

AEROSPACE ENGINEERING, BS

REQUIREMENTS

UNIVERSITY REQUIREMENTS

All undergraduate students must complete both the following Core General Education (Core GenEd) and University Degree and Quality of Work requirements. The requirements below apply to students whose first term at UW-Madison or whose earliest post-high school college attendance at any institution is Summer 2026 or later.

Students whose first term at UW-Madison or whose earliest post-high school college attendance at any institution occurred before Summer 2026 should refer to the archived Guide (<https://guide.wisc.edu/archive/>) for the requirements that apply to them.

CORE GENERAL EDUCATION (CORE GENED) REQUIREMENTS

Civics & Perspectives 3 credits of Civics & Perspectives coursework.

Communication & Literacy 6 credits of Communication & Literacy coursework. This requirement may be partially satisfied by a qualifying placement test score. More information: <https://go.wisc.edu/qualifyingenglishplacement> (<https://go.wisc.edu/qualifyingenglishplacement/>)

Humanities & Arts 6 credits of Humanities & Arts coursework.

Mathematics & Quantitative Reasoning 6 credits of Mathematics & Quantitative Reasoning coursework. This requirement may be partially satisfied by a qualifying placement test score. More information: <https://go.wisc.edu/qualifyingmathplacement> (<https://go.wisc.edu/qualifyingmathplacement/>)

Natural Science & Wellness Complete both:

- 6 credits of Natural Science & Wellness or Natural Science & Wellness + Laboratory coursework.
- one course must be in Natural Science & Wellness + Laboratory coursework.

Social & Behavioral Science 3 credits of Social & Behavioral Science coursework.

Total Credits 30 credits.

For more information see the policy (<https://policy.wisc.edu/library/UW-1095/>).

UNIVERSITY DEGREE AND QUALITY OF WORK REQUIREMENTS

All undergraduate degree recipients must complete the following minimum requirements. Requirements for some programs will exceed these requirements; see program requirements for additional information.

Total Degree 120 degree credits.

Residency Complete 30 credits in residence. A course is considered "in residence" if it is taken when in undergraduate degree-seeking status and:

- is offered by UW-Madison and completed on the UW-Madison campus or at an approved off-site location, or
- is offered by UW-Madison in an online or distance format, or is completed during participation in a UW-Madison study abroad/study away program.

Quality of Work Achieve at least the minimum grade point average specified by the school, college, and/or academic program.

Math Demonstrate minimal mathematics competence by:

- placing above MATH 96, or
- successfully completing MATH 96, or
- successfully completing a more advanced mathematics course such as MATH 112, MATH 113, MATH 114, MATH 141, MATH 211, or MATH 221.

English Language If required to take the UW-Madison English as a Second Language Assessment Test (MSN-ESLAT), demonstrate minimal English language competence by:

- earning credit for ESL 118, or
- achieving a qualifying MSN-ESLAT placement test score.

Language Complete one:

- 2 high school units of a single language other than English, or
- one course with the second semester Language designation.

Major Declaration Declare and complete the requirements for at least one major.

COLLEGE OF ENGINEERING DEGREE GRANTING PROGRAMS' COMMON REQUIREMENTS

The College of Engineering departments collaborated and adopted a common set of guidelines in their degree granting program (major) requirements. Engineering departments incorporate specific coursework within their curricula to meet these guidelines. Students should refer to specific coursework detailed below the Summary of Requirements.

COLLEGE OF ENGINEERING DEGREE GRANTING PROGRAMS' COMMON REQUIREMENTS

Communication All College of Engineering majors require two levels of communication coursework:

- Engineering Communication 1: one course with the Communication A designation or satisfaction of Communication A based on eligible UW Placement Score.
- Engineering Communication 2: each major specifies one course (e.g. INTEREGR 397) which also carries the Communication B designation.

Quantitative Reasoning All College of Engineering majors require a math sequence that incorporates two levels of quantitative reasoning.

Humanities or Literature All College of Engineering majors require a minimum of 6 credits with the Humanities or Literature breadth designations. See major Liberal Studies Electives Requirement below.

Social Sciences All College of Engineering majors require a minimum of 3 credits with the Social Sciences breadth designation. See major Liberal Studies Electives Requirement below.

Natural Sciences All College of Engineering majors require specific coursework that incorporates a minimum of 6 credits with the Biological, Natural, or Physical Science breadth designations.

Ethnic Studies All College of Engineering majors require at least one course of at least 3 credits with the Ethnic Studies designation. This course may also be used to satisfy the Social Sciences or Humanities or Literature requirement.

AEROSPACE ENGINEERING, BS CURRICULUM

This curriculum applies to students admitted to the degree program this Guide academic year. Curricular requirements for students admitted in previous semesters are available in the Archive (<https://guide.wisc.edu/archive/>) section of Guide.

SUMMARY OF REQUIREMENTS

Code	Title	Credits
Mathematics and Statistics ¹		22
Science ¹		9
Engineering Science		29
Aerospace Engineering Core		36
Technical Electives		12
Communication Skills		6
Liberal Studies Electives		15
Total Credits		129

¹ If the Mathematics and Statistics and the Science requirements are fulfilled with fewer than 30 credits combined, additional math/science credits will be needed to meet the math/science auxiliary credit condition.

MATHEMATICS AND STATISTICS

Code	Title	Credits
MATH 221	Calculus and Analytic Geometry 1	5
MATH 222	Calculus and Analytic Geometry 2	4
MATH 234	Calculus--Functions of Several Variables	4
MATH 320	Linear Algebra and Differential Equations ¹	3
MATH 321	Applied Mathematical Analysis 1: Vector and Complex Calculus	3
STAT 324	Introduction to Statistics for Science and Engineering	3
or I SY E 210	Introduction to Industrial Statistics	
Total Credits		22

¹ The MATH 320 requirement may also be satisfied by combining MATH 319 and MATH 340. In that case, MATH 340 may count towards technical elective requirements.

SCIENCE

Code	Title	Credits
Select one of the following:		
CHEM 103	General Chemistry I	4-5
or CHEM 104	General Chemistry II	
or CHEM 109	Advanced General Chemistry	
PHYSICS 202	General Physics	5
Total Credits		9-10

ENGINEERING SCIENCE

Code	Title	Credits
E M A 200	Introduction to Aerospace Engineering ¹	3
or M E 201	Introduction to Mechanical Engineering	
M E 231	Geometric Modeling for Design and Manufacturing	3
COMP SCI 220	Data Science Programming I ²	4
E M A/E P 471	Intermediate Problem Solving for Engineers ³	3
E M A 201	Statics (with a grade of C or better) ⁴	3
E M A 202	Dynamics (with a grade of C or better)	3
E M A 303	Mechanics of Materials (with a grade of C or better)	3
E M A/M E 307	Mechanics of Materials Lab	1
M E 361	Thermodynamics (with a grade of C or better)	3
M E 363	Fluid Dynamics	3
Total Credits		29

¹ E M A 200 or M E 201 are preferred introduction to engineering options. E M A 200 is offered in the fall only. M E 201 can be taken in either semester. If a student begins in another engineering major, other introduction to engineering courses can count for the introduction to engineering requirement.

² COMP SCI 220 Data Science Programming I is the preferred required computer science course. If a student needs to take COMP SCI 300 Programming II to satisfy requirements for another major or certificate, COMP SCI 300 Programming II can count for this computer science requirement. Note however that COMP SCI 300 Programming II is not a satisfactory pre-requisite for E M A/E P 471 Intermediate Problem Solving for Engineers.

³ E P/E M A 471 is the preferred second required computing course. If a student took COMP SCI 300 instead of COMP SCI 220 to satisfy requirements for another major or certificate, they may not satisfy the pre-requisites for E P/E M A 471. Instead, COMP SCI/MATH 513, COMP SCI/MATH 514, or COMP SCI 412 can count for this second computing course requirement. Note that MATH 322 (PDEs) is a pre-requisite for COMP SCI/MATH 514.

⁴ Students may substitute PHYSICS 201 General Physics, 5 credits, for E M A 201 Statics, 3 credits, with the approval of their advisor.

AEROSPACE ENGINEERING CORE ¹

Code	Title	Credits
M E 340	Dynamic Systems	3
E M A 442	Advanced Dynamics	3
E M A 450	Orbital Mechanics ²	3
E M A 406	Aerospace Structures	3
E M A 421	Aerodynamics	3
E M A 422	Aerodynamics Laboratory	3
E M A 423	Flight Dynamics and Control ³	3
E M A/M E 425	Gasdynamics	3
E M A 426	Aerospace Propulsion	3
E M A 405	Practicum in Finite Elements	3
E M A 351	Aerospace Design I	3
E M A 352	Aerospace Design II	3
Total Credits		36

¹ Some of the required courses may not be offered every semester. Check course availability in the Future Course Offering document on the department intranet or talk with your advisor.

² E M A 450 Orbital Mechanics is the preferred course but this requirement may also be fulfilled with E M A 642 Satellite Dynamics.

³ E M A 423 Flight Dynamics and Control is the preferred course but this requirement may also be fulfilled with M E/E M A 458 Introduction to Feedback Control of Autonomous Systems.

TECHNICAL ELECTIVES

Code	Title	Credits
Select 12 credits from the following:		12
Courses numbered 300+ in the College of Engineering except for E P D/INTEREGR		
Courses numbered 300+ MATH, PHYSICS, COMP SCI, STAT (except STAT 301), ASTRON, MED PHYS, and CHEM departments		

Up to 3 technical elective credits may be obtained for non-formal courses such as independent study courses (E M A 488, E M A 489, M E 489, E M A 599, and other engineering independent study courses numbered 399 and higher); and Cooperative Education (E M A 1). Students may propose a course that they feel will benefit their aerospace engineering education path. To be a strong candidate, the proposed course should have pre-requisites of two physics or calculus courses. For these courses, the curriculum committee will review the request and if approved, recommend a DARS substitution.

COMMUNICATION SKILLS

Code	Title	Credits
Engr Comm 1		3
INTEREGR 156	Introduction to Writing, Speaking, and Ethics for Engineers	
or ENGL 100	Introduction to College Composition	
or COM ARTS 1C	Introduction to Speech Composition	
or LSC 100	Science and Storytelling	

or ESL 118	Academic Writing II	
Engr Comm 2		3
INTEREGR 397	Engineering Communication	
Total Credits		6

LIBERAL STUDIES ELECTIVES

Code	Title	Credits
College of Engineering Liberal Studies Requirements		
Complete Requirements (https://guide.wisc.edu/undergraduate/engineering/#requirementstext)		15
Total Credits		15

Additional Information: Students fulfilling all course requirements with fewer than 129 credits must comply with the credit minimum by taking additional free elective credits. Students must meet the math/science auxiliary credit condition with a minimum of 30 credits. Students in good academic standing may take free elective courses pass/fail (see the College of Engineering Official Regulations for details). Pass/fail courses do not count toward specific degree requirements.

For information on credit load, adding or dropping courses, course substitutions, pass/fail, auditing courses, dean's honor list, repeating courses, probation, and graduation, see the College of Engineering Official Regulations. (<https://guide.wisc.edu/undergraduate/engineering/#policiesandregulationstext>)

HONORS IN UNDERGRADUATE RESEARCH PROGRAM

The Department of Mechanical Engineering's Undergraduate Honors in Research Program offers students the opportunity to contribute to the creation of new knowledge and experience the research process. Participants work closely with a faculty advisor and complete a senior thesis based on their research.

ADMISSION REQUIREMENTS

Code	Title	Credits
Complete at least 2 semesters on the UW-Madison campus		
Have a cumulative GPA of at least 3.5		
Have completed progression in Aerospace Engineering		
Obtain approval from a faculty member who agrees to serve as the thesis advisor		

ENROLLMENT PROCESS

To enroll in the Honors in Research program

1. Identify and confirm a faculty member (<https://engineering.wisc.edu/departments/mechanical-engineering/people/>) who is willing to serve as your research advisor.
2. Ask your faculty advisor to send an email to aero-ema-enrollment@engr.wisc.edu, with you copied (cc'd), confirming they will serve as your advisor for the Honors in Research project.
3. Once confirmation is received, you will be granted permission to enroll in E M A 488 Honors in Research I.

COMPLETION REQUIREMENTS

Students who fulfill the following criteria will receive the "Honors in Research" designation on their transcript and diploma:

Code	Title	Credits
Satisfy all requirements for the BS in Aerospace Engineering		
Maintain a cumulative GPA of 3.3 or higher		
E M A 488	Honors in Research I	3
or E M A 599	Independent Study	
or M E 491	Mechanical Engineering Projects I	
E M A 489	Honors in Research II (with grade of B or better)	3
Complete and submit a senior thesis		
(Optional) Present the thesis formally, at the discretion of the faculty advisor		