AEROSPACE ENGINEERING MINOR

College of Engineering

Program Website (https://www.engineering.cornell.edu/mae/minors/)

Program Description

All undergraduates are eligible to participate in the aerospace minor.

Students intending to earn this minor should seek advice and pre-approval of their minor academic program from the Undergraduate Office in Mechanical Engineering before taking courses toward the minor.

The aerospace minor develops the engineering analysis and design skills necessary for creating and understanding aerospace vehicles and their subsystems. The minor includes diverse topics relevant to applications both in the earth's atmosphere (e.g., aerodynamics) and in space (e.g., spacecraft thermal systems or orbital mechanics). Students in this minor will take at least four core aerospace courses, along with up to two supporting courses in engineering fundamentals or courses with applicability to aeronautics and spacecraft.

Academic Standards

A grade of at least C– in each course. If a course is offered only S–U, a grade of S is acceptable.

Minor Requirements

At least six (6) courses (minimum of 18 credits) from the lists below must be completed. At most one course from outside Cornell can be used in place of one of those listed below, by petition. Any course used to satisfy early Master of Engineering (M.Eng.) graduation requirements may not be used for the aerospace minor.

Rules for Selecting Courses

Rules for Mechanical Engineering (ME) Majors

- Select at least four Core Aerospace Engineering courses, of which one must choose MAE 3050 Introduction to Aeronautics or MAE 4060 Introduction to Spaceflight Mechanics (or both).
- Select at most two Applicable to Aerospace Engineering courses. No Fundamentals courses may be used.
- Two courses must be selected from the Aerospace Engineering subject field under the Major Approved Electives list in Mechanical Engineering (https://www.engineering.cornell.edu/mae/degree/mechanical-engineering-bs-requirements/). These two courses may not be used toward fulfillment of the Mechanical Engineering B.S. degree requirements.

Rules for Other Majors

- Select at least four Core Aerospace Engineering courses, of which you must choose MAE 3050 Introduction to Aeronautics or MAE 4060 Introduction to Spaceflight Mechanics (or both).
- Select at most two Applicable to Aerospace Engineering and Fundamentals courses from group B and group C.
- Students may not use any courses to satisfy requirements of both the Mechanical Engineering Minor and the Aerospace Engineering Minor.

Code	Title	Hours
Core Aerospace Engineering		
Select at least four of the following:		
MAE 3050	Introduction to Aeronautics	4
MAE 4060	Introduction to Spaceflight Mechanics	3
MAE 4150	GPS: Theory and Design	4
MAE 4160	Spacecraft Technology and Systems Architecture	3
or MAE 4161	Spacecraft Technology and Systems Architecture	
or MAE 5160	Spacecraft Technology and Systems Architecture	
MAE 4900	Individual and Group Projects in Mechanical Engineering (with Aerospace Focus) [1]	1-4
ENGRG 3400	Engineering Student Project Teams	1-3
MAE 4230	Intermediate Fluid Dynamics	3
or MAE 4231	Intermediate Fluid Dynamics	
or MAE 5230	Intermediate Fluid Dynamics with CFD	
MAE 4440	Spacecraft Thermal Management	3
or MAE 4441	Spacecraft Thermal Management	
or MAE 5440	Spacecraft Thermal Management	
MAE 4510	Propulsion of Aircraft and Rockets	3
or MAE 5510	Propulsion of Aircraft and Rockets	
MAE 4540	Propulsion of Spacecraft	3
or MAE 5540	Propulsion of Spacecraft	
MAE 4070	Dynamics of Flight Vehicles	3
or MAE 5070	Dynamics of Flight Vehicles	

[1] MAE 4291 Supervised Senior Design Experience and MAE 4900 Individual and Group Projects in Mechanical Engineering require a form signed by the project advisor, stating that the project focuses on aerospace and is suitable as a core aerospace course for the minor. MAE 4291 Supervised Senior Design Experience or MAE 4900 Individual and Group Projects in Mechanical Engineering must be worth 3 credits or more. Students may count at most one MAE 4291 Supervised Senior Design Experience OR one MAE 4900 Individual and Group Projects in Mechanical Engineering toward the minor (i.e. students may not count both MAE 4291 Supervised Senior Design Experience and MAE 4900 Individual and Group Projects in Mechanical Engineering toward the minor).

Code	Title	Hours
Courses Applicable to Aerospace Engineering		
MAE 4020	Wind Power	3
or MAE 4021	Wind Power	
or MAE 5020	Wind Power	
MAE 4130	Mechanics of Composite Structures	4
or MAE 4131	Mechanics of Composite Structures	
MAE 4180	Autonomous Mobile Robots	3
or MAE 5180	Autonomous Mobile Robots	
MAE 4770	Engineering Vibrations	3-4
or MAE 5700	Finite Element Analysis for Mechanical and Aerospace Design	
MAE 4730	Intermediate Dynamics	3
or MAE 5730	Intermediate Dynamics	
MAE 4770	Engineering Vibrations	3
or MAE 5770	Engineering Vibrations	

MAE 4780	Feedback Control Systems	4
or MAE 5780	Feedback Control Systems	
MAE 5130	Mechanical Properties of Thin Films (crosslisted)	3
MAE 5430	Combustion Processes	3
MAE 6510	Advanced Heat Transfer	4

Code	Title	Hours
Fundamentals		
ENGRD 2020	Statics and Mechanics of Solids	4
MAE 2030	Dynamics	4
ENGRD 2210	Thermodynamics	3
MAE 3230	Introductory Fluid Mechanics	4
MAE 3240	Heat Transfer	3
MAE 3260	System Dynamics	4
MAE 3270	Mechanics of Engineering Materials	4
MAE 3780	Mechatronics	4
or MAE 3783	Mechatronics	
ECE 2100	Introduction to Circuits for Electrical and Computer Engineers	4
PHYS 3360	Electronic Circuits	4

Graduation Requirements for Engineering Minor Degree Programs

Requirements

Students may pursue minors in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the students' major. Completed minors will appear on the student's transcript. Not all departments offer minors. Additional information on specific minors can be found above, in the *Engineering Undergraduate Handbook*, in the undergraduate major office of the department or school offering the minor, and in Engineering Advising.

An engineering minor recognizes formal study of a particular subject area in engineering normally outside the major. Students undertaking a minor are expected to complete the requirements during the time of their continuous undergraduate enrollment at Cornell. Completing the requirements for an engineering minor (along with a major) may require more than the traditional eight semesters at Cornell. However, courses that fulfill minor requirements may also satisfy other degree requirements (e.g., distribution courses, advisor-approved, or major-approved electives), and completion within eight semesters is possible.

An engineering minor requires:

- successful completion of all requirements for an undergraduate degree.
- enrollment in a major that approves participation in the minor.
- satisfactory completion of six courses (at least 18 credits) in a college-approved minor.

Students may apply for certification of a minor at any time after the required course work has been completed in accordance with published standards. An official notation of certification of a minor appears on the Cornell transcript following graduation.