

# Mechanical Engineering

## 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 >	
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 Requirement*

## 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 Mechanical Design of Cryogenic Systems	3
ME 416 Computer Asstd Design of Thermal Sys	3
ME 417 Design of Alternative Energy Systems	3
ME 422 Introduction to Combustion	3
ME 423 Intermed 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 456 Mechatronics	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 496 Biomechanical Analysis of Human Movement	3
ME 497 Biomechanical Design in Product Dev	3

### d. Design-Intensive Senior Electives: (3) Complete a minimum of three *additional* credits from:

ME 414 Mechanical Design of Cryogenic Systems	3
ME 416 Computer Asstd Design of Thermal Sys	3
ME 417 Design of Alternative Energy Systems	3
ME 442 Turbomachinery	3
ME 445 Automotive Powertrain Design	3
ME 456 Mechatronics	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 the requirements for the B.S. degree, including the following:

##### All of the following courses: (6)

ME 440	Aerospace Propulsion	3
ME 441	Aerodynamics & Aircraft Performance	3

##### One of the following courses: (3)

ME 423	Intermediate Mech of Deformable Solids	3
ME 426	Introduction to Composite Materials	3
ME 456	Mechatronics	3
ME 475	Computer Aided Design of Structures	3

##### One of the following courses: (3)

ME 422	Introduction to Combustion	3
ME 433	Intro to Computational Fluid Dynamics	3
ME 442	Turbomachinery	3

#### Automotive Powertrain Concentration: (12)

To earn a Bachelor of Science degree in Mechanical Engineering with an automotive powertrain concentration, students must complete the requirements for the B.S. degree, including 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 the requirements for the B.S. degree, including the following:

##### Both of the following courses: (7)

BS 161	Cell 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 496	Biomechanical Analysis of Human Movement	3
ME 497	Biomechanical Design in Product Dev	3
MSE 425	Biomaterials and Biocompatibility	3

Students who select BE444, ECE445, and/or MSE 425 may request to apply these course credits towards fulfillment of the Mechanical Engineering Major Senior-Elective requirement (item 3c)

#### Computational Design Concentration: (12)

To earn a Bachelor of Science degree in Mechanical Engineering with a computational design concentration, students must complete the requirements for the B.S. degree, including 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 the requirements for the B.S. degree, including the following:

##### All of the following: (12)

ME 413	Cryogenic Systems Analysis	3
ME 414	Mechanical Design of Cryogenic Systems	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 the requirements for the B.S. degree, including the following:

**All of the following courses: (6)**

ME 416	Computer Assisted Design of Thermal Systems	3
ME 417	Design of Alternative Energy Systems	3

**Two of the following courses: (6)**

ME 422	Introduction to Combustion	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 the requirements for the B.S. degree, including the following:

**All of the following: (12)**

ME 423	Intermediate 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 the requirements for the B.S. degree, including 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
MSE 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

Students who select CHE472, ECE415, and/or MSE 426 may request to apply these course credits towards fulfillment of the Mechanical Engineering Major Senior-Elective requirement (item 3c)

**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 2023. 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 their advisor to obtain assistance in planning an appropriate schedule of courses.

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.

## Mechanical Engineering

### Sample Program

Freshman Year				Sophomore Year			
Fall	Credits	Spring	Credits	Fall	Credits	Spring	Credits
Bioscience	3/4	CEM 161	1	ME 280	2	MSE 250	3
CEM 141	4	CSE 231	4	MTH 234	4	ME 201	3
EGR 100	2	MTH 133	4	CE 221	3	ME 222	3
MTH 132	3	PHY 183	4	PHY 184	4	MTH 235	3
ISS 2XX	4	WRA 101	4	IAH 201-210	4	IAH 211 or >	4
<b>Total</b>	<b>16/17</b>	<b>Total</b>	<b>17</b>	<b>Total</b>	<b>17</b>	<b>Total</b>	<b>16</b>

  

Junior Year				Senior Year			
Fall	Credits	Spring	Credits	Fall	Credits	Spring	Credits
Elective	4	Elective	4	ME 410	3	ME 412	2
ME 300	1	ME 370	3	ME 470	3	ME 451	4
ME 391	3	ME 332	4	ME 461	3	ME 481	3
ME 361	3	ECE 345	3	Sr Elective	3	Sr Elective	3
STT 351	3	ISS 3XX	4	Dsgn Int Sr Elec	3	Sr Elective	3
<b>Total</b>	<b>14</b>	<b>Total</b>	<b>18</b>	<b>Total</b>	<b>15</b>	<b>Total</b>	<b>15</b>

**Program Educational Objectives for the Undergraduate Program  
in Mechanical Engineering  
Department of Mechanical Engineering  
Michigan State University  
(Approved by the Department Faculty December 1, 2022)**

**Within 3 to 5 years of graduation our graduates are expected to:**

1. Have evolved into competent and ethical engineers practicing in a diverse range of current and emerging activities
2. Use their mechanical engineering education as a stimulus for personal and professional growth
3. Demonstrate capability, creativity, leadership, and application of knowledge
4. Be critical thinkers, both independently and as members of a team, who identify problems and develop effective solutions