MANAGEMENT SCIENCE AND ENGINEERING UNDERGRADUATE MAJOR

COVID-19-Related Degree Requirement Changes

For information on how Management Science and Engineering degree requirements have been affected by the pandemic, see the "COVID-19 Policies tab" (http://exploredegrees.stanford.edu/schoolofengineering/managementscienceandengineering/#covid19policies) in this section of this bulletin. For University-wide policy changes related to the pandemic, see the "COVID-19 and Academic Continuity" (http://exploredegrees.stanford.edu/covid-19-policy-changes) section of this bulletin.

See the "Department of Management Science and Engineering" (http://exploredegrees.stanford.edu/schoolofengineering/managementscienceandengineering) section of this bulletin for additional information on the department, and its programs and faculty.

The department offers a B.S. as well as a minor in Management Science and Engineering.

Management Science and Engineering (MS&E)

Completion of the undergraduate program in Management Science and Engineering leads to the conferral of the Bachelor of Science in Management Science and Engineering.

**Requirements**

<table>
<thead>
<tr>
<th>Mathematics and Science</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math, Science, or Statistics Elective from SoE approved lists.</td>
<td>3</td>
</tr>
<tr>
<td>Technology in Society</td>
<td>3</td>
</tr>
<tr>
<td>Math, Science, or Statistics Elective from SoE approved lists.</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Core Courses (all six required)</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 106B Programming Abstractions</td>
<td>3</td>
</tr>
<tr>
<td>ECON 50 Economic Analysis</td>
<td>1</td>
</tr>
<tr>
<td>MS&amp;E 108 Senior Project (WIM)</td>
<td>1</td>
</tr>
<tr>
<td>MS&amp;E 111 Introduction to Optimization</td>
<td>1</td>
</tr>
<tr>
<td>MS&amp;E 140 Accounting for Managers and Entrepreneurs</td>
<td>1</td>
</tr>
<tr>
<td>MS&amp;E 180 Organizations: Theory and Management</td>
<td>1</td>
</tr>
</tbody>
</table>

Area Courses (see below) | 24 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose four courses from a primary area and two courses from each of the other two areas.</td>
<td></td>
</tr>
</tbody>
</table>

**Depth Areas**

**Finance and Decision Area**

Students choosing F&D as their primary area must take at least two of ECON 51, MS&E 145 (or 245A), and MS&E 152 (or 252).

<table>
<thead>
<tr>
<th>Introductory (no prerequisites)</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>ECON 143 Finance and Society for non-MBAs</td>
<td>1</td>
</tr>
</tbody>
</table>

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Management Science and Engineering Undergraduate Major

The following courses are required to fulfill the major requirements:

- **Background requirements (two courses; letter-graded or CR/NC)**
  - CME 100 or MATH 51: Vector Calculus for Engineers
  - CS 106A: Programming Methodology

- **Minor requirements (seven courses; all letter-graded)**
  - CS 106B: Introduction to Optimization
  - CS 106C: Introduction to Optimization (Accelerated)
  - MS&E 120: Probabilistic Analysis
  - MS&E 121: Introduction to Stochastic Modeling
  - MS&E 125: Introduction to Applied Statistics
  - MS&E 180: Organizations: Theory and Management

- **Electives (select any two 100- or 200-level MS&E courses)**

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (http://ughb.stanford.edu).

### COVID-19-Related Degree Requirement Changes

For information on how Management Science and Engineering degree requirements have been affected by the pandemic, see the "COVID-19 Policies tab" in this section of this bulletin. For University-wide policy changes related to the pandemic, see the "COVID-19 and Academic Continuity" section of this bulletin.

### Management Science and Engineering (MS&E) Minor

The following courses are required to fulfill the minor requirements:

- **Background requirements (two courses; letter-graded or CR/NC)**
  - CME 100 or MATH 51: Vector Calculus for Engineers
  - CS 106A: Programming Methodology

- **Minor requirements (seven courses; all letter-graded)**
  - MS&E 111 or MS&E 111X: Introduction to Optimization
  - MS&E 120: Probabilistic Analysis
  - MS&E 121: Introduction to Stochastic Modeling
  - MS&E 125: Introduction to Applied Statistics
  - MS&E 180: Organizations: Theory and Management

- **Electives (select any two 100- or 200-level MS&E courses)**

In addition to the required background and minor courses, it is recommended that students also take the following courses:

- MS&E 152: Introduction to Decision Analysis
- MS&E 145: Introduction to Finance and Investment
- MS&E 146: Corporate Financial Management
- MS&E 252: Decision Analysis I: Foundations of Decision Analysis

**Advanced (intended primarily for graduate students, but may be taken by advanced undergraduates)**

- MS&E 245A: Investment Science
- MS&E 245B: Advanced Investment Science
- MS&E 246: Financial Risk Analytics
- MS&E 250A: Engineering Risk Analysis
- MS&E 250B: Project Course in Engineering Risk Analysis

**Operations and Analytics Area**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS&amp;E 184</td>
<td>Global Work</td>
<td>6</td>
</tr>
<tr>
<td>MS&amp;E 188</td>
<td>Organizing for Good</td>
<td>6</td>
</tr>
<tr>
<td>MS&amp;E 243</td>
<td>Energy and Environmental Policy Analysis</td>
<td>6</td>
</tr>
<tr>
<td>MS&amp;E 292</td>
<td>Health Policy Modeling</td>
<td>6</td>
</tr>
</tbody>
</table>

1. Students without AP/IB mathematics credit, who skip MATH 19, 20, 21, 41, and/or 42, may petition to waive up to 10 units of math.
2. AP/IB credit for Chemistry and Physics may be used.
3. Electives must come from the School of Engineering approved list or PSYCH 50 Introduction to Cognitive Neuroscience, and may not repeat material from any other requirement. AP/IB credit for Chemistry and Physics may be used if not used above.
5. Students may petition to waive CS 106A Programming Methodology.
6. A course may only be counted towards one requirement; it may not be double-counted. For example, MS&E 193 may not count towards both TiS and towards the OTP depth area, and MS&E 111/ENGR 62 may not count towards both an engineering fundamental and towards the MS&E core depth.

All courses taken for the major must be taken for a letter grade. Students may petition to waive up to 10 units of math. Students without AP/IB mathematics credit, who skip MATH 19, 20, 21, 41, and/or 42, may petition to waive up to 10 units of math. AP/IB credit for Chemistry and Physics may be used.

For information on how Management Science and Engineering degree requirements have been affected by the pandemic, see the "COVID-19 Policies tab" in this section of this bulletin. For University-wide policy changes related to the pandemic, see the "COVID-19 and Academic Continuity" section of this bulletin.

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  - CS 106A: Programming Methodology

- **Minor requirements (seven courses; all letter-graded)**
  - CS 106B: Introduction to Optimization
  - CS 106C: Introduction to Optimization (Accelerated)
  - MS&E 120: Probabilistic Analysis
  - MS&E 121: Introduction to Stochastic Modeling
  - MS&E 125: Introduction to Applied Statistics
  - MS&E 180: Organizations: Theory and Management

- **Electives (select any two 100- or 200-level MS&E courses)**

In addition to the required background and minor courses, it is recommended that students also take the following courses:

- MS&E 152: Introduction to Decision Analysis
- MS&E 145: Introduction to Finance and Investment
- MS&E 146: Corporate Financial Management
- MS&E 252: Decision Analysis I: Foundations of Decision Analysis

**Advanced (intended primarily for graduate students, but may be taken by advanced undergraduates)**

- MS&E 245A: Investment Science
- MS&E 245B: Advanced Investment Science
- MS&E 246: Financial Risk Analytics
- MS&E 250A: Engineering Risk Analysis
- MS&E 250B: Project Course in Engineering Risk Analysis

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All courses taken for the major must be taken for a letter grade. Minimum combined GPA for all courses in Engineering Topics (Engineering Fundamentals and Depth courses) is 2.0.

For additional information and sample programs see the Handbook for Undergraduate Engineering Programs (UGHB) (http://ughb.stanford.edu).
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 50</td>
<td>Economic Analysis I</td>
<td>5</td>
</tr>
<tr>
<td>MS&amp;E 140</td>
<td>Accounting for Managers and Entrepreneurs (may be used as one of the required electives above)</td>
<td>3-4</td>
</tr>
</tbody>
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1 Students completing a calculus-based probability course such as CS 109 or STATS 116 for their major, may substitute another MS&E course for MS&E 120.