



BACHELOR OF SCIENCE IN ENGINEERING

Major in Aerospace Engineering

The courses you will take to earn a B.S. degree in Aerospace Engineering fall into 3 categories.

If you entered the university in Spring 2023 or earlier

1. General Education Requirements include:

- SAGES First Seminar
- 2 SAGES University Seminars
- 4 Breadth Electives (12 credits outside of engineering, natural science, mathematics)
- 2 semesters of Physical Education

2. Engineering Core Requirements include:

- 7 preparatory courses in Math (4), Chemistry (1), and Physics (2)
- 4 basic Engineering courses taken by most or all engineering majors (ENGR)
- ENGL/ENGR 398 Professional Communication for Engineers

If you entered the university in Fall 2023 or later

1. Unified General Education Requirements (UGER) include:

- Academic Inquiry Seminar
- 6 Breadth, or Electives (18 credits outside of engineering, natural science, mathematics)
 - Arts & Humanities (A+H) – 6 credits (2 courses)
 - Social Sciences & Management (SS+M) – 6 credits (2 courses)
 - 6 credits to be satisfied in either of the two areas (2 courses)
 - at least 2 courses must be designated “Communication Intensive”
- 2 semesters of Wellness courses

2. Engineering Core Requirements include:

- 7 preparatory courses in Math (4), Chemistry (1), and Physics (2)
- 4 basic Engineering courses taken by most or all engineering majors (ENGR)
- ENGR 399 Impact of Engineering on Society (UGER Perspectives 1-3)

3. Major Specific Courses include:

- 18 required courses in Mechanical/Aerospace and Civil Engineering
- Physics 221 Introduction to Modern Physics
- 1 Technical Elective
- 1 Open Elective

More information about electives can be found after the recommended curriculum below.

First Year**Credit Hours****Notes**

Fall

SAGES First Seminar Academic Inquiry Seminar*	(4 3*)
CHEM 111 Principles of Chemistry for Engineers	(4)
MATH 121 Calculus for Science and Engineering I	(4)
PHYS 121 General Physics I - Mechanics	(4)
Physical Education Wellness*	(0)
Total	(16 15*)

Spring

University Seminar Breadth, or Elective*	(3)
MATH 122 Calculus for Science and Engineering II	(4)
PHYS 122 General Physics II - Electricity & Magnetism	(4)
ENGR 130 Foundations of Engineering and Programming	(3)
ENGR 145 Chemistry of Materials	(4)
Physical Education Wellness*	(0)
Total	(18)

Second Year

Fall

University Seminar Breadth, or Elective*	(3)
MATH 223 Calculus for Science and Engineering III	(3)
ENGR 200 Statics and Strength of Materials	(3)
EMAE 160 Mechanical Manufacturing	(3)
EMAE 181 Dynamics	(3)
Total	(15)

Spring

MATH 224 Elementary Differential Equations	(3)
PHYS 221 Introduction to Modern Physics	(3)
ENGR 210 Introduction to Circuits and Instrumentation	(4)
EMAE 250 Computers in Mechanical Engineering	(3)
EMAE 251 Thermodynamics	(3)
Total	(16)

Third Year

Fall

Breadth Elective Breadth, or Elective*	(3)
EMAE 252 Fluid Mechanics	(3)
EMAE 285 Mechanical Engineering Measurements Lab**	(4)
EMAE 350 Mechanical Engineering Analysis	(3)
ECIV 310 Strength of Materials	(3)
Total	(16)

Spring

Breadth Elective Breadth, or Elective*	(3)	
EMAE 353 Heat Transfer	(3)	
EMAE 359 Aero/Gas Dynamics	(3)	offered Spring only
EMAE 376 Aerostructures	(3)	offered Spring only
EMAE 351 Control of Mechanical Systems	(3)	
Total	(15)	

Fourth Year

Fall

Breadth Elective Breadth, or Elective*	(3)	
EMAE 383 Flight Mechanics	(3)	offered Fall only
EMAE 384 Orbital Dynamics	(3)	offered Fall only
EMAE 355 Design of Fluid and Thermal Elements.....	(3)	
Open Elective.....	(3)	
Total	(15)	

Spring

Breadth Elective Breadth, or Elective*	(3)	
EMAE 356 Aerospace Design.....	(3)	offered Spring only
EMAE 382 Propulsion.....	(3)	offered Spring only
EMAE 398 Senior Project***	(3)	
ENGL/ENGR 398 ENGR 399*	(3)	
Technical Elective.....	(3)	
Total	(18)	

Total (129 | 128*)

* Changes resulting from the new Unified General Education Requirements (UGER) for students who entered the university in Fall 2023 or later

** UGER Disciplinary Communication course

*** UGER Capstone Project course

BACHELOR OF SCIENCE IN ENGINEERING DEGREE

Major in Mechanical Engineering

The courses you will take to earn a B.S. degree in Mechanical Engineering fall into 3 categories.

If you entered the university in Spring 2023 or earlier

1. General Education Requirements include:

- SAGES First Seminar
- 2 SAGES University Seminars
- 4 Breadth Electives (12 credits outside of engineering, natural science, mathematics)
- 2 semesters of Physical Education

2. Engineering Core Requirements include:

- 7 preparatory courses in Math (4), Chemistry (1), and Physics (2)
- 4 basic Engineering courses taken by most or all engineering majors (ENGR)
- ENGL/ENGR 398 Professional Communication for Engineers

If you entered the university in Fall 2023 or later

1. Unified General Education Requirements (UGER) include:

- Academic Inquiry Seminar
- 6 Breadth, or Electives (18 credits outside of engineering, natural science, mathematics)
 - Arts & Humanities (A+H) – 6 credits (2 courses)
 - Social Sciences & Management (SS+M) – 6 credits (2 courses)
 - 6 credits to be satisfied in either of the two areas (2 courses)
 - at least 2 courses must be designated “Communication Intensive”
- 2 semesters of Wellness courses

2. Engineering Core Requirements include:

- 7 preparatory courses in Math (4), Chemistry (1), and Physics (2)
- 4 basic Engineering courses taken by most or all engineering majors (ENGR)
- ENGR 399 Impact of Engineering on Society (UGER Perspectives 1-3)

3. Major Specific Courses include:

- 15 required courses in Mechanical/Aerospace and Civil Engineering
- 1 Science Elective
- 4 Technical Elective
- 1 Open Elective

More information about electives can be found after the recommended curriculum below.

First Year**Credit Hours****Notes**

Fall

SAGES First Seminar Academic Inquiry Seminar*	(4 3*)
CHEM 111 Principles of Chemistry for Engineers	(4)
MATH 121 Calculus for Science and Engineering I	(4)
PHYS 121 General Physics I - Mechanics	(4)
Physical Education Wellness*	(0)
Total	(16 15*)

Spring

University Seminar Breadth, or Elective*	(3)
MATH 122 Calculus for Science and Engineering II	(4)
PHYS 122 General Physics II - Electricity & Magnetism	(4)
ENGR 130 Foundations of Engineering and Programming	(3)
ENGR 145 Chemistry of Materials	(4)
Physical Education Wellness*	(0)
Total	(18)

Second Year

Fall

University Seminar Breadth, or Elective*	(3)
MATH 223 Calculus for Science and Engineering III	(3)
ENGR 200 Statics and Strength of Materials	(3)
EMAE 160 Mechanical Manufacturing	(3)
EMAE 250 Computers in Mechanical Engineering	(3)
Total	(15)

Spring

MATH 224 Elementary Differential Equations	(3)
Science Elective	(3)
ENGR 210 Introduction to Circuits and Instrumentation	(4)
EMAE 181 Dynamics	(3)
EMAE 251 Thermodynamics	(3)
Total	(16)

Third Year

Fall

Breadth Elective Breadth, or Elective*	(3)
EMAE 252 Fluid Mechanics	(3)
EMAE 285 Mechanical Engineering Measurements Lab**	(4)
EMAE 350 Mechanical Engineering Analysis	(3)
ECIV 310 Strength of Materials	(3)
Total	(16)

Spring

Breadth Elective Breadth, or Elective*	(3)
EMAE 260 Design and Manufacturing I	(3)
EMAE 353 Heat Transfer	(3)
EMAE 370 Design of Mechanical Elements	(3)
EMAE 351 Control of Mechanical Systems	(3)
Technical Elective	(3)
Total	(18)

Fourth Year

Fall

Breadth Elective Breadth, or Elective*	(3)
EMAE 355 Design of Fluid and Thermal Elements	(3)
EMAE 360 Design and Manufacturing II	(3)
Technical Elective	(3)
Open Elective	(3)
Total	(15)

offered Fall only

Spring

Breadth Elective Breadth, or Elective*	(3)
EMAE 398 Senior Project***	(3)
ENGL/ENGR 398 ENGR 399*	(3)
Technical Elective	(3)
Technical Elective	(3)
Total	(15)

Total (129 | 128*)

* Changes resulting from the new Unified General Education Requirements (UGER) for students who entered the university in Fall 2023 or later

** UGER Disciplinary Communication course

*** UGER Capstone Project course

BACHELOR OF SCIENCE IN ENGINEERING DEGREE

Double Major in Mechanical Engineering and Aerospace Engineering

The courses you will take to earn a B.S. degree in Mechanical Engineering and Aerospace Engineering fall into 3 categories.

If you entered the university in Spring 2023 or earlier

1. General Education Requirements include:

- SAGES First Seminar
- 2 SAGES University Seminars
- 4 Breadth Electives (12 credits outside of engineering, natural science, mathematics)
- 2 semesters of Physical Education

2. Engineering Core Requirements include:

- 7 preparatory courses in Math (4), Chemistry (1), and Physics (2)
- 4 basic Engineering courses taken by most or all engineering majors (ENGR)
- ENGL/ENGR 398 Professional Communication for Engineers

If you entered the university in Fall 2023 or later

1. Unified General Education Requirements (UGER) include:

- Academic Inquiry Seminar
- 6 Breadth, or Electives (18 credits outside of engineering, natural science, mathematics)
 - Arts & Humanities (A+H) – 6 credits (2 courses)
 - Social Sciences & Management (SS+M) – 6 credits (2 courses)
 - 6 credits to be satisfied in either of the two areas (2 courses)
 - at least 2 courses must be designated “Communication Intensive”
- 2 semesters of Wellness courses

2. Engineering Core Requirements include:

- 7 preparatory courses in Math (4), Chemistry (1), and Physics (2)
- 4 basic Engineering courses taken by most or all engineering majors (ENGR)
- ENGR 399 Impact of Engineering on Society (UGER Perspectives 1-3)

3. Major Specific Courses include:

- 21 required courses in Mechanical/Aerospace and Civil Engineering
- Physics 221 Introduction to Modern Physics

More information about electives can be found after the recommended curriculum below.

First Year**Credit Hours****Notes**

Fall

SAGES First Seminar Academic Inquiry Seminar*	(4 3*)
CHEM 111 Principles of Chemistry for Engineers	(4)
MATH 121 Calculus for Science and Engineering I	(4)
PHYS 121 General Physics I - Mechanics	(4)
Physical Education Wellness*	(0)
Total	(16 15*)

Spring

University Seminar Breadth, or Elective*	(3)
MATH 122 Calculus for Science and Engineering II	(4)
PHYS 122 General Physics II - Electricity & Magnetism	(4)
ENGR 130 Foundations of Engineering and Programming	(3)
ENGR 145 Chemistry of Materials	(4)
Physical Education Wellness*	(0)
Total	(18)

Second Year

Fall

University Seminar Breadth, or Elective*	(3)
MATH 223 Calculus for Science and Engineering III	(3)
ENGR 200 Statics and Strength of Materials	(3)
EMAE 160 Mechanical Manufacturing	(3)
EMAE 181 Dynamics	(3)
Total	(15)

Spring

MATH 224 Elementary Differential Equations	(3)
PHYS 221 Introduction to Modern Physics	(3)
ENGR 210 Introduction to Circuits and Instrumentation	(4)
EMAE 250 Computers in Mechanical Engineering	(3)
EMAE 251 Thermodynamics	(3)
Total	(16)

Third Year

Fall

Breadth Elective Breadth, or Elective*	(3)
EMAE 252 Fluid Mechanics	(3)
EMAE 260 Design and Manufacturing I	(3)
EMAE 350 Mechanical Engineering Analysis	(3)
ECIV 310 Strength of Materials	(3)
Total	(15)

Spring

EMAE 285	Mechanical Engineering Measurements Lab**	(4)	
EMAE 353	Heat Transfer	(3)	
EMAE 359	Aero/Gas Dynamics	(3)	offered Spring only
EMAE 370	Design of Mechanical Elements	(3)	
EMAE 376	Aerostructures	(3)	offered Spring only
EMAE 351	Control of Mechanical Systems	(3)	
	Total	(19)	

Fourth Year

Fall

	Breadth Elective Breadth, or Elective*	(3)	
EMAE 383	Flight Mechanics	(3)	offered Fall only
EMAE 384	Orbital Dynamics	(3)	offered Fall only
EMAE 355	Design of Fluid and Thermal Elements	(3)	
EMAE 360	Design and Manufacturing II	(3)	offered Fall only
	Total	(15)	

Spring

	Breadth Elective Breadth, or Elective*	(3)	
	Breadth Elective Breadth, or Elective*	(3)	
EMAE 356	Aerospace Design	(3)	offered Spring only
EMAE 382	Propulsion	(3)	offered Spring only
EMAE 398	Senior Project***	(3)	
ENGL/ENGR 398 ENGR 399*		(3)	
	Total	(18)	

Total (132 | 131*)

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** UGER Disciplinary Communication course

*** UGER Capstone Project course

TECHNICAL ELECTIVES

All 200-, 300-, and 400-level courses from the following areas:

EMAE, EBME, ECIV, ECSE, EMAC, EMSE, and CSDS

All 300- and 400-level courses in ECHE

All 300-level MATH and STAT courses with the concurrence of the advisor.

OPEN ELECTIVE

You may take *any course you wish* to fill the Open Elective slot.

SCIENCE ELECTIVE (for Mechanical Engineering Major)

SIS is currently setup to accept PHYS 221 or STAT 312 as a science elective.

Other courses for individual students can be selected **with the approval of the student's advisor and the chair** using an Academic Advisement Requirement Form.

If you entered the university in Spring 2023 or earlier

BREADTH ELECTIVE REQUIREMENTS

The General Education Requirements of the Case School of Engineering requires twelve (12) credit-hours of Breadth Electives. The Breadth Elective requirements are satisfied by any course outside of the areas of engineering, natural science, and mathematics offered by:

- the College of Arts and Sciences
- the Weatherhead School of Management
- the Frances Payne Bolton School of Nursing
- the Jack, Joseph, and Morton Mandel School of Applied Social Sciences
- the School of Medicine Department of Bioethics
- the Cleveland Institute of Music
- the Cleveland Institute of Art

Other courses approved by the School of Engineering's Undergraduate Studies Committee are also acceptable. The selection of courses to satisfy this requirement should be done in consultation with the student's academic advisor(s).

If you entered the university in Fall 2023 or later

BREADTH, OR ELECTIVE REQUIREMENTS

The Unified General Education Requirements are in the General Bulletin at the link below:

<https://bulletin.case.edu/undergraduate-academics/unified-general-education-requirements/>

NOTES

All courses may be taken in Fall or Spring unless otherwise noted.

SUGGESTED TECHNICAL ELECTIVES (for Mechanical Engineering Major)

Machine Design

EMAE 272 Actuators and Drive Trains
EMAE 372 / EMSE 372 Structural Materials by Design
EMAE 373 Dynamics of Machinery
EMAE 387 Vibration Problems in Engineering

Manufacturing

EMAE 290 Computer-Aided Manufacturing
EMAE 366 Sustainable Manufacturing
EMAE 368 Machine Learning for Manufacturing
EMAE 390 Advanced Manufacturing Technology

Materials Science

EMSE 276 Materials Properties: Composition and Structure
EMSE 319 Processing and Manufacturing of Materials
EMAE 372 / EMSE 372 Structural Materials by Design
EMSE 379 Design for Lifetime Performance

Biomechanics

EBME 201 Physiology-Biophysics I
EBME 202 Physiology-Biophysics II
EMAE 307 / EBME 317 Fundamentals of Biomechanics
EBME 329 Tissue Biomechanics

Robotics

ECSE 275 Fundamentals of Robotics
ECSE 373 Modern Robot Programming
ECSE 376 Mobile Robotics
EMAE 379 Mechanics and Control of Compliant Robotics

Structural Engineering (minor in Civil Engineering)

ECIV 311 Civil Engineering Materials
ECIV 315 Introduction to Structural Engineering and Analysis
ECIV 373 Reinforced Concrete Design
ECIV 374 Structural Steel Design

Electrochemical Engineering

ECHE 372 Electrochemical Energy Storage
ECHE 381 Electrochemical Engineering
ECHE 383 Chemical Engineering Applied to Microfabrication and Devices
ECHE 384 Corrosion Fundamentals

Computer Engineering (minor in Electrical, Computer, and Systems Engineering)

ECSE 233 Introduction to Data Structures
ECSE 281 Logic Design and Computer Organization
ECSE 314 Computer Architecture
ECSE 315 Digital Systems Design

Electrical Engineering

ECSE 245 Electronic Circuits

ECSE 246 Signals and Systems

ECSE 281 Logic Design and Computer Organization

ECSE 309 Electromagnetic Fields I

Revision Control

- 03/25/2026 Made changes to the schedules for courses EMAE 181, EMAE 250, EMAE 260, and EMAE 285 adjusting the semester taken for AE majors.
Included a list of Suggested Technical Electives for the ME major.
- 10/27/2023 Updated information and course schedules showing changes resulting from the new Unified General Education Requirements (UGER) impacting students who entered the university in Fall 2023 or later
- 11/09/2022 Replaced ENGR 131 with ENGR 130
Included as a Technical Elective courses from CSDS
- 10/12/2021 Updated EMAE 353 offered both Fall and Spring semesters
Introduced new course EMAE 351 replacing ECSE 304
- 10/27/2020 Updated EMAE 251 and EMAE 252 offered both Fall and Spring semesters
Changed department designation from EECS to ECSE
- 03/27/2019 Updated information on CSE Breadth Elective requirements:
replaced Humanities or Social Science electives with Breadth electives
- 10/17/2017 Included information on EMAE Course requirements change