AEROSPACE ENGINEERING, BS

As an aerospace engineering major, you will learn how to design and analyze aerospace systems and subsystems. The program covers both atmospheric flight (aeronautics) relevant to airplanes or drones, as well as space flight (astronautics) pertinent to rockets or satellites. You will also have the opportunity to broaden your expertise in areas as wide-ranging as thermal systems, controls, computational mechanics, aerospace structures, manufacturing, and many more.

Throughout the program, you will build a strong foundation in core engineering disciplines while developing problem-solving skills essential for real-world applications. The program has a strong focus on modeling, simulation, and computing for aerospace systems. In addition, it also offers extensive opportunities for hands-on learning, including:

- required laboratories in mechanics of materials, aerodynamics, and flight controls (flight simulator). Optional laboratories in manufacturing, measurements, vibrations, mechatronics, and more as part of the undergraduate curriculum.
- a two-semester senior design capstone course, in which you will work in teams to design solutions to aerospace engineering challenges, with projects focused on the conceptual and preliminary design of aircraft and/or spacecraft, including hands-on prototyping.
- access to state-of-the-art makerspace and workshops.
- participating in world-class research, collaborating with graduate students and researchers in our faculty's labs.
- getting involved in student organizations and competition teams.

An aerospace engineering degree opens doors to a variety of careers. You will benefit from a large network of alumni, many of whom have been successful in the aerospace industry and beyond, including in other engineering disciplines, finance, healthcare, law, or business.

HOW TO GET IN

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ADMISSION TO THE COLLEGE AS A FIRST-YEAR STUDENT

Students applying to UW–Madison (https://www.admissions.wisc.edu/apply/) need to indicate an engineering major (https://engineering.wisc.edu/degrees-programs/undergraduate/) as their first choice in order to be considered for direct admission to the College of Engineering. Direct admission means that students get to start their college career in the engineering program of their choice and have access to engineering-specific resources and facilities. Students who are directly admitted need to meet progression requirements (https://engineering.wisc.edu/student-services/undergraduate-student-advising/progression/) at the end of the first year to guarantee advancement in that program.

CURRENT UW-MADISON STUDENTS (CROSS-CAMPUS TRANSFER TO ENGINEERING)

Requirements	Details
How to get in	Application required. Meeting the requirements listed below does not guarantee admission. (https://engineering.wisc.edu/admissions/undergraduate/cross-campus-students (https://engineering.wisc.edu/admissions/undergraduate/cross-campus-students/)/)
Application restrictions	• Students may apply a maximum of two times. • Students who have earned more than 72 course credits at UW-Madison (as indicated on the UW-Madison transcript) at the time of application are not eligible to apply for admission to the College of Engineering. Course credits in progress at the time of application are not included in the COE Credit Limit. • Students may apply to only one engineering degree program per admissions cycle. • Students who meet course/credit requirements and have a Core GPA below 2.500 would not be considered for admission in their selected engineering degree program (major) without an appeal process. All graded UW-Madison courses referenced in the Foundational Courses List and any degree program engineering courses level 200 or higher will be counted in the Core GPA (excludes E P D, INTEREGR, special topics, independent study, and seminar courses). All graded UW-Madison courses count in the Overall GPA. For one and only one of these core courses that a student has repeated, the more recent of the two grades will be used in the calculation of Core and Overall GPAs for admission purposes. Students may not be considered for admission if on academic probation for GPA reasons at time of review.
Credits required to get in	24 graded credits completed at UW-Madison, including at least one full-time (12 credit) semester. English as a Second Language course credits count toward the 24 credit minimum.
Courses required to get in	Engr Comm 1 (Comm A) requirement taken on a graded basis at UW-Madison. If the Comm A requirement has been satisfied through placement test, AP/IB, or transfer credit, then a liberal studies course of at least 3 credits (breadth designation of Humanities, Literature, or Social Sciences) must be taken on a graded basis at UW-Madison. Math course sequence through MATH 222. Four foundational courses completed on a graded basis at UW-Madison, as defined in the Foundational Courses List below.

Foundational courses list

Four Foundational Courses must be completed at UW-Madison as defined in 1. and 2.

1. Math Foundation

A minimum of two math courses numbered 221 or higher; one math course 300 level or higher; or calculus sequence completed through MATH 234. Excludes MATH 228, MATH/HIST SCI 473, special topics, independent study, seminar, pass/fail, and credit/no credit courses.

2. Engineering Foundation

A minimum of two courses as defined below:

Chemical Engineering:

(i) one course must be CHEM 104 or higher
(ii) one course must be PHYSICS 201/E M A 201 or higher

If the above two course requirements are completed with transfer or test credit, select from additional engineering foundation courses in (ii) below.

Aerospace Engineering, Biomedical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Engineering Mechanics, Engineering Physics, Environmental Engineering, Geological Engineering, Industrial Engineering, Materials Science and Engineering, Mechanical Engineering, Nuclear Engineering:

(i) one course must be CHEM 104 or higher OR PHYSICS 201/E M A 201 or higher
(ii) one other engineering foundation course from the following subject codes:

- Chemistry
- E M A 201, E M A 202, E M A 303
- PHYSICS 201 or higher
- Statistics, calculus-based
- COMP SCI 200, COMP SCI 220, COMP SCI 300 or higher, excluding COMP SCI 304
- excludes special topics, independent study, seminar, pass/fail, and credit/no credit courses

3. Additional foundational course options, if applicable

If the math and engineering foundational courses for the degree program are complete, then degree program engineering courses 200 level or higher can be taken to complete the Four Foundational Courses requirement. Excludes EPD, InterEGR, special topics, independent study, seminar, pass/fail, and credit/no credit courses.

Additional considerations

Cross-campus admission is selective. The admissions committee considers applicants' grades/grade trends, academic rigor, and personal statement. The College of Engineering offers an online information tutorial and advising (https://engineering.wisc.edu/admissions/undergraduate/cross-campus-students/) for students to learn about the cross-campus transfer process.

Semester	Deadline to apply	Decision notification timeline
To apply for a fall start	Mid May	Late June
To apply for a spring start	Late December/Early January	Late January
To apply for a summer start	This program does not accept applications to start in the summer.	

OFF-CAMPUS TRANSFER TO ENGINEERING

With careful planning, students at other accredited institutions can transfer coursework that will apply toward engineering degree requirements at UW–Madison. Off-campus transfer applicants are considered for direct admission to the College of Engineering by applying to the Office of Admissions with an engineering major listed as their first choice. Those who are admitted to their intended engineering program must meet progression requirements (https://engineering.wisc.edu/admissions/undergraduate/transfer-from-off-campus/) at the point of transfer or within their first two semesters at UW–Madison to guarantee advancement in that program. Transfer admission to the College of Engineering is selective. A minimum of 30 credits in residence in the College of Engineering is required after transferring, and all students must meet all requirements for their engineering major.

The College of Engineering has dual degree transfer agreements with select four-year UW System campuses and a transfer agreement with Madison College. Eligible students in COE's transfer agreements automatically meet progression at the point of transfer.

Off-campus transfer students are encouraged to discuss their interests, academic background, and admission options with the Transfer & Academic Program Manager in the College of Engineering: ugtransfer@engr.wisc.edu.

SECOND BACHELOR'S DEGREE

The College of Engineering does not accept second undergraduate degree applications. Second degree student (https://engineering.wisc.edu/admissions/undergraduate/adult-students-second-degree-students/)s (https://engineering.wisc.edu/student-services/undergraduate-student-advising/) might explore the Biological Systems Engineering program at UW–Madison, an undergraduate engineering degree elsewhere, or a graduate program in the College of Engineering.

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.
Communicatio & 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:		4-5
CHEM 103	General Chemistry I	
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 10	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		

LEARNING OUTCOMES

LEARNING OUTCOMES

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. 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
3. an ability to communicate effectively with a range of audiences
4. 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
5. 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

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

FOUR-YEAR PLAN

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First Year

Fall	Credits	Spring	Credits
E M A 200	3	Engr Comm 1 or	3
or Engr Comm 1		M E 201	
MATH 221	5	E M A 201	3
CHEM 103, 104, or 109	4	M E 231	3
Liberal Studies	3	MATH 222	4
		Liberal Studies	3
	15		**16**

Second Year

Fall	Credits	Spring	Credits
E M A 202	3	E M A 303	3
PHYSICS 202	5	E M A/M E 307	1
MATH 234	4	M E 361	3
COMP SCI 220	4	MATH 320	3
		E M A/E P 471	3
		Liberal Studies	3
	16		**16**

Third Year

Fall	Credits	Spring	Credits
M E 363	3	STAT 324	3
E M A 406	3	E M A/M E 425	3
MATH 321	3	E M A 421	3
M E 340	3	E M A 442	3
E M A 405	3	INTEREGR 397	3
	15		**15**

Fourth Year

Fall	Credits	Spring	Credits
E M A 450	3	E M A 422	3
Tech Elective	3	E M A 423	3
Tech Elective	3	E M A 352	3
E M A 351	3	Tech Elective	3
E M A 426	3	Tech Elective	3
Liberal Studies	3	Liberal Studies	3
	18		**18**

Total Credits 129

ADVISING AND CAREERS

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ADVISING

Every College of Engineering undergraduate has an assigned academic advisor (https://engineering.wisc.edu/student-services/undergraduate-student-advising/). Academic advisors support and coach students through their transition to college and their academic program all the way through graduation.

Advisors help students navigate the highly structured engineering curricula and course sequencing, working with them to select courses each semester.

When facing a challenge or making a plan toward a goal, students can start with their academic advisor. There are many outstanding resources at UW–Madison, and academic advisors are trained to help students navigate these resources. Advisors not only inform students about the various resources, but they help reduce the barriers between students and campus resources to help students feel empowered to pursue their goals and communicate their needs.

Students can find their assigned advisor in their MyUW Student Center.

ENGINEERING CAREER SERVICES

Engineering Career Services (https://ecs.wisc.edu) (ECS) assists students in finding work-based learning experiences such as co-ops and summer internships, exploring and applying to graduate or professional school, and finding full-time professional employment.

ECS offers two large career fairs per year, assists students with resume building and developing interviewing skills, hosts skill-building workshops, and meets one-on-one with students to discuss offer negotiations.

Students are encouraged to engage with the ECS office early in their academic careers. For more information on ECS programs and workshops, visit: https://ecs.wisc.edu.

ACCREDITATION

ACCREDITATION

This program will seek accreditation from the Engineering Accreditation Commission of ABET (https://www.abet.org/), http://www.abet.org. Application for accreditation will be made at the earliest opportunity, in 2028, with an ABET decision in 2029. If accreditation is awarded, it may be retroactively applied to those who graduated beginning December 2027.

PROGRAM EDUCATIONAL OBJECTIVES FOR THE BACHELOR OF SCIENCE IN AEROSPACE ENGINEERING

We recognize that our graduates will choose to use the knowledge and skills that they have acquired during their undergraduate years to pursue a wide variety of career and life goals, and we encourage this diversity of paths. Whatever path our graduates may choose, we expect them to be meeting the following objectives at least three to five years after graduation:

1. They will exhibit a fundamental understanding of broader engineering disciplines with strong skills in aerospace engineering, problem solving, leadership, teamwork, and communication.
2. They will use these skills to contribute to their organizations and communities.
3. They will make thoughtful, well-informed decisions in their career and life.
4. They will demonstrate a continuing commitment to and interest in their own and others' education.