## Mechanical Engineering

Accredited by the Engineering Accreditation Commission of ABET, www.abet.org

1. **University Requirements:** (23-24)
   - Writing, Rhetoric and American Cultures (WRA) 4
   - Integrative Studies in Humanities (IAH) 8
   - IAH 201-210 and IAH 211 or > 8
   - Integrative Studies in Social Sciences (ISS) 8
   - ISS 2XX and ISS 3XX
   - Bioscience (one of the following):
     - BS 161, ENT 205, IBIO 150, MMG 141, MMG 201, PLB 105, PSL 250 3-4

2. **College Requirements:** (32)
   - *CEM 141 General Chemistry* 4
   - *CSE 231 Introduction to Programming I* 4
   - *EGR 100 Introduction to Engineering Design* 2
   - *MTH 132 Calculus I* 3
   - *MTH 133 Calculus II* 4
   - *MTH 234 Multivariable Calculus* 4
   - *MTH 235 Differential Equations* 3
   - *PHY 183 Physics for Scientists & Engineers I* 4
   - *PHY 184 Physics for Scientists & Engineers II* 4
   - *College Admission Requirements*

3. **Major Requirements:** (65)
   - a. **Complete all of the following courses:** (13)
     - CE 221 Statics 3
     - CEM 161 Chemistry Laboratory I 1
     - ECE 345 Electronic Instrumentation and Systems 3
     - MSE 250 Materials Science and Engineering 3
     - STT 351 Probability and Statistics for Engineering 3
   - b. **Complete all of the following courses:** (40)
     - ME 201 Thermodynamics 3
     - ME 222 Mechanics of Deformable Solids 3
     - ME 280 Graphic Communications 2
     - ME 300 Professional Issues in Mechanical Eng 1
     - ME 332 Fluid Mechanics (W) 4
     - ME 361 Dynamics 3
     - ME 370 Mechanical Design & Manufacturing I 3
     - ME 391 Mechanical Engineering Analysis 3
     - ME 410 Heat Transfer 3
     - ME 412 Heat Transfer Laboratory (W) 2
     - ME 451 Control Systems (W) 4
     - ME 461 Mechanical Vibrations 3
     - ME 470 Mechanical Design & Manufacturing II 3
     - ME 481 Mechanical Engr Design Projects (W) 3
   - c. **Senior Electives:** (9)
     - Complete a minimum of nine credits from the following:
     - ME 413 Cryogenic Systems Analysis 3
     - ME 414 Cryogenic Systems Mechanical Design 3
     - ME 416 Computer Ass't Design of Thermal Sys 3
     - ME 417 Design of Alternative Energy Systems 3
     - ME 422 Introduction to Combustion 3
     - ME 423 Intermediate Mech of Deformable Solids 3
     - ME 425 Experimental Mechanics 3
     - ME 426 Introduction to Composite Materials 3
     - ME 433 Intro to Computational Fluid Dynamics 3
     - ME 440 Aerospace Propulsion 3
     - ME 441 Aerodynamics and Aircraft Performance 3
     - ME 442 Turbomachinery 3
     - ME 444 Automotive Engines 3
     - ME 445 Automotive Powertrain Design 3
     - ME 464 Intermediate Dynamics 3
     - ME 465 Computer Aided Optimal Design 3
     - ME 475 Computer Aided Design of Structures 3
     - ME 477 Manufacturing Processes 3
     - ME 478 Product Development 3
     - ME 490 Independent Study in Mechanical Engr 1-4
     - ME 491 Selected Topics in Mechanical Engr 1-4
     - ME 494 Biofluid Mechanics and Heat Transfer 3
     - ME 495 Tissue Mechanics 3
     - ME 497 Biomechanical Design in Product Dev 3
   - d. **Design-Intensive courses. Complete a minimum of three additional credits from:** (3)
     - ME 414 Cryogenic Systems Mechanical Design 3
     - ME 416 Computer Ass't Design of Thermal Sys 3
     - ME 417 Design of Alternative Energy Systems 3
     - ME 442 Turbomachinery 3
     - ME 445 Automotive Powertrain Design 3
     - ME 465 Computer Aided Optimal Design 3
     - ME 475 Computer Aided Design of Structures 3
     - ME 478 Product Development 3
     - ME 497 Biomechanical Design in Product Dev 3

Courses used to fulfill item 3.c. may not be used to fulfill 3.d.
Concentrations:
The Department offers concentrations in aerospace engineering, automotive powertrain, biomedical engineering, computational design, cryogenic engineering, energy, engineering mechanics, global engineering, and manufacturing engineering to students wishing an area of specialization in their degree. The concentrations are available to, but not required of, any student enrolled in the Bachelor of Science degree program in mechanical engineering. NOTE: Completing the Bachelor of Science degree in mechanical engineering with a concentration may require more than 128 credits. Upon completion of the required courses for one of these concentrations, certification will appear on the student’s official transcript.

**Aerospace Engineering Concentration:** (12)
To earn a Bachelor of Science degree in Mechanical Engineering with an aerospace engineering concentration, students must complete requirements 1., 2., 3.a., 3.b., and 3.d. above and the following:

All of the following courses: (9)
- ME 440  Aerospace Propulsion  3
- ME 441  Aerodynamics & Aircraft Performance  3
- ME 475  Computer Aided Design of Structures  3

One of the following courses: (3)
- ME 422  Introduction to Combustion  3
- ME 426  Introduction to Composite Materials  3
- ME 433  Computational Fluid Dynamics  3
- ME 442  Turbomachinery  3
- ME 464  Intermediate Dynamics  3

**Automotive Powertrain Concentration:** (12)
To earn a Bachelor of Science degree in Mechanical Engineering with an automotive powertrain concentration, students must complete requirements 1., 2., 3.a., 3.b., and 3.d. above and the following:

All of the following: (9)
- ME 422  Intro to Combustion  3
- ME 444  Automotive Engines  3
- ME 445  Automotive Powertrain Design  3

One of the following: (3)
- ME 433  Intro to Computational Fluid Dynamic  3
- ME 442  Turbomachinery  3

**Biomedical Engineering Concentration:** (16)
To earn a Bachelor of Science degree in Mechanical Engineering with a biomedical engineering concentration, students must complete requirements 1., 2., 3.a., 3.b., and 3.d. above and the following:

Both of the following courses: (7)
- BS 161  Cells and Molecular Biology  3
- PSL 250  Introductory Physiology  4

Select nine credits from the following courses: (9)
- BE 444  Biosensors for Medical Diagnostics  3
- ECE 445  Biomedical Instrumentation  3
- ME 494  Biofluid Mechanics and Heat Transfer  3
- ME 495  Tissue Mechanics  3
- ME 497  Biomechanical Design in Product Dev  3
- MSE 425  Biomaterials and Biocompatibility  3

**Computational Design Concentration:** (12)
To earn an Bachelor of Science degree in Mechanical Engineering with a computational design concentration, students must complete requirements 1.,2., 3.a.,3.b.,and 3.d. and the following:

All of the following: (12)
- ME 416  Computer Assisted Design of Thermal Systems  3
- ME 433  Intr to Computational Fluid Dynamics  3
- ME 465  Computer Aided Optimal Design  3
- ME 475  Computer Aided Design of Structures  3

**Cryogenic Engineering Concentration:** (12)
To earn a Bachelor of Science degree in Mechanical Engineering with a cryogenic engineering concentration, students must complete requirements 1.,2.,3.a.,3.b.,and 3.d. and the following:

All of the following: (12)
- ME 413  Cryogenic Systems Analysis  3
- ME 414  Cryogenic Systems Mechanical Design  3
- ME 416  Computer Assisted Design of Thermal Systems  3
- ME 442  Turbomachinery  3
Energy Concentration: (12)
To earn a Bachelor of Science degree in Mechanical Engineering with an energy concentration, students must complete requirements 1., 2., 3.a., 3.b., and 3.d. and the following:

All of the following courses: (9)
- ME 416 Computer Assisted Design of Thermal Systems 3
- ME 417 Design of Alternative Energy Systems 3
- ME 422 Introduction to Combustion 3

One of the following courses: (3)
- ME 440 Aerospace Propulsion 3
- ME 442 Turbomachinery 3
- ME 444 Automotive Engines 3

Engineering Mechanics Concentration: (12)
To earn a Bachelor of Science degree in Mechanical Engineering with an engineering mechanics concentration, students must complete requirements 1., 2., and 3.a., and 3.b. above and the following:

All of the following: (12)
- ME 423 Intermed Mechanics of Deform Solids 3
- ME 425 Experimental Mechanics 3
- ME 464 Intermediate Dynamics 3
- ME 475 Computer Aided Design of Structures 3

Global Engineering: (12)
To earn a Bachelor of Science degree in Mechanical Engineering with a global engineering concentration, students must complete requirements 1., 2., 3.a., and 3.b. above and 12 credits of approved mechanical engineering courses from a MSU co-sponsored Study Abroad institution. At least 3 credits must include a team design project.

Manufacturing Engineering Concentration: (13)
To earn a Bachelor of Science degree in Mechanical Engineering with a manufacturing engineering concentration, students must complete requirements 1., 2., 3.a., 3.b., and 3.d. above and the following:

All of the following courses: (7)
- ME 372 Machine Tool Laboratory 1
- ME 477 Manufacturing Processes 3
- ME 478 Product Development 3

Select one of the following courses: (3)
- CHE 472 Composite Materials Processing 3
- ECE 415 Computer Aided Manufacturing 3
- ME 426 Introduction to Composite Materials 3

Select one of the following courses: (3)
- ACC 230 Survey of Accounting Concepts 3
- EC 201 Intro to Microeconomics 3

Total Credits Required for Degree 128

The requirements listed apply to students admitted to the major of Mechanical Engineering in the Department of Mechanical Engineering beginning Fall 2018. The Department of Mechanical Engineering (ME) constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with his/her advisor to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Mechanical Engineering should contact the Mechanical Engineering Department Advising Office, 2560 Engineering Building, phone (517) 355-3338.

Some courses may have prerequisites, which are not otherwise required in the program. Students should check course descriptions to ensure they are aware of prerequisites.

Last Revised May 2018
## Mechanical Engineering Sample Program

### Freshman Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioscience</td>
<td>3/4</td>
<td>CEM 161</td>
<td>1</td>
</tr>
<tr>
<td>CEM 141</td>
<td>4</td>
<td>CSE 231</td>
<td>4</td>
</tr>
<tr>
<td>EGR 100</td>
<td>2</td>
<td>MTH 133</td>
<td>4</td>
</tr>
<tr>
<td>MTH 132</td>
<td>3</td>
<td>PHY 183</td>
<td>4</td>
</tr>
<tr>
<td>ISS 2XX</td>
<td>4</td>
<td>WRA 101</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16-17</td>
<td><strong>Total</strong></td>
<td>17</td>
</tr>
</tbody>
</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 280</td>
<td>2</td>
<td>MSE 250</td>
<td>3</td>
</tr>
<tr>
<td>MTH 234</td>
<td>4</td>
<td>ME 201</td>
<td>3</td>
</tr>
<tr>
<td>CE 221</td>
<td>3</td>
<td>ME 222</td>
<td>3</td>
</tr>
<tr>
<td>PHY 184</td>
<td>4</td>
<td>MTH 235</td>
<td>3</td>
</tr>
<tr>
<td>IAH 201-210</td>
<td>4</td>
<td>IAH 211 or &gt;</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td><strong>Total</strong></td>
<td>16</td>
</tr>
</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective</td>
<td>4</td>
<td>Elective</td>
<td>4</td>
</tr>
<tr>
<td>ME 300</td>
<td>1</td>
<td>ME 370</td>
<td>3</td>
</tr>
<tr>
<td>ME 391</td>
<td>3</td>
<td>ME 332</td>
<td>4</td>
</tr>
<tr>
<td>ME 361</td>
<td>3</td>
<td>ECE 345</td>
<td>3</td>
</tr>
<tr>
<td>STT 351</td>
<td>3</td>
<td>ISS 3XX</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14</td>
<td><strong>Total</strong></td>
<td>18</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 410</td>
<td>3</td>
<td>ME 412</td>
<td>2</td>
</tr>
<tr>
<td>ME 470</td>
<td>3</td>
<td>ME 451</td>
<td>4</td>
</tr>
<tr>
<td>ME 461</td>
<td>3</td>
<td>ME 481</td>
<td>3</td>
</tr>
<tr>
<td>Senior Elective</td>
<td>3</td>
<td>Senior Elective</td>
<td>3</td>
</tr>
<tr>
<td>Senior Elective</td>
<td>3</td>
<td>Senior Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td><strong>Total</strong></td>
<td>15</td>
</tr>
</tbody>
</table>

## Program Educational Objectives for the Undergraduate Program in Mechanical Engineering

**Department of Mechanical Engineering**  
**Michigan State University**  
(Approved by the Department Faculty December 10, 2015)

**Our graduates will:**

- Be competent and ethical engineers practicing in a diverse range of activities
- Use their mechanical engineering education as a stimulus for personal and professional growth
- Be recognized for their capability, creativity, and application of knowledge
- Be independent and critical thinkers who identify problems and develop effective solutions.