

# Mechanical Engineering B.S.

## Program Requirements

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## Minimum Requirements for Mechanical Engineering B.S.: 128 credits

### Concentrations: Aerospace (p. 1), Mechanical (p. 1), Petroleum (p. 1)

Students must earn a C- grade or better in each course.

Code	Title	Credits
<b>General University Requirements</b>		
Complete the general university requirements. ( <a href="https://catalog.uaf.edu/bachelors/#gurbachelorsdegreestext">https://catalog.uaf.edu/bachelors/#gurbachelorsdegreestext</a> )		
<b>General Education Requirements</b>		
Complete the general education requirements. ( <a href="https://catalog.uaf.edu/bachelors/#generaleducationrequirementstext">https://catalog.uaf.edu/bachelors/#generaleducationrequirementstext</a> )		36-40
As part of the general education requirements, complete the following:		
MATH F251X	Calculus I	
CHEM F105X	General Chemistry I	
CHEM F106X	General Chemistry II	
<b>B.S. Degree Requirements</b>		
Complete the B.S. degree requirements. ( <a href="https://catalog.uaf.edu/bachelors/#bachelorofsciencetext">https://catalog.uaf.edu/bachelors/#bachelorofsciencetext</a> )		16
As part of the B.S. requirements, complete the following:		
MATH F252X	Calculus II	
PHYS F211X	General Physics I	
PHYS F212X	General Physics II	
<b>Mechanical Engineering Program Requirements</b>		
Complete the following:		
ES F100X	Engineering Alaska - An Introduction to Engineering	3
ES F201	Computer Techniques	3
ES F209	Statics	3
ES F210	Dynamics	3
ES F301	Engineering Analysis	3
ES F307	Elements of Electrical Engineering	3
ES F331	Mechanics of Materials	3
ES F341	Fluid Mechanics	4
ES F346	Introduction to Thermodynamics	3
MATH F253X	Calculus III	4
MATH F302	Differential Equations	3
ME F302	Dynamics of Machinery	4
ME F308	Instrumentation and Measurement	3
ME F313	Mechanical Engineering Thermodynamics	3

ME F321	Industrial Processes	3
ME F334	Elements of Material Science/Engineering	3
ME F403	Machine Design	3
ME F408	Mechanical Vibrations	3
ME F415	Thermal Systems Laboratory	3
ME F441	Heat Transfer	3
ME F486	Senior Design <sup>2</sup>	1
ME F487	Design Project <sup>1,2</sup>	3

### Fundamentals of Engineering (FE) Examination

Complete the Fundamentals of Engineering (FE) examination administered by the State of Alaska.

### Concentration

Complete one of the following:	9-12
Aerospace	
Mechanical	
Petroleum	

**Total Credits** 128-131

<sup>1</sup> Design project must be related to area of concentration.

<sup>2</sup> Fulfills the baccalaureate capstone requirement.

## Concentrations

### Aerospace

Code	Title	Credits
<b>Aerospace Concentration Requirements</b>		
Complete the following:		
ME F450	Theory of Flight	3
ME F451	Aerodynamics	3
ME F452	Introduction to Astroynamics	3
ME F453	Propulsion Systems	3
<b>Total Credits</b>		<b>12</b>

### Mechanical

Code	Title	Credits
<b>Mechanical Concentration Requirements</b>		
Complete the following:		
Mechanical Engineering electives at the F400 level or above		6
Advisor-approved engineering elective at the F400 level or above		3
<b>Total Credits</b>		<b>9</b>

### Petroleum

Code	Title	Credits
<b>Petroleum Concentration Requirements</b>		
Complete the following:		
ME F409	Controls	3
ME F416	Design of Mechanical Equipment for the Petroleum Industry	3
ME F464	Corrosion Engineering	3
PETE F426	Drilling Engineering	3
<b>Total Credits</b>		<b>12</b>

## Roadmaps

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Roadmaps are recommended semester-by-semester plans of study for programs and assume full-time enrollment unless otherwise noted.

- This roadmap should be used in conjunction with regular academic advising appointments. All students are encouraged to meet with their advisor or mentor each semester.
- Some courses and milestones must be completed in the semester listed to ensure timely graduation.
- Transfer credit may change the roadmap.
- Requirements, course availability and sequencing are subject to change.
- Courses with (\*) are recommended.

## Aerospace Concentration

### First Year

Fall	Credits Spring	Credits
CHEM F105X <sup>7</sup>	4 CHEM F106X <sup>7</sup>	4
COM F121X, F131X, or F141X <sup>1</sup>	3 ES F201 <sup>20</sup>	3
ES F100X <sup>20</sup>	3 LS F101X <sup>15</sup>	1
MATH F251X <sup>6</sup>	4 MATH F252X <sup>16</sup>	4
WRTG F111X <sup>1</sup>	3 WRTG F211X, F212X, F213X, or F214X <sup>1</sup>	3
	Degree Requirement - Alaska Native-themed	3
	<b>17</b>	<b>18</b>

### Second Year

Fall	Credits Spring	Credits
ES F209 <sup>20</sup>	3 ES F210 <sup>20</sup>	3
MATH F253X <sup>20</sup>	4 ES F346 <sup>20,25</sup>	3
ME F321 <sup>20,25</sup>	3 MATH F302 <sup>20,25</sup>	3
PHYS F211X <sup>17</sup>	4 PHYS F212X <sup>17</sup>	4
General Education Requirement - Arts	3 General Education Requirement - Humanities	3
	<b>17</b>	<b>16</b>

### Third Year

Fall	Credits Spring	Credits
ES F301 <sup>20,25</sup>	3 ES F331 <sup>20,25</sup>	3
ES F307 <sup>20,25</sup>	3 ME F308 <sup>20,25</sup>	3
ES F341 <sup>20,25</sup>	4 ME F313 <sup>20,25</sup>	3
ME F302 <sup>20,25</sup>	4 ME F334 <sup>20,25</sup>	3
ME F450 <sup>22,25</sup>	3 ME F451 <sup>22,25</sup>	3
General Education Requirement - Social Sciences	3	
	<b>20</b>	<b>15</b>

### Fourth Year

Fall	Credits Spring	Credits
ME F408 <sup>20,25</sup>	3 ME F403 <sup>20,25</sup>	3
ME F441 <sup>20,25</sup>	3 ME F415 <sup>20,25</sup>	3
ME F452 <sup>22,25</sup>	3 ME F453 <sup>22,25</sup>	3
ME F486 <sup>20,21,25</sup>	1 ME F487 <sup>20,21,25</sup>	3
General Education Requirement - Social Sciences	3 Degree Requirement - Ethics	3
General Education Requirement - Additional Arts, Humanities or Social Sciences	3 Fundamentals of Engineering (FE) Examination	0
	<b>16</b>	<b>15</b>

**Total Credits 134**

## Footnote Definitions

General Education Requirements	Degree Requirements	Program & Other Requirements
1—Communication	8—Alaska Native-themed	20—Program Requirement
2—Arts	9—Communication	21—Capstone Requirement
3—Humanities	10—Computation	22—Concentration Course
4—Social Sciences	11—Ethics	23—General Elective
5—Additional Arts, Humanities or Social Sciences	12—Humanities	24—Minor Course
6—Mathematics	13—Human Relations	25—Upper Division
7—Natural Sciences	14—Humanities or Social Sciences	26—Program Elective
	15—Library & Information Research	
	16—Mathematics	
	17—Natural Sciences	
	18—Other	
	19—Social Sciences	

## Mechanical Concentration

### First Year

Fall	Credits Spring	Credits
CHEM F105X <sup>7</sup>	4 CHEM F106X <sup>7</sup>	4
COM F121X, F131X, or F141X <sup>1</sup>	3 ES F201 <sup>20</sup>	3
ES F100X <sup>20</sup>	3 LS F101X <sup>15</sup>	1
MATH F251X <sup>6</sup>	4 MATH F252X <sup>16</sup>	4
WRTG F111X <sup>1</sup>	3 WRTG F211X, F212X, F213X, or F214X <sup>1</sup>	3
	Degree Requirement - Alaska Native-themed	3
	<b>17</b>	<b>18</b>

**Second Year**

Fall	Credits Spring	Credits
ES F209 <sup>20</sup>	3 ES F210 <sup>20</sup>	3
MATH F253X <sup>20</sup>	4 ES F346 <sup>20,25</sup>	3
ME F321 <sup>20,25</sup>	3 MATH F302 <sup>20,25</sup>	3
PHYS F211X <sup>17</sup>	4 PHYS F212X <sup>17</sup>	4
General Education Requirement - Arts	3 General Education Requirement - Humanities	3
	<b>17</b>	<b>16</b>

**Third Year**

Fall	Credits Spring	Credits
ES F301 <sup>20,25</sup>	3 ES F341 <sup>20,25</sup>	4
ES F307 <sup>20,25</sup>	3 ME F308 <sup>20,25</sup>	3
ES F331 <sup>20,25</sup>	3 ME F313 <sup>20,25</sup>	3
ME F302 <sup>20,25</sup>	4 ME F334 <sup>20,25</sup>	3
General Education Requirement - Social Sciences	3 Concentration Course - Upper Division	3
	<b>16</b>	<b>16</b>

**Fourth Year**

Fall	Credits Spring	Credits
ME F408 <sup>20,25</sup>	3 ME F403 <sup>20,25</sup>	3
ME F441 <sup>20,25</sup>	3 ME F415 <sup>20,25</sup>	3
ME F486 <sup>20,21,25</sup>	1 ME F487 <sup>20,21,25</sup>	3
General Education Requirement - Social Sciences	3 Degree Requirement - Ethics	3
General Education Requirement - Additional Arts, Humanities or Social Sciences	3 Concentration Course - Upper Division	3
Concentration Course - Upper Division	3 Fundamentals of Engineering (FE) Examination	0
	<b>16</b>	<b>15</b>

**Total Credits 131**
**Footnote Definitions**

General Education Requirements	Degree Requirements	Program & Other Requirements
1—Communication	8—Alaska Native-themed	20—Program Requirement
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5—Additional Arts, Humanities or Social Sciences	12—Humanities	24—Minor Course
6—Mathematics	13—Human Relations	25—Upper Division
7—Natural Sciences	14—Humanities or Social Sciences	26—Program Elective

15—Library &amp; Information Research

16—Mathematics

17—Natural Sciences

18—Other

19—Social Sciences

**Petroleum Concentration**
**First Year**

Fall	Credits Spring	Credits
CHEM F105X <sup>7</sup>	4 CHEM F106X <sup>7</sup>	4
COM F121X, F131X, or F141X <sup>1</sup>	3 ES F201 <sup>20</sup>	3
ES F100X <sup>20</sup>	3 LS F101X <sup>15</sup>	1
MATH F251X <sup>6</sup>	4 MATH F252X <sup>16</sup>	4
WRTG F111X <sup>1</sup>	3 WRTG F211X, F212X, F213X, or F214X <sup>1</sup>	3
	Degree Requirement - Alaska Native-themed	3
	<b>17</b>	<b>18</b>

**Second Year**

Fall	Credits Spring	Credits
ES F209 <sup>20</sup>	3 ES F210 <sup>20</sup>	3
MATH F253X <sup>20</sup>	4 ES F346 <sup>20,25</sup>	3
ME F321 <sup>20,25</sup>	3 MATH F302 <sup>20,25</sup>	3
PHYS F211X <sup>17</sup>	4 PHYS F212X <sup>17</sup>	4
General Education Requirement - Arts	3 General Education Requirement - Humanities	3
	<b>17</b>	<b>16</b>

**Third Year**

Fall	Credits Spring	Credits
ES F301 <sup>20,25</sup>	3 ES F341 <sup>20,25</sup>	4
ES F307 <sup>20,25</sup>	3 ME F308 <sup>20,25</sup>	3
ES F331 <sup>20,25</sup>	3 ME F313 <sup>20,25</sup>	3
ME F302 <sup>20,25</sup>	4 ME F334 <sup>20,25</sup>	3
ME F408 <sup>20,25</sup>	3 ME F416 <sup>22,25</sup>	3
General Education Requirement - Social Sciences	3	
	<b>19</b>	<b>16</b>

**Fourth Year**

Fall	Credits Spring	Credits
ME F409 <sup>22,25</sup>	3 ME F403 <sup>20,25</sup>	3
ME F441 <sup>20,25</sup>	3 ME F415 <sup>20,25</sup>	3
ME F464 <sup>22,25</sup>	3 ME F487 <sup>20,21,25</sup>	3
ME F486 <sup>20,21,25</sup>	1 PETE F426 <sup>22,25</sup>	3
General Education Requirement - Social Sciences	3 Degree Requirement - Ethics	3

General Education Requirement - Additional Arts, Humanities or Social Sciences	3 Fundamentals of Engineering (FE) Examination	0
<b>16</b>		<b>15</b>

**Total Credits 134****Footnote Definitions**

General Education Requirements	Degree Requirements	Program & Other Requirements
1–Communication	8–Alaska Native-themed	20–Program Requirement
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6–Mathematics	13–Human Relations	25–Upper Division
7–Natural Sciences	14–Humanities or Social Sciences	26–Program Elective
	15–Library & Information Research	
	16–Mathematics	
	17–Natural Sciences	
	18–Other	
	19–Social Sciences	

**Learning Outcomes**

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Learning Outcomes are measurable statements that describe knowledge or skills achieved by students upon completion of the program.

Students graduating from this program will be able to:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (ABET Student Learning Outcome #1)
- Communicate effectively, participate on multi-disciplinary teams, and design systems under realistic constraints
- Develop the skills necessary to compete in both the local and global engineering economy
- Have an understanding of professional and ethical responsibility, and a knowledge of contemporary issues