

AEROSPACE ENGINEERING, BSE

Degree: Bachelor of Science in Engineering (BSE)

Major: Aerospace Engineering

Program Overview

The Bachelor of Science in Engineering degree program with a major in Aerospace Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

The Department of Aerospace and Mechanical Engineering also offers a double major in Mechanical and Aerospace Engineering. Students completing this plan of study meet the requirements for both the Aerospace Engineering program and the Mechanical Engineering program. Details of the double major can be found on the Plan of Study tab.

Program Educational Objectives

- Graduates will enter and successfully engage in careers in Aerospace Engineering and other professions appropriate to their background, interests, and skills.
- Graduates will engage in continued learning through post-baccalaureate education and/or professional development in engineering or other professional fields.
- Graduates will develop as leaders in their chosen professions.

Learning Outcomes

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- an ability to communicate effectively with a range of audiences
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Co-op and Internship Programs

Opportunities are available for students to alternate studies with work in industry or government as a co-op student, which involves paid full-time employment over seven months (one semester and one summer). Students may work in one or two co-ops, beginning in the third year of study. Co-ops provide students the opportunity to gain valuable hands-

on experience in their field by completing a significant engineering project while receiving professional mentoring. During a co-op placement, students do not pay tuition but maintain their full-time student status while earning a salary. Learn more at engineering.case.edu/coop. Alternatively or additionally, students may obtain employment as summer interns.

Undergraduate Policies

For undergraduate policies and procedures, please review the Office of Undergraduate Studies section of the General Bulletin.

Accelerated Master's Programs

Undergraduate students may participate in accelerated programs toward graduate or professional degrees. For more information and details of the policies and procedures related to accelerated studies, please visit the Office of Undergraduate Studies section of the General Bulletin.

BS/MS Program

The combined bachelors/masters program allows a student to double count 9 credit hours of graduate course work towards the Bachelor of Science in Engineering degree in any one of the department's two degree programs. By completing the remaining graduate credit hours and a thesis, a student may earn a Master of Science degree in mechanical or aerospace engineering. This typically takes 5 years or slightly longer. Application to this program is initiated in the spring of the junior year with the department's graduate student programs office. A minimum grade point of 3.2 is required for consideration for this accelerated program. Review the Office of Undergraduate Studies BS/MS program requirements here.

BS/MS Academic Program Details

The current regulations for the MS degree by the School of Graduate Studies require a minimum of 18 credit hours of coursework at the 400-level (or higher). Please note that any 400-level course taken prior to admission to the BS/MS Program cannot typically be counted as part of the MS degree. However, EMAE 398 Senior Project may be included in the double counted credit hours toward the MS Thesis, if appropriate.

Follow the link below to learn more about the components of the BS/MS Program.

- [BS/MS Application Process](#)

If you have additional questions, please contact either:

- Professor Chirag Kharangate crk91@case.edu
- Student Affairs Coordinator Nathaniel Vishner cwx75@case.edu

Program Requirements

Students seeking to complete this major and degree program must meet the general requirements for bachelor's degrees and the general requirements of the Case School of Engineering. Students completing this program as a secondary major while completing another undergraduate degree program do not need to satisfy the latter set of requirements.

Code	Title	Hours
Major Courses		
EMAE 160	Mechanical Manufacturing	3
EMAE 181	Dynamics	3

EMAE 250	Computers in Mechanical Engineering	3
EMAE 251	Thermodynamics	3
EMAE 252	Fluid Mechanics	3
EMAE 285	Mechanical Engineering Measurements Laboratory	4
ECIV 310	Strength of Materials	3
EMAE 350	Mechanical Engineering Analysis	3
EMAE 351	Control of Mechanical Systems	3
EMAE 353	Heat Transfer	3
EMAE 355	Design of Fluid and Thermal Elements	3
EMAE 359	Aero/Gas Dynamics	3
EMAE 376	Aerostructures	3
EMAE 383	Flight Mechanics	3
EMAE 384	Orbital Dynamics	3
EMAE 356	Aerospace Design	3
EMAE 382	Propulsion	3
EMAE 398	Senior Project	3
One Technical Elective *		3
For the Engineering Core natural science and math requirement		
PHYS 221	Introduction to Modern Physics	3
Total Hours		61

* Technical Electives by Program:

- All 200-, 300-, and 400-level courses from the following areas: EMAE all, EMAE cross-listed, EBME all, EBME cross-listed, ECIV all, ECIV cross-listed, ESCE all, ESCE cross-listed, EMAC all, EMAC cross-listed, EMSE all, EMSE cross-listed, CSDS all, CSDS cross-listed
- All 300- and 400-level courses in ECHE
- All 300-level MATH and STAT courses with the concurrence of the advisor

Sample Plan of Study

The following is a suggested program of study. Current students should always consult their advisors and their individual graduation requirement plans as tracked in SIS.

First Year

Fall		Hours
CHEM 111	Principles of Chemistry for Engineers ^{**} , ^d	4
MATH 121	Calculus for Science and Engineering I ^{**} , ^d	4
PHYS 121	General Physics I - Mechanics ^{**} , ^d	4
FSCC 100	First Seminar [*]	4
PHED (two half semester classes)		0
Hours		16
Spring		Hours
MATH 122	Calculus for Science and Engineering II ^{**} , ^d	4
PHYS 122	General Physics II - Electricity and Magnetism ^{**} , ^d	4
ENGR 145	Chemistry of Materials ^{**} , ^d	4
ENGR 130	Foundations of Engineering and Programming ^{**} , ^d	3

SAGES University Seminar [*] , ^d	3	
PHED (two half semester classes) [*]	0	
Hours		18

Second Year

Fall		Hours
EMAE 160	Mechanical Manufacturing ^d	3
ENGR 200	Statics and Strength of Materials ^{**} , ^d	3
MATH 223	Calculus for Science and Engineering III ^{**} , ^d	3
EMAE 250	Computers in Mechanical Engineering ^d	3
SAGES University Seminar [*] , ^d	3	
Hours		15
Spring		Hours
ENGR 210	Introduction to Circuits and Instrumentation ^{**} , ^d	4
PHYS 221	Introduction to Modern Physics ^{**} , ^d	3
MATH 224	Elementary Differential Equations ^{**} , ^d	3
EMAE 181	Dynamics ^d	3
EMAE 251	Thermodynamics ^d	3
Hours		16

Third Year

Fall		Hours
Breadth elective ^{**} , ^d	3	
EMAE 285	Mechanical Engineering Measurements Laboratory ^d	4
EMAE 252	Fluid Mechanics ^d	3
ECIV 310	Strength of Materials ^d	3
EMAE 350	Mechanical Engineering Analysis ^d	3
Hours		16
Spring		Hours
Breadth elective ^{**} , ^d	3	
EMAE 351	Control of Mechanical Systems	3
EMAE 353	Heat Transfer ^d	3
EMAE 359	Aero/Gas Dynamics	3
EMAE 376	Aerostructures	3
Hours		15

Fourth Year

Fall		Hours
Breadth elective ^{**} , ^d	3	
EMAE 355	Design of Fluid and Thermal Elements ^d	3
EMAE 383	Flight Mechanics	3
EMAE 384	Orbital Dynamics	3
Open Elective ^d	3	
Hours		15
Spring		Hours
Breadth elective ^{**} , ^d	3	
EMAE 356	Aerospace Design	3
EMAE 382	Propulsion	3
EMAE 398	Senior Project ^d	3
ENGR 398 & ENGL 398	Professional Communication for Engineers and Professional Communication for Engineers ^{**} , ^d	3

Technical Elective ^d	3
Hours	18
Total Hours	129

- * University general education requirement
 ** Engineering general education requirement
 d May be taken fall or spring semester.

Sample Plan of Study: Double Major in Mechanical and Aerospace Engineering

First Year

Fall	Hours
CHEM 111 Principles of Chemistry for Engineers ^{**d}	4
MATH 121 Calculus for Science and Engineering I ^{**d}	4
PHYS 121 General Physics I - Mechanics ^{**d}	4
FSCC 100 First Seminar [*]	4
PHED (two half semester classes) [*]	0
Hours	16

Spring

MATH 122 Calculus for Science and Engineering II ^{**d}	4
PHYS 122 General Physics II - Electricity and Magnetism ^{**d}	4
ENGR 130 Foundations of Engineering and Programming ^{**d}	3
ENGR 145 Chemistry of Materials ^{**d}	4
SAGES University Seminar ^{*d}	3
PHED (two half semester classes) [*]	0
Hours	18

Second Year

Fall	Hours
EMAE 160 Mechanical Manufacturing ^d	3
ENGR 200 Statics and Strength of Materials ^{**d}	3
MATH 223 Calculus for Science and Engineering III ^{**d}	3
EMAE 250 Computers in Mechanical Engineering ^d	3
SAGES University Seminar ^{*d}	3
Hours	15

Spring

ENGR 210 Introduction to Circuits and Instrumentation ^{**d}	4
PHYS 221 Introduction to Modern Physics ^{**d}	3
MATH 224 Elementary Differential Equations ^{**d}	3
EMAE 181 Dynamics ^d	3
EMAE 251 Thermodynamics ^d	3
Hours	16

Third Year

Fall	Hours
Breadth elective ^{**d}	3
EMAE 285 Mechanical Engineering Measurements Laboratory ^d	4
EMAE 252 Fluid Mechanics ^d	3

ECIV 310 Strength of Materials ^d	3
EMAE 350 Mechanical Engineering Analysis ^d	3
Hours	16

Spring

EMAE 260 Design and Manufacturing I ^d	3
EMAE 351 Control of Mechanical Systems	3
EMAE 353 Heat Transfer ^d	3
EMAE 359 Aero/Gas Dynamics	3
EMAE 370 Design of Mechanical Elements ^d	3
EMAE 376 Aerostructures	3
Hours	18

Fourth Year

Fall	Hours
Breadth elective ^{**d}	3
EMAE 383 Flight Mechanics	3
EMAE 384 Orbital Dynamics	3
EMAE 355 Design of Fluid and Thermal Elements ^d	3
EMAE 360 Design and Manufacturing II	3
Hours	15

Spring

EMAE 356 Aerospace Design	3
EMAE 382 Propulsion	3
EMAE 398 Senior Project ^{**d}	3
ENGR 398 & ENGL 398 Professional Communication for Engineers and Professional Communication for Engineers	3
Breadth elective ^{**d}	3
Breadth elective ^{*d}	3
Hours	18
Total Hours	132

- * University general education requirement.
 ** Engineering general education requirement.
 d May be taken fall or spring semester.