Regression & Multivar Analysis
- EIND 590 Master’s Thesis

Elective Courses: (9 credits)
- EIND 434 Project Management for Engineers
- EIND 458 Production & Engineering Mgmt
- EIND 477 Quality Management Systems
- EIND 506 Healthcare Delivery Systems
- EIND 525 Multi-Attribute Analysis
- EIND 592 Independent Study
- BMGT 464 International Management
- BMGT 466 Team and Process Facilitation
- NRSM 421 Holistic Thought/Mgmt
- PSCI 520 Government Leadership & Ethics
- PSCI 525 Non-Profit Management
- PSCI 530 Tools of Public Administration
- PSCI 554 Foundations of Public Administration
- PSCI 558 Public Organization Dynamics
- CTHH 503 Community-Based Participatory Research: Research, Practice, and Policy
- NRSN 610 Health Care Informatics

FOCUS AREA: INCLUSIVE DESIGN

Core Courses: (18 credits)
- EIND 510 Usability and Inclusive Design
- EIND 511 Advanced Human Factors
- EIND 500 Engineering Organizational Change and Innovation
- or EIND 574 Management Engineering Systems
- EIND 554 DOE for Engineers
  - or EIND 557 Regression & Multivar Analysis
- EIND 575 Research or Prof Paper/Project
  - or EIND 598 Internship

Elective Courses: (15 credits)
- EIND 410 Interaction Design
  - & EIND 411 and Interaction Design Project
- EIND 413 Ergonomics & Human Factors Engineering
- EIND 513 Human Factors in Complex Systems
- EIND 592 Independent Study
- PSYX 461 Indus & Organiz Psych
- PSYX 477 Science of Psych Well-Being
- PSYX 562 Psychology of Prejudice, Stereotypes, Discrimination and Stigma
- CTHH 503 Community-Based Participatory Research: Research, Practice, and Policy
- NRSN 610 Health Care Informatics

FOCUS AREA: DATA ANALYTICS

Core Courses: (22 credits)
- EIND 554 DOE for Engineers
- EIND 557 Regression & Multivar Analysis
- EIND 500 Engineering Organizational Change and Innovation
  - or EIND 574 Management Engineering Systems
- EIND 510 Usability and Inclusive Design
  - or EIND 511 Advanced Human Factors
- EIND 590 Master’s Thesis

Elective Courses: (9 credits)
- EIND 422 Introduction to Simulation
- EIND 464 Prin of Operations Research II
- EIND 468 Managerial Forecasting & Decision Analysis
  - or EIND 558 Manage Forecast & Dec Analysis
- EIND 509 Systems Simulation
- EIND 592 Independent Study
- BMGT 405 Supply Chain Analytics
- STAT 421 Probability Theory
- STAT 431 Nonparametric Statistics
- STAT 439 Introduction to Categorical Data Analysis

Plan B - Professional Option

Students chose a focus area of Inclusive Design, Management Systems or Data Analytics. They then complete a minimum of 33 credits in the chosen focus area (18 credits from core course list + 15 credits from elective course list). Students must complete 6 credits of either a project or internship, but not both.

NOTE: EIND 490, EIND 492 and EIND 499 cannot be used towards Plan B course requirements. The final graduate plan of study must comply with Graduate School Policy (http://www.montana.edu/gradschool/policy/ degreq_general.html) including the requirement that the number of 5xx-level course credits must be equal to two-thirds (2/3) of the total graded coursework.

FOCUS AREA: MANAGEMENT SYSTEMS

Core Courses: (18 credits)
- EIND 500 Engineering Organizational Change and Innovation
- EIND 574 Management Engineering Systems
- EIND 510 Usability and Inclusive Design
  - or EIND 511 Advanced Human Factors
- EIND 554 DOE for Engineers
  - or EIND 557 Regression & Multivar Analysis
- EIND 575 Research or Prof Paper/Project
  - or EIND 598 Internship

Elective Courses: (15 credits)
- EIND 554 DOE for Engineers
- EIND 557 Regression & Multivar Analysis
- EIND 575 Research or Prof Paper/Project
- EIND 598 Internship

FOCUS AREA: INCLUSIVE DESIGN

Core Courses: (18 credits)
- EIND 510 Usability and Inclusive Design
- EIND 511 Advanced Human Factors
- EIND 500 Engineering Organizational Change and Innovation
  - or EIND 574 Management Engineering Systems
- EIND 554 DOE for Engineers
  - or EIND 557 Regression & Multivar Analysis
- EIND 575 Research or Prof Paper/Project
  - or EIND 598 Internship

Elective Courses: (15 credits)
- EIND 554 DOE for Engineers
- EIND 557 Regression & Multivar Analysis
- EIND 575 Research or Prof Paper/Project
- EIND 598 Internship

FOCUS AREA: DATA ANALYTICS

Core Courses: (22 credits)
- EIND 554 DOE for Engineers
- EIND 557 Regression & Multivar Analysis
- EIND 500 Engineering Organizational Change and Innovation
  - or EIND 574 Management Engineering Systems
- EIND 510 Usability and Inclusive Design
  - or EIND 511 Advanced Human Factors
- EIND 590 Master’s Thesis

Elective Courses: (9 credits)
- EIND 422 Introduction to Simulation
- EIND 464 Prin of Operations Research II
- EIND 468 Managerial Forecasting & Decision Analysis
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CHTH 503 Community-Based Participatory Research: Research, Practice, and Policy
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### Industrial and Management Systems Engineering

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<td>BMGT 406</td>
<td>Negotiation/Dispute Resolution</td>
<td>3</td>
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<tr>
<td>BMGT 410</td>
<td>Sustainable Business Practices</td>
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**Core Courses:** (18 credits)

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