INDUSTRIAL ENGINEERING AND MANAGEMENT SCIENCES PHD

Degree Requirements
The following requirements are in addition to, or further elaborate upon, those requirements outlined in The Graduate School Policy Guide (https://catalogs.northwestern.edu/tgs/academic-policies-procedures).

Master's
Those students enrolled in the IEMS PhD program receive the MS as they progress toward the PhD. For students who are progressing to the PhD, the master's degree is generally awarded upon completion of the following:

Total Units Required: 12

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>IEMS 401-0</td>
<td>Applied Mathematical Statistics</td>
</tr>
<tr>
<td>IEMS 435-0</td>
<td>Stochastic Simulation</td>
</tr>
<tr>
<td>IEMS 450-1</td>
<td>Mathematical Optimization I</td>
</tr>
<tr>
<td>IEMS 450-2</td>
<td>Mathematical Optimization II</td>
</tr>
<tr>
<td>IEMS 460-1</td>
<td>Stochastic Processes I</td>
</tr>
<tr>
<td>OPNS 516-0</td>
<td>Stochastic Foundations</td>
</tr>
<tr>
<td><strong>Electives (6)</strong></td>
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Other MS Degree Requirements
- Examination on a research paper at end of first year

PhD
Total Units Required: 17

<table>
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<tr>
<td>IEMS 401-0</td>
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<tr>
<td>OPNS 516-0</td>
<td>Stochastic Foundations</td>
</tr>
<tr>
<td><strong>Other Required Courses</strong></td>
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<tr>
<td>IEMS 481-0</td>
<td>Logistics</td>
</tr>
<tr>
<td>IEMS 482-0</td>
<td>Operations</td>
</tr>
<tr>
<td><strong>Program of Coursework</strong></td>
<td></td>
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<tr>
<td>Courses in major area (at least four)</td>
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<tr>
<td>Courses in two minor areas (two each)</td>
<td></td>
</tr>
<tr>
<td>IEMS 4xx Elective Course</td>
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</tbody>
</table>

Other PhD Degree Requirements
- Examinations: candidacy examination on a research paper at end of first year
- Prospectus: Initial part of dissertation research, to be completed by the end of the third year in the program.
- PhD Dissertation: based on independent research
- Final Evaluations: oral defense of dissertation

- Other: at least one experience as an instructor or teaching assistant; satisfy TGS English proficiency requirement