# 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. |
| Communicatio & Literacy | 6 credits of Communication & Literacy coursework. This requirement may be partially satisfied by a qualifying placement test score. For more information see this tiny url: 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. For more information see this tiny url: https://go.wisc.edu/qualifyingmathplacement (https://go.wisc.edu/qualifyingmathplacement/) |
| Natural Science & Wellness | Complete both:<br>• 6 credits of Natural Science & Wellness or Natural Science & Wellness + Laboratory coursework.<br>• 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:<br>• is offered by UW-Madison and completed on the UW-Madison campus or at an approved off-site location, or<br>• 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:<br>• placing above MATH 96,<br>• successfully completing MATH 96 at UW-Madison, or<br>• transferring the equivalent of MATH 96 or a more advanced mathematics course from another institution (content such as MATH 112, 114, 211, 221, 222, 234). |
| English Language | If required to take the UW-Madison English as a Second Language Assessment Test (MSN-ESLAT), demonstrate minimal English language competence by:<br>• earning credit for ESL 118 at UW-Madison, or<br>• achieving a qualifying MSN-ESLAT placement test score. |
| Language | Complete one:<br>• 2 high school units of a single language other than English, or<br>• 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:<br>• Engineering Communication 1: one course with the Communication A designation or satisfaction of Communication A based on eligible UW Placement Score.<br>• 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 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 | | |

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|---|
| 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 | | |