AEROSPACE ENGINEERING SCIENCES - BACHELOR OF SCIENCE (BSAE)

The undergraduate curriculum in aerospace engineering sciences is designed to prepare students to advance to a distinguished professional career in the aerospace industry or for graduate school, consistent with our stated program educational objectives. In particular, this involves providing students with an interdisciplinary systems perspective of aerospace engineering. The curriculum accomplishes these goals by:

- providing a strong basis in mathematics, science, and engineering fundamentals;
- extending these fundamentals to advanced topics in aerospace engineering;
- complementing the engineering education with sufficient exposure to the humanities and social sciences; and
- beginning and ending in major design experiences that stress an interdisciplinary systems perspective.

AES students are also encouraged to consider a technical minor or double major in electrical engineering, computer science, applied math, engineering physics, astrophysical and planetary sciences, or atmospheric and oceanic sciences. In most cases, the junior- and senior-level courses required for the above-mentioned minors can be applied to the professional area elective requirements.

For students having sufficient ability and interest, planning for graduate study should begin by the start of the junior year. Such a plan should consider the foreign language requirements of appropriate graduate schools and an advanced mathematics program. Students who wish to combine the business and aerospace engineering sciences curricula are advised to consider obtaining the BS degree in aerospace and a master’s degree in business rather than a combined BS degree.

For more information, visit the department’s Prospective Students (https://www.colorado.edu/aerospace/prospective-students/undergraduates) webpage.

Requirements
Prerequisites and Passing Grades
The minimum passing grade for a course that is a prerequisite for another required course is C. If a grade of C- or lower is received in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C or higher.

The minimum passing grade for a course that is not specifically a prerequisite for another required course is D-.

The Ann and HJ Smead Department of Aerospace Engineering Sciences (AES) reserves the right to drop students enrolled in ASEN courses who have not met the minimum prerequisite grade requirements. It is the student’s responsibility to communicate with the department if summer course work and/or transfer credit will be used to meet the prerequisite requirement.

Course Requirements
The BS curriculum in aerospace engineering sciences is revised annually to keep up with new advances in technology, to make use of new educational methodologies, and to satisfy updated program accreditation criteria. A total of 128 credit hours is required.

Professional Area Electives
- Any ASEN course at the 4000 level or above that is not a required course can be used as a professional area elective.
- A professional area elective (PAE) is generally a course in math, engineering, or science at the 3000-level or above. Elective courses most likely to help an aerospace engineer's career development are ASEN, APPM, CSCI, ECEN and PHYS courses. It is suggested that students secure advance approval for professional area elective courses from their advisor.
- Upper-division independent study from technical areas (math, science, and engineering) is acceptable for up to 6 credit hours of professional area elective credit.

A full listing of approved PAE courses can be found in the degree audit.

Recommended Four-Year Plan of Study

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freshman</strong></td>
<td></td>
<td></td>
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<tr>
<td>Fall Semester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPM 1350</td>
<td>Calculus 1 for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>First-Year Projects course</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Humanities or social science elective ¹</td>
<td></td>
<td>3</td>
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<tr>
<td>CSCI 1320</td>
<td>Computer Science 1: Starting Computing-Engineering Applications</td>
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<tr>
<td>Free Elective</td>
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<tr>
<td><strong>Total</strong></td>
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<tr>
<td><strong>Spring Semester</strong></td>
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<tr>
<td>APPM 1360</td>
<td>Calculus 2 for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>ASEN 1022</td>
<td>Materials Science for Aerospace Engineers</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 1110</td>
<td>General Physics 1</td>
<td>4</td>
</tr>
<tr>
<td>Humanities or social science elective ¹</td>
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</tr>
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<td><strong>Total</strong></td>
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<tr>
<td><strong>Sophomore</strong></td>
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<tr>
<td>Fall Semester</td>
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<tr>
<td>APPM 2350</td>
<td>Calculus 3 for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>ASEN 2001</td>
<td>Aerospace 1: Introduction to Statics, Structures, and Materials</td>
<td>4</td>
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<tr>
<td>ASEN 2002</td>
<td>Aerospace 2: Introduction to Thermodynamics and Aerodynamics</td>
<td>4</td>
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<td>ASEN 2012</td>
<td>Experimental and Computational Methods in Aerospace Engineering Sciences</td>
<td>2</td>
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<tr>
<td>Free electives</td>
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<tr>
<td><strong>Total</strong></td>
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<td>16</td>
</tr>
<tr>
<td><strong>Spring Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPM 2360</td>
<td>Introduction to Differential Equations with Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>ASEN 2003</td>
<td>Aerospace 3: Introduction to Dynamics and Systems</td>
<td>5</td>
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<tr>
<td>ASEN 2004</td>
<td>Aerospace 4: Aerospace Vehicle Design and Performance</td>
<td>5</td>
</tr>
<tr>
<td>Humanities or social science elective ¹</td>
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<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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<td>17</td>
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</tbody>
</table>
Aerospace Engineering Sciences - Bachelor of Science (BSAE)

Junior
Fall Semester
ASEN 3111 Aerodynamics 4
ASEN 3112 Structures 4
ASEN 3113 Thermodynamics and Heat Transfer 4
PHYS 1120 General Physics 2 4
Credit Hours 16

Spring Semester
ASEN 3128 Aircraft Dynamics 4
ASEN 3200 Orbital Mechanics/Attitude Dynamics and Control 4
ASEN 3300 Aerospace Electronics and Communications 4
Professional area elective 3
Credit Hours 15

Senior
Fall Semester
ASEN 4013 Foundations of Propulsion 3
ASEN 4018 Senior Projects 1: Design Synthesis 4
College-approved writing course 2
Professional area electives 6
Credit Hours 16

Spring Semester
ASEN 4028 Senior Projects 2: Design Practicum 4
Professional area electives 6
Humanities or social science elective 1
Free elective 3
Credit Hours 16
Total Credit Hours 128

1 Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements).
2 Students may choose a course from the list of college-approved writing courses (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements).

Bachelor’s–Accelerated Master’s Degree Program(s)
The Bachelor’s–Accelerated Master’s (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor’s and master’s degree in a shorter period of time. Students receive the bachelor’s degree first, but begin taking graduate coursework as undergraduates (typically in their senior year). Because some courses are allowed to double count for both the bachelor’s and the master’s degrees, students receive a master’s degree in less time and at a lower cost than if they were to enroll in a stand-alone master’s degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor’s–accelerated master’s program enables students to continue working with their established faculty mentors.

BS and MS in Aerospace Engineering Sciences
Admissions Requirements
In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a CU cumulative GPA of 3.250 or higher
- Have completed eight core ASEN courses and have a minimum ASEN Major GPA of 3.250
- Have at least junior class standing
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder

Program Requirements
Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master’s degree. However, only 6 credits may be double counted toward the bachelor’s degree and the master’s degree. Students must apply to graduate with the bachelor’s degree, and apply to continue with the master’s degree, early in the semester in which the undergraduate requirements will be completed.1

Please see the Aerospace Engineering Sciences BAM degree program (https://www.colorado.edu/aerospace/current-students/undergraduates/bsms-degree) web page for more information.

1 Students who were admitted prior to July 2019 follow a concurrent Bachelor’s/Master’s structure, and the two degrees are awarded simultaneously when requirements for both degrees are met.

Learning Outcomes
Students completing the undergraduate degree in aerospace engineering sciences will be knowledgeable in the following areas:

- the professional context of the practice of aerospace engineering and expectations of new graduates in aerospace engineering organizations, including an awareness of ethics issues, economics, and the business environment,
- the history of aerospace engineering, providing a perspective on current events,
- aerospace engineering as a highly multidisciplinary endeavor, requiring a systems perspective to integrate technologies and manage complexity, and
- major principles and scientific methods underlying the technologies comprising aerospace vehicles and systems.