Aerospace Engineering Sciences

Undergraduate Student Handbook

(AY 2016-2017)

Effective September 1, 2016

Note: This handbook is not a substitute for face-to-face advising. Students should meet with their academic advisor each semester to discuss their coursework and progress in the program.

Handbook Revisions

March 23, 2017. Modified graduate advisor from Annie Brookover to Carrie Simon on page 28.

March 23, 2017. Updated URL hyperlinks for CEAS on pages 15, 19, 23, 25-27, 29-31, 33, 35, 39, 40, 41.

August 1, 2017. Deleted Lauren Cole, added Maureen Craig and Carmody Leerssen. Removed Penina Axelrad, added Brian Argrow.

Contents

Department Regulations and Other Useful Information

Students with questions concerning department regulations and requirements should check with the AES Undergraduate Advisor first. In some cases, Department regulations differ from those of the College of Engineering. Students should make themselves aware of the following regulations, as well as University and College regulations.

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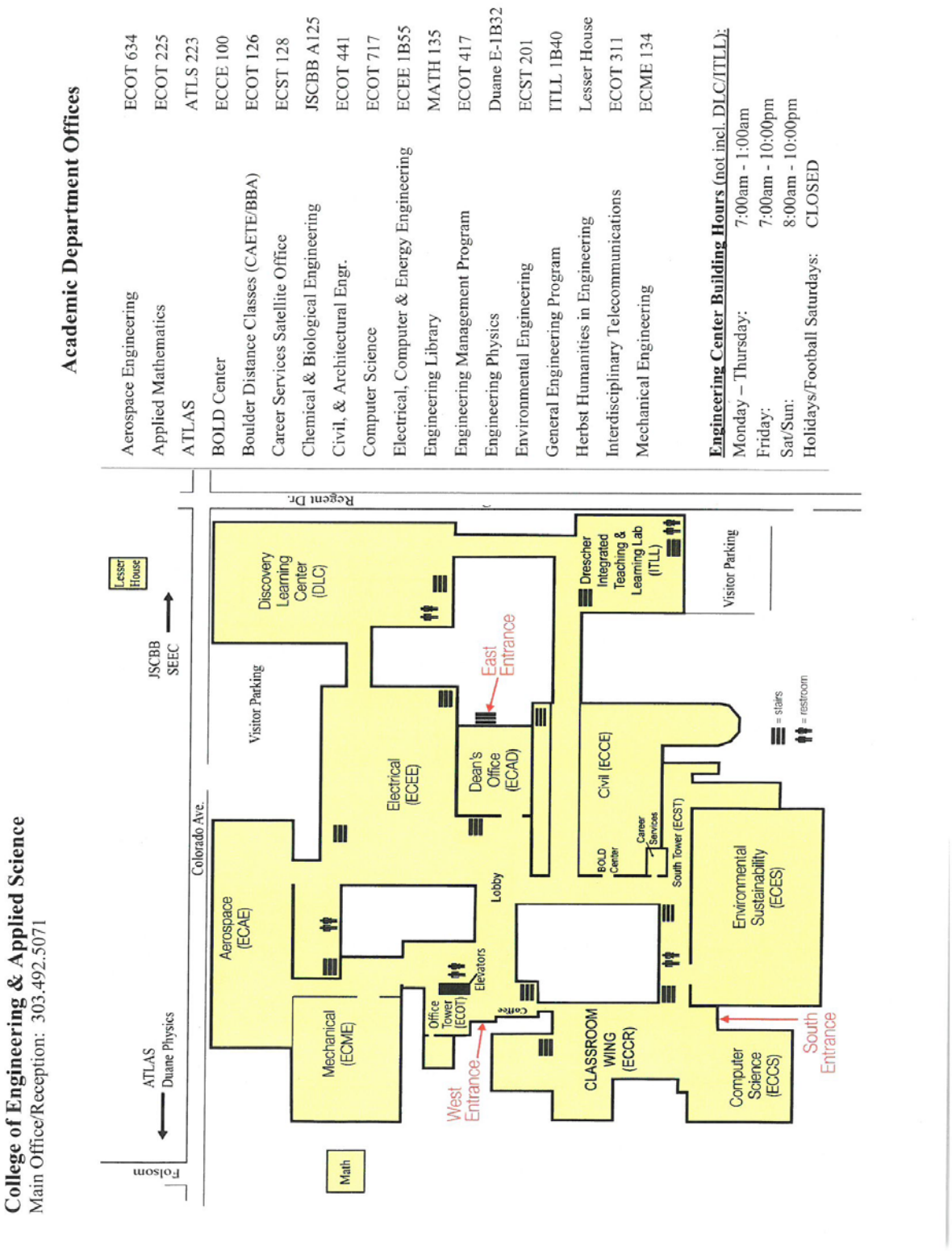
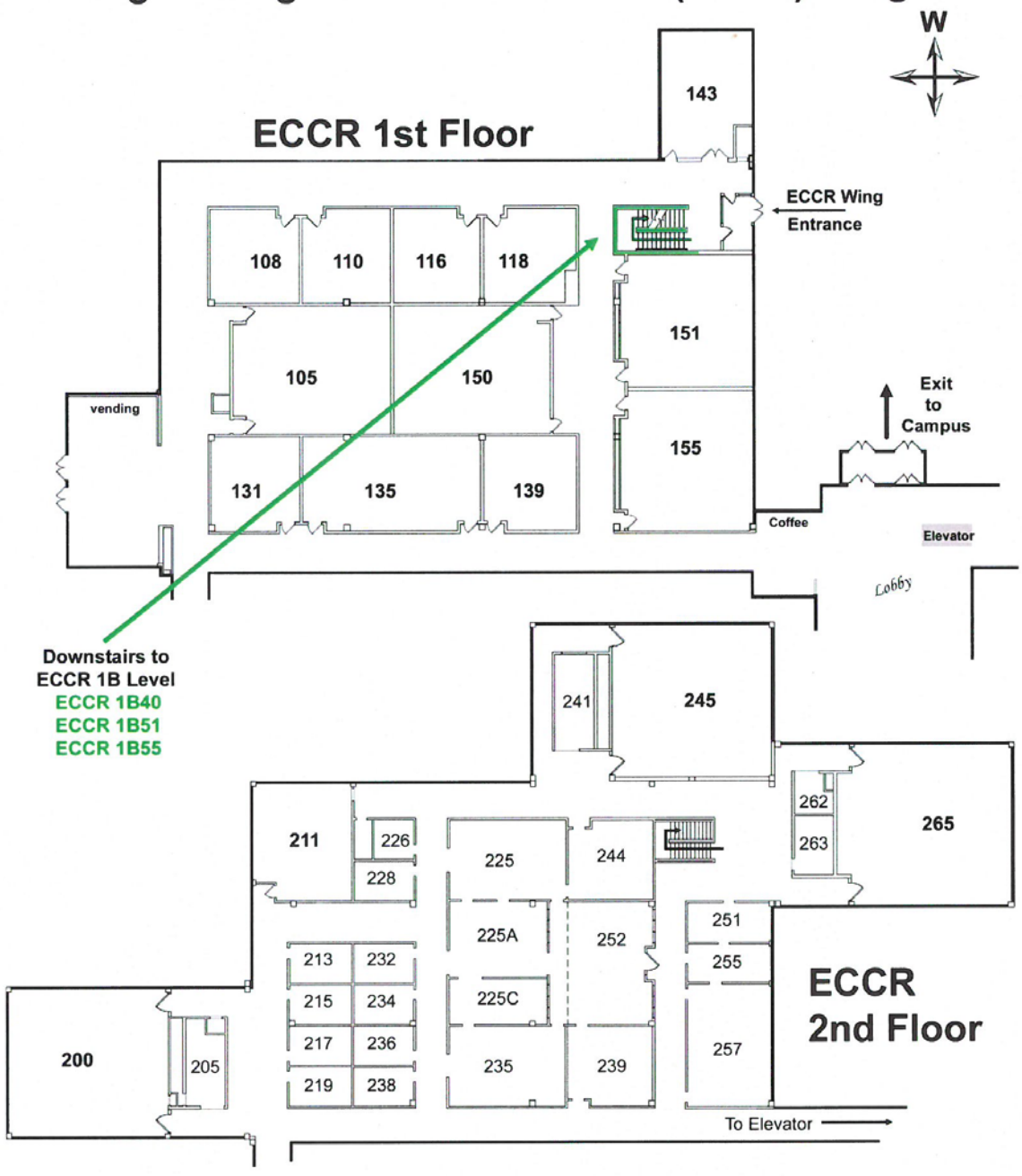
College of Engineering and Applied Science Building Maps



Engineering Center ClassRoom (ECCR) Wing



Acronyms in the Aerospace Department

Here are a list of common acronyms that can be found within the Aerospace Department and within this handbook.

AES = Aerospace Engineering Sciences – this is the name of the department as well as the official name of the major that will appear on diplomas
AIAA = American Institute for Aeronautics & Astronautics (student group)
ASEN – Course prefix for the aerospace courses as well as the aerospace Major Code
ASN = Astrodynamics & Satellite Navigation (focus area in the graduate program)
ASV = AeroSpace Ventures
BioServe = BioServe Space Technologies (aerospace dept research center)
BOLD = Broadening Opportunity through Leadership and Diversity
BS/MS = Concurrent Bachelors/Masters program
CA'S = Class Assistants (hired to be graders or lab assistants in the undergraduate ASEN classes)
CAPS = Counseling & Psychiatric Services
CAS = Center for Aerospace Structures (Research Center in the Aerospace Department)
CCAR = Colorado Center for Astrodynamics Research (Research Center in the Aerospace Department)
CSGC = Colorado Space Grant Consortium
DBF = Design, Build, Fly (student group)
DLA = Discovery Learning Apprenticeship
DLC – Discovery Learning Center (building with the black ball in front of it – location of the DLC Collaboratory, Space Grant & some faculty labs)
ECAD – Engineering Center Administration Department (i.e. the Engineering Deans Office – head East on the first floor near the lobby and you'll dead end into glass doors)
ECAE = Engineering Center Aerospace Engineering Wing (many of the faculty are on the first floor, basement houses the AES Machine Shop, BioServe, Lockheed Martin Sr. Projects room, electronics lab, etc.)
ECCR = Engineering Center Class Room wing
ECNT = Engineering Center North Tower – i.e. where CCAR is located as well as all of the faculty associated with CCAR
ECOT = Engineering Center Office Tower (AES advisors – undergraduate & graduate) & Dept. Chair on the 6th floor, take the main elevator in the lobby to access the office tower)
FE = Free Elective
HSS= Humanities & Social Science elective
IF = Incomplete Grade (requires a form, medical documentation, approval, etc.)
ITLL = Integrated Teaching & Learning Laboratory (where the ASEN labs meet)
LASP = Laboratory for Atmospheric & Space Physics (on east campus, undergraduates get hired to do mission ops, etc.)
LDHSS = Lower-Division Humanities & Social Science Elective
MAPS = Minimum Academics Preparation Standards
PAE = Professional Area Elective
PRT – Plan Requirement Term (third item down in the Degree Audit, reflects the year and term the student matriculated into the Aerospace program and reflects the degree requirements for the student; used in conjunction with the Course Sequence to plan future semesters)
RECUV= Research & Engineering Center for Unmanned Vehicles (Research Center in the Aerospace Department)

REU = Research Experience for Undergraduates (national program)
RSESS = Remote Sensing, Earth & Space Science (focus area for the graduate program)
SEDS = Students for the Exploration and Development of Space (student group)
SGT = Sigma Gamma Tau = aerospace honor society (student group)
SWE = Society of Women Engineers (student group)
UAS = Unmanned Aerial Systems
UDHSS = Upper-Division Humanities & Social Science Elective
UDWRTG = Upper-Division Writing Requirement
UROP = Undergraduate Research Opportunities (program on the CU-Boulder campus)
WAE = Women in Aerospace Engineering (student group)

Goals

What are your goals?

- "I want to get a degree."
- "I want to become an astronaut / pilot."
- "I want to build aircraft / satellites."
- "I want to have a good time in Boulder."

Challenges to Meeting Your Goals:

- Being adequately prepared
- Managing your time
- Prioritizing your goals
- Being organized
- Finding the best study environment
- Working with a good team
- Staying healthy (exercise, sufficient sleep)
- Managing stress
- Maintaining a positive attitude

What do Aerospace Engineers DO? (i.e., the skills you will have acquired when you graduate)

- Identify Needs/Problems
- Analyze (feasibility, performance, reliability, cost)
- Create Solutions; Solve Problems
- Develop Technologies (products/processes)
- Manage Resources
- Work in Teams
- Lifelong Learning
- Communicate efficiently
- Design/Develop/Integrate Components: Systems Engineering

Engineers are a valuable part of our knowledge-based "services" economy.

Academic Expectations

Our expectations are meant to help you meet your goals.

The faculty in Aerospace Engineering Sciences are committed to preparing you for professional life. To that end, they have created a rigorous program. The expectations written below will help you to navigate this system as well as possible. Always keep in mind that your course work should have clear priority over any other activity, including extra-curricular activities, income-producing work, etc. ***It's why you are here.***

You should be prepared to work, on average, **three hours per week for each course credit hour** (i.e. a 3-credit course will need an additional 9 hours/week), including preparing for the lecture, doing homework, working on labs, and preparing for exams. Students are expected to independently seek information about material discussed in courses, in addition to what is provided in lectures and labs. This may include information on the web and textbooks other than the one officially used for the course.

Students should understand that completing homework and lab assignments, and passing exams with good grades are not the goal of taking a course. In addition to gaining course specific knowledge and skills, there are equally important, generic learning goals, such as the ability to independently learn and to work in teams. Therefore, courses are not necessarily designed such that students learn a small subset of knowledge and skills in the most effortless way. Instead, the courses are designed to enhance students' overall education.

For example, homework may be worth only 10% of your grade in a given class, but its value to your learning is far greater than that—it is the best place for you to develop your problem solving skills. Although you may discuss the problem solving process with your classmates, do so with great care as it can easily rob you of the opportunity for deep learning. Seeing the solutions of others does not improve your problem solving ability. It is far better to struggle, get stuck, and bring your incomplete solution to faculty office hours to unlock the concept that you are stuck on than to see someone else's solution. Reading solutions to problems does NOT teach you anything about solving problems; rather, it gives you a false confidence that you understand. Students who face the struggle of problem solving will eventually perfect the process and ace exams because they understand the meaning of small changes to the problem statement and the impact it has on the solution process. ***This will stand you in good stead when you have graduated and are working professionally.***

Key Concepts

Accountability

You are ultimately responsible for your own education.
Be prepared for class, turn in assignments on time.
Reserve enough time in your schedule for studying.
Be conscious of your learning style, strengths and weaknesses.
Be able to articulate your problems and questions when asking an instructor for help.

Meet with undergraduate advisor annually or when you have questions.
Meet with a faculty advisor annually or when you have questions.
Abide by all university policies.

Contacting people

Email, in person at office hours, by phone. ***Respect boundaries.***

Coming to class

May be required or optional. ***Make sure you know.***
Contribute to the learning environment.
Be prepared and bring required materials.

Communication

Writing effectively is required for engineering.
Making oral presentations of your work is also important.
Articulating complex technical issues in a precise and compact manner is a necessary skill.
"Engineers talk about equations and numbers. ***Being imprecise is costly and sometimes deadly."***

Difficult Situations

If you have to miss exams, notify the instructor in writing as early as possible. Our policy is to require a doctor's note explaining why you were absent, if you wish to make up an exam. ***Note that typically there are not enough exams in a course for you to drop one.***

If you become seriously ill, get in an accident, or have any situation that will cause you to be out for an extended period of time, notify the undergraduate advisor and/or your instructors.

If you have personal issues, contact student services. ***If they impact your academic progress/ performance, talk to the undergraduate advisor or instructors.***

Contact staff/faculty/student services/or special CU offices for help if you experience sexual harassment, discrimination, or another situation that requires assistance.
If you are struggling with classes, talk to your instructor, TA, tutoring services. ***Don't wait until the semester is almost over.***

Diligence

Be engaged, ask questions.
Collaborate positively with all your peers.
Work "smart" (versus working hard).
Good time management.

Grading

Grading in each course is determined by the instructor – you don't lose points, you earn points.
Grades are mostly due to individual efforts; group grades are also factored into final grade. In all courses there is a minimum individual score required to pass.
All courses in ASEN are graded on an "absolute" scale. Read the course syllabus to understand how each instructor plans to assign grades.

While teamwork is important - it is more important that YOU understand the fundamentals.

Independent Learning

Develop a broad understanding of your field.
Identify interesting problems and solutions.
Learn because it is fun!

Individual work

Teamwork builds on each individual's work.
Each individual is responsible for the team's successes and failures.
Everyone must lead part of the time. Some will lead more than others.
Exams and quizzes are 100% individual work.
Over 50% of your grade will be based on individual work.
In core ASEN classes, students must get an individual grade of C or better in order to be eligible to bring in the group grade (i.e. labs and homework).

Study skills

Assess your study skills.
Plan your study sessions.
Develop study groups/teams.
Go ***prepared*** to faculty office hours and study group meetings.
Identify and correct missing links in knowledge base.
Support each other in the study group – ***"One of the best ways to learn is to teach."***
Learn computer skills and languages (MATLAB).

Teamwork

Required, because of the interdisciplinary nature of aerospace engineering.
Do your fair share.
Provide constructive criticisms.
Go prepared to team meetings.
Rotate leadership among peers – learn to lead and learn to let others lead.
Care for each member of your team; do not leave anyone behind.

What Will Help You – Best Tools for Learning

Instructor – ***your instructor wants you to succeed.***
Textbook
Lectures
TAs & CAs – it's their job to help you.
Peers
Internet, etc.
You

Professionalism

Protocol

Who's who and how do I address him or her?

Professors – "Professor" or "Dr. [last name]"
Instructors and Staff – "Dr." (if s/he has a Ph.D.) or "Mr." "Ms." "Mrs."
Course assistants (TA's, course assistants, graders): first or last names (they will tell you)
If you don't know, err on the side of being more formal as a sign of respect.

Ethics

Respect the CU Honor Code. Cheating will be prosecuted.
http://honorcode.colorado.edu/student-information

You're expected to take the Honor Code quiz (receiving a score of 100%) at the beginning of the fall semester. Holds will be placed on your file that will prevent registration for the spring semester if you fail to take the quiz or score 100%, and you will also be required to write a paper addressing the importance of academic integrity. This paper will be reviewed and must be approved before your hold will be released.

Be aware of the social implications of rapid technological advances.
Consider the "sustainability" of technology in the face of global population growth, industrialization, and degradation of environment.

Ask: Is it legal? Is it safe? Growing complexity and uncertainty of engineered systems.

Embrace the growing diversity of the workforce. Respect different perspectives and views.

Honor Code Pledge:

"On my honor, as a University of Colorado Boulder student, I have neither given nor received unauthorized assistance."

Academic Standing

To remain in good academic standing in the College of Engineering and Applied Science, a student must maintain satisfactory academic performance as measured by grade point average (GPA) criteria and satisfactory academic progress toward completion of a Bachelor of Science degree in the College. For

degree-seeking students matriculating at CU-Boulder Fall 2011 semester or later, CU cumulative, semester, and major GPAs should all be at or greater than 2.250 (2.000 for students prior to Fall 2011). Failure to meet these requirements results in the student being placed on academic alert, academic probation, and/or academic suspension.

Please review the Academic Standing Guidelines.

Grading Policies

The core ASEN sophomore & junior level courses (i.e. ASEN 2001, 2002, 2012, 2003, 2004, 3111, 3112, 3113, 3128, 3200, 3300) have a grading policy that all students must get an individual grade (i.e. exams and reading quizzes) of **C or above** in order for the group grades (labs and homework) to be added to the final grade. Please refer to the course syllabus for more information. The purpose behind this policy is to ensure that each student is competent in the course subject matter so that they can be successful in the next course for which that class is a prerequisite.

The curriculum is based on a mastery approach which ensures that each individual student obtains the knowledge and skills defined in the program outcomes. While students are given the opportunity to develop an ability to efficiently work in teams (for example, through group homework, lab assignments and team projects), a 2-tier grading system has been implemented to ensure sufficiency in the student's individual knowledge and skills. The student's final course grade consists of at least 50% individual assignments, namely exams and quizzes, and 50% group/team work. However, group/team work is only counted toward the final grade if the individual grade portion is sufficient for the course (i.e. the individual grade is a C or better), in order to satisfy prerequisites for follow-up courses. This ensures that group/team assignments cannot compensate for a lack in individual skills and knowledge.

Please review the Grading Policies for the College of Engineering & Applied Science.

Aerospace Department policy on pass/fail credit

Aerospace majors may take up to 6 credit hours of humanities/social science electives pass/fail. A petition is required for all engineering students wishing to take pass/fail courses. Please note that if the student is pursuing a minor, those courses may not be taken pass/fail. In addition, if the student is using the HSS course to also double count as a MAPS deficiency, the course must be taken for a grade. No Professional Area Electives may be taken pass/fail.

Aerospace Department policy on independent study courses

A maximum of 6 hours of upper-level independent study can count for the Professional Area Elective requirements. For example, if a student is working at LASP or Space Grant and is approved to take 4000+ level independent study they can use up to 6 hours of independent study to meet AES degree requirements. Lower-level independent study coursework can only count as free electives. A maximum of 5 hours of independent study in Space Grant is allowed to count for degree 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. If a student takes the advanced course, it does not remove the obligation to repeat the prerequisite course and get a grade of C or better, even if the grade earned in the advanced course is a C or above.

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

The AES department reserves the right to drop students enrolled in ASEN courses who have not met the minimum prerequisite 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.

Aerospace engineering students are expected to take APPM courses for the required mathematics courses (APPM 1350, 1360, 2350, 2360) once they have matriculated into the program.

If a student has not had at least one year of high school chemistry (or equivalent) they will be required to take CHEM 1021 to satisfy pre-requisite requirements for ASEN 1022.

Curriculum

The undergraduate curriculum 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.

Beginning with the sophomore year courses, students acquire a broad spectrum of knowledge and skills in the context of aerospace engineering applications, ranging from structural mechanics, aerodynamics, thermodynamics, controls and system design. In contrast to a curricular structure that first establishes depth in a few core areas, our curriculum exposes the students to a broad range of aerospace concepts. Thus the vital importance of interfaces between subsystems is communicated to the students at this very early stage of their education.

At the junior level, courses in aerospace engineering topics specifically enumerated in the AIAA Program Criteria Outcomes list provide greater intellectual depth to the topics covered in sophomore year.

Our curriculum teaches students the research and development process inherent in successful systems engineering. While most sophomore and junior core courses have design components, mainly through design lab assignments, the senior design, two-semester sequence teaches students conceiving, designing, modeling, analysis, manufacturing, integration, testing, operation, verification and validation skills required when designing an aerospace engineering system. Each senior design project must have a conceptual phase where students learn how to research the current state-of–the-art and history of a specific technology. In the following design phase students develop a concept of a system according to design-to specifications, which exposes them to the process of developing a technology based on their knowledgebase. Next is the implementation phase of the design in a fabricated system where all subsystems must meet requirements and work well together in a completed system. In the operational phase of the project, students learn to prove their technology, verify its capabilities, and validate the customer's requirements.

For students having sufficient ability and interest, planning for graduate study should begin in 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. Space in the undergraduate aerospace engineering program is limited; some restrictions may apply.

Course Sequence

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 semester credit hours is required.**
Course descriptions may be found in the University Course Catalog:
http://www.colorado.edu/catalog/2015-16/courses?subject=ASEN.

Note: Curriculum requirements may differ depending on a student's academic year of entry to the Aerospace department. *This information can be found in the student's Degree Audit, under "**Plan Requirement Term**". Students can then view the Course Sequence that corresponds with their Plan Requirement Term on the AES Website: http://www.colorado.edu/aerospace/current-students/undergraduates/curriculum/course-sequence Students who have questions should to consult with their academic advisor.*

Students are encouraged to complete MAPS deficiencies as soon as possible. Students who have not completed their MAPS deficiencies are not eligible to apply for the BS/MS program. Completion of MAPS requirements are a graduation requirement.

Required Courses and Semester Credit Hours

Freshman Year

Fall Semester—15

- APPM 1350 Calculus 1 for Engineers—4
- GEEN 1400 Engineering Projects/ASEN 1400 Gateway to Space—3
- CSCI 1320 Computer Science 1: Starting Computing-Engineering Applications– 4
- Lower-division Humanities/Social Science Elective – 3
- Free Elective-1*

***Spring Semester*—17**

- APPM 1360 Calculus 2 for Engineers—4
- PHYS 1110 General Physics 1—4
- ASEN 1022 Material Science for Aerospace Engineers - 3
- Lower-division Humanities/Social Science Elective—6

Sophomore Year

***Fall Semester*—16**

- APPM 2350 Calculus 3 for Engineers—4
- ASEN 2001 Introduction to Statics, Structures, and Materials—4
- ASEN 2002 Introduction to Thermodynamics and Aerodynamics—4
- ASEN 2012 Experimental and Computational Methods in AES—2
- Free Electives – 2*

***Spring Semester*—17**

- APPM 2360 Introduction to Differential Equations with Linear Algebra—4
- ASEN 2003 Introduction to Dynamics and Systems—5
- ASEN 2004 Aerospace Vehicle Design and Performance—5
- Upper-division Humanities/Social Science elective—3

Junior Year

***Fall Semester*—16**

- ASEN 3111 Aerodynamics—4
- ASEN 3112 Structures—4
- ASEN 3113 Thermodynamics and Heat Transfer—4
- PHYS 1120 General Physics 2—4

***Spring Semester*—16**

- ASEN 3128 Aircraft Dynamics—4
- ASEN 3200 Orbital Mechanics/Attitude Determination and Control—4
- ASEN 3300 Electronics and Communications—4
- Professional Area Elective—3
- Free Elective—1

Senior Year

***Fall Semester*—16**

- ASEN 4013 Foundations of Propulsion—3
- ASEN 4018 Senior Projects 1: Design Synthesis—4
- Professional area electives—6
- Upper-division Writing (WRTG 3030, 3035, HUEN 3100)—3

***Spring Semester*—16**

- ASEN 4028 Senior Projects 2: Design Practicum—4
- Professional area electives—6
- Upper-division Humanities/Social Science elective—3
- Free elective—3

Courses selected must meet humanities and social science requirements as detailed here. Up to six hours of humanities and social science credit can be taken pass/fail. Students will need to petition to request the humanities course be taken on a pass/fail basis.

To view updated program accreditation criteria please visit: http://www.colorado.edu/aerospace/current-students/undergraduates/curriculum/course-sequence

Helpful Hints

*The 1 credit hour Free Elective listed in the fall of the freshman year can include courses like COEN 1500 Intro to Engineering (for Fall 2016 new freshmen only), COEN 2500 Industry 101, Calculus Work Groups, APPM 2450 & 2460 labs, etc.
*In the fall of the sophomore year, courses like APPM 2450-1 Calculus 3 Computer Lab and COEN 2350-1 Calculus 3 Work Group are good options for fulfilling the Free Elective credit.

*Students who transfer into the ASEN program as sophomores, may take ASEN 1022 in the spring of the sophomore year. ASEN 1022 is a prerequisite for Senior Projects (ASEN 4018) so the course must be completed with a grade of C or better.

*Students who transfer into the ASEN program in the spring of the freshman year are encouraged to take CSCI 1320 as this MATLAB programming class will help to make them more successful in the ASEN classes. However, the AES Department will accept the following classes for the programming requirement: CHEN 1310-3, CSCI 1300-4, CSCI 1310-4 or ECEN 1310; the students will need to teach themselves MATLAB programming. The Mathworks website has some excellent resources. Students pursuing the ECEN (EE or CE) Minors need to take ECEN 1310.

Minimum Academic Preparation Standards (MAPS) Requirements/Deficiencies

Students who graduated from high school in 1988 or later are expected to have completed courses that meet certain minimum academic preparation standards (MAPS) before enrolling at CU-Boulder. Students who attended a non-U.S. high school for two years or more are not subject to MAPS. Any MAPS deficiency will be considered during the admission review process. The MAPS for specific CU-Boulder colleges and schools are listed in this section.

Students may be admitted to CU-Boulder even though they have not met all the MAPS requirements. If that is the case, they are required to complete the appropriate MAPS courses once enrolled, and the credits may be applied toward graduation. *All MAPS deficiencies must be completed prior to graduation from CU-Boulder.* Students may also complete missing MAPS course work at other colleges or universities, through approved credit-by-examination programs or by testing out through the appropriate foreign language department.

For the official policies concerning MAPS Deficiencies please visit this site: http://www.colorado.edu/catalog/2016-17/ugradadmissions/freshman#Minimum-Academic-Preparation-Standards-(MAPS)

Students can view their MAPS requirements on the Degree Audit. Here's the MAPS Table from the Office of Admissions: http://www.colorado.edu/admissions/selection. Students are encouraged to complete MAPS deficiencies within the first few semesters of their college career.

New freshmen & transfer students should identify if they have a MAPS Deficiency and if they do, they need to submit a MAPS Plan to their academic advisor during the first semester after they have matriculated into the Aerospace Program. The MAPS plan should show how and when the student plans to complete their MAPS Deficiencies.

Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of D- or higher. Courses used to fulfill MAPS deficiencies may NOT be taken pass/fail.

Also a reminder that students who have not completed their MAPS Deficiencies are not allowed to apply for the BS/MS program.

Students are allowed to take classes at other institutions as long as it doesn't run into the Residency Requirement (i.e. the last 45 hours of a student's academic career must be completed on the CU-Boulder campus). Students should use the Transferology website to find out what classes offered at the other institution will transfer back to CU-Boulder as an approved course to fulfill a MAPS deficiency. Please note that only classes with a grade of C- or better can be transferred back to CU-Boulder. Also a reminder that courses taken at other institutions will transfer back to CU-Boulder as credit only – not the grade. The course grade taken at another institution will not count towards the CU-Boulder GPA.

The main two areas where students tend to be deficient that are not automatically covered by the regular degree requirements for the BS in Aerospace Engineering are the MAPS Deficiency in Foreign Language and the MAPS Deficiency in Social Science.

Here's a list of options on how to complete these deficiencies.

For the MAPS Deficiency in Social Science, please complete one of the following courses:

- GEOG1982,1992,2002,2412
- HIST1010,1020,1040 , HIST1025,1035
- COMM2110
- ECON1000,1001,2010, ECON2020
- LING1000,2000
- PHIL1200
- PSCI1101
- PSYC1001
- SOCY1001
- WMST2000

The following courses fulfill both the MAPS deficiency in Social Science as well as a LDHSS for engineering students:

GEOG1982,1992, HIST1010,1020, ECON1000,2010, ECON2020 HIST1025, LING1000, PHIL1200, PSCI1101, PSYC1001, SOCY1001, WMST2000

To complete the MAPS Deficiency in Foreign Language:

Students need to either complete the 3rd semester of a foreign language, or if they took two years of a foreign language in high school, they must complete two semesters of a different foreign language at the university level. One year of high school foreign language equals one semester of university level foreign language.

Students who wish to continue with a foreign language previously completed in high school must take a placement test. Questions about placement should be referred to the appropriate foreign language department. New incoming freshmen and Transfer Students will have an opportunity at Orientation to complete a foreign language placement exam.

For students who plan to complete the 3rd semester of a foreign language, the following courses will fulfill this requirement:

Courses offered at CU-Boulder that satisfy this requirement include the following:

- **ARAB 2110-5** Second Year Intermediate Arabic 1
- **CHIN 2110-5** Intermediate Chinese 1
- **DANE 2010-4** Intermediate Danish 1-DILS (added 12/2015)
- **FINN 2010-4** Intermediate Finnish 1-DILS (added 12/2015)
- **FREN 2110-3** Second-Year French Grammar Review and Reading 1
- **FRSI 2110-4** Intermediate Farsi 1 (formerly FRSI 2010)
- **GREK 3113-3** Intermediate Classical Greek 1 (formerly CLAS 3113)
- **GRMN 2010-4** Intermediate German 1
- **GRMN 2030-5** Intensive Intermediate German
- **HEBR 2110-(3-4)** Intermediate Modern Hebrew I (12/2015: formerly Intermediate Hebrew 1)
- **HIND 2110-5** Intermediate Hindi 1 (formerly HIND 2010)
- **INDO 2010-4** Intermediate Indonesian 1
- **ITAL 2110-3** Intermediate Italian Reading, Grammar, and Composition 1
- **JPNS 2110-5** Intermediate Japanese 1
- **KREN 2110-5** Second-Year Intermediate Korean 1
- **LATN 2114-4** Intermediate Latin 1 (formerly CLAS 2114)
- **NORW 2110-4** Second-Year Norwegian Reading and Conversation 1
- **PORT 2110-3** Second-Year Portuguese 1
- **RUSS 2010-4** Second-Year Russian 1
- **SLHS 2325-4** American Sign Language 3
- **SPAN 2110-3** Second-Year Spanish 1
- **SPAN 2150-5** Intensive Second-Year Spanish
- **SWED 2010-4** Intermediate Swedish 1 – DILS

Or if a student completed two years of one foreign language in high school, they must complete two semesters of a different foreign language at the university level. Here are the courses that satisfy this requirement:

ARAB 1020
CHIN 1020
FREN 1020, 1050;
FRSI 1020;
GREK 1023;
GRMN 1020, 1030;
HEBR 1020, 1050;
HIND 1020;
INDO 1020;
ITAL 1020;
JPNS 1020;

KREN 1020;
LATN 1024, 2044;
NORW 1020;
PORT 1020
RUSS 1020, 1050;
SLHS 2315;
SPAN 1020, 1150;
SWED 1120

If a student is already fluent (both written proficiency as well as oral proficiency) in another language and is also fluent in English, they can take the Foreign Language Achievement Tests (FLATS) exam offered through Testing Services: http://www.colorado.edu/career/testing/exemption-exams-0. A reminder that FLATS exemption language tests cannot be used for placement purposes, nor can the placement exams be used for exemption purposes.

In some instances some students may experience significant difficulties with learning a foreign language. Modified Foreign Language (MFL) and Cultural Course Substitution (CCS) are separate but related programs that offer students an alternative way to fulfill their Foreign Language requirement.

The Modified Foreign Language Program is for students who do not have a diagnosed learning disability, but do have a problem learning a foreign language – ***it is only available for Spanish***. Most students in MFL are referred to Jean Bouchard, who runs this program, by the language instructors. Jean tests referred students to see if they are a good fit for MFL and if they are not sometimes refers them to Disability Services to see if they would qualify for CCS.

To get a CCS accommodation, a student has to register with the Disability Services Office even if they do not have a previously diagnosed disability. Disability Services makes all determinations about whether students can get a CCS for Foreign Language. If the determination is approved, Disability Services will inform the student of how to proceed.

Professional Area Electives Options/Selection

Any ASEN course at the 4000 level or above that is not a required course can be used as a professional area elective, including up to 5 credits of ASEN independent study through Space Grant. A link to the Independent Study Agreement form is located here. A professional area elective 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 physics courses. A complete list of approved professional area electives can be found in the Degree Audit. Courses not listed must be petitioned. Upper-division independent study from technical areas (math, science and engineering) is acceptable for up to 6 credit hours of professional area elective credit.

Here's a list of Professional Area Electives that ASEN sophomores & juniors are eligible to take. Please check the prerequisites and restrictions for the courses. Many of the courses listed below have prerequisites that are already embedded into the ASEN degree requirements. For instance, PHYS 1120 & APPM 1360 are part of the aerospace degree requirements and are also the prerequisites for ASTR 3750. Please consult your academic advisor for referrals/confirmation of applicability/appropriateness/ workload: APPM 3350, 3570, 3310; ASTR 3710, 3270, 3750, 3800, 4800; EMEN 4030, 4050, 4825, EMEN 4830- Fundamentals of Systems Engineering, EMEN 4830-Introduction to Engineering Management, EMEN 5080; NAVR 3040 & 3030; ASEN 4128, ASEN 4519 Aerospace Software; CHEN 4610.

These 3000 & 4000 level classes in the following areas have prerequisites of other courses not required for the ASEN degree. ASTR 3000 & 4000 level courses not listed above; ATOC, CSCI, ECEN, etc. APPM 4650, 4660, 4350, 4360, 4570 are also recommended. Students pursuing minors in EBIO, MCDB, GEOL, CHEM are eligible to use 3000 & 4000 level courses towards professional area elective requirements.

All prerequisites for ASEN professional area electives must be completed with a grade of C or above. Students who do not have a grade of C or above in prerequisite courses will be administratively dropped.

Professional Area Electives must be taken for a grade, not as pass/fail (a grade of D- is passing). PAEs that list the junior level ASEN classes as prerequisites are excellent choices. For instance, ASEN 4114, 4123, 4138, 4047 Microavionics, etc.

5000-level ASEN classes are available to students admitted to the BS/MS program. Aerospace seniors with a cumulative GPA of 3.00 or higher are also eligible to take classes as long as they have received instructor consent.

The three main purposes of Professional Area Electives are to give the student a technical skill to implement in senior projects, to help a student get a job in the aerospace industry, and often a PAE will help a student to do better in an ASEN class (like APPM 3350 or APPM 3310).

AES students are also encouraged to consider a technical minor or double major in electrical engineering, computer engineering, computer science, applied mathematics, 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.

Academic Advising & Degree Progress

Every semester undergraduate aerospace students will have an advising hold on their record. Students will need to schedule an appointment with their academic advisor through MyCUHub. Prior to the advising meeting:

- Please review your Academic Degree Requirements by using the Degree Audit (found in MyCUInfo):
  - Find your **Plan Requirement Term** (third item down in the Degree Audit). The Plan Requirement Term lists which AES Degree Requirements you are subject to which is based on when you matriculated into the ASEN major.
  - To view the **ASEN Course Sequence** that corresponds with the Aerospace degree Plan Requirement Term listed in your degree audit, please view this site: http://www.colorado.edu/aerospace/current-students/undergraduates/curriculum/course-sequence
  - Check your Degree Audit to make sure that all requirements have been met.
  - Classes that do not transfer in as an exact course equivalency must be petitioned in order to meet specific degree requirements.
  - Make sure that all **MAPS requirements** have been completed. If you have a MAPS deficiency, discuss with your advisor how and when you plan to complete the deficiency (i.e. submit your MAPS Deficiency Plan to your academic advisor during the first semester of your freshman year or the first semester in the aerospace program). A MAPS deficiency in Foreign Language is one of the top reasons why students do not graduate on time. In addition, students are not eligible to apply to the BS/MS program until they have completed their MAPS deficiencies. For more information on how to complete common MAPS Deficiencies, please view the MAPS Deficiencies section of this handbook (see above).
  - Please contact your advisor if you have questions or feel that there are inaccuracies in your degree audit.
  - Reminders:
    - The ASEN classes are offered once a year and are all prerequisites for each other
    - All courses that are a prerequisite for another required course **MUST** be completed with a grade of C or better.

Other Advising Opportunities

- Take advantage of meeting with your **Aerospace Faculty Mentor**. They can provide insight into your long-term career plans, selection of professional area electives, networking, research opportunities, graduate school options and general academic and professional development. Please email your faculty mentor for an appointment. To view who is listed as your faculty mentor, please visit MyCUInfo in the student center (view My Advisors).

- Take advantage of **Group Advising Sessions** (offerings listed in the AES weekly email)
- Take advantage of **Mobile Advising** opportunities (they usually take place in the ITLL lab during the sophomore & junior lab sections during the month prior to registration)
- Students who are struggling in their courses or have external factors (medical or personal issues) that are affecting their academic performance are highly encouraged to schedule an appointment with their academic advisor to discuss options, campus resources as well as strategies for academic success. Appointments can be made through MyCUHub.
- Students in the spring of their junior year are encouraged to meet with their academic advisor for a pre-graduation checkout.

International Students

International Students are encouraged to get a technical minor or a double major in a technical field (like CS, EE, CE, etc.), as non-US citizens can find it difficult to get a job in the US aerospace industry. Students should meet with a career counselor at Career Services.

A Planning Guide for Undergraduate Aerospace Engineering Students

Items That Should Be Addressed Every Semester

- Keep all addresses current via MyCUInfo
- Read your CU email daily
- Check your class schedule to make sure you are enrolled in the correct courses
- Familiarize yourself with the academic calendar and deadlines
  - http://www.colorado.edu/registrar/calendars-schedules/academic-calendar
  - Check the Final Exams Schedule for each semester (make sure you don't have 3 finals on the same day and if you do, take care of it by the posted deadline): http://www.colorado.edu/registrar/students/academic-calendar/final-exam-schedule
- Familiarize yourself with the Honor Code and prepare for the Honor Code quiz that you'll be expected to take in September every year.
- Take advantage of Academic Support and Campus Resources:
  - Academic Support: http://www.colorado.edu/engineering-advising/resources-support/academic-support-tutoring
  - Campus Resources & Academic Success: http://www.colorado.edu/students/academic-success

- Health & Wellness: http://www.colorado.edu/students/health-wellness
- Financial Wellness (CU Money Sense Program): http://cumoneysense.colorado.edu/ Tips & Tools for Financial Wellness

- Keep Track of your Academic Degree Progress
  - Electives to consider:
    - **Humanities & Social Science electives**. Please review this website for a list of approved HSS classes for engineering students: http://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements. All students must complete 9 credit hours of LDHSS, 6 credit hours of UDHSS & 3 credit hours of UDWRTG. To select HSS classes, advanced planning is helpful. Students may wish to start with Upper-division courses that they are interested in taking. Most UDHSS classes on campus have prerequisites of Lower-division classes. Many lower-division courses can double count as LDHSS requirements (but double check with the above link to make sure). **If you have registered for a class that you think counts as HSS but it does not pull into the Degree Audit, it is not an approved HSS elective.** New freshmen and transfer students are encouraged to complete a HSS Plan for completing their Humanities & Social Science electives. For more information about the HSS Plan or how to select HSS classes, please view the freshman section of this handbook. Advanced planning for HSS electives can be helpful because registration for the next semester usually happens at the same time as mid-terms so completing a HSS Plan in advance will help you save you time and effort during the academic year.
    - **Professional Area Electives (PAEs)** are 3000, 4000 & 5000-level Math, Science and Engineering Electives. A full list of approved PAEs (with course descriptions) can be found in the Degree Audit. Students are encouraged to meet with their Aerospace Faculty Mentor to discuss PAEs options, especially in light of what they would like to do in their future career. For more information about selecting PAEs, please visit the PAE section of this handbook (see above).
    - **Free Electives** are classes that do not fulfill HSS or PAE electives or other degree requirements. Common Free Electives are business classes, Marching Band, studio art classes, COEN 2500 Industry 101, Calculus Work Groups, APPM 2450 & 2460 labs, music ensembles and choirs, and lower-division technical classes that are not degree requirements like CSCI 2270, 2400, 2824; ASTR 2020, 2600, 2030, 1030; ATOC 1050, 1070; GEOL 1010, MCDB 1150, 2150; PHYS 1140, 2130, 2170, 2210; ECEN 2250, 2350, 2400; EMEN 4100; most AIRR, MILR & NAVR courses, etc. In many instances transfer students or students with AP or IB credit already have their Free Elective credit complete. Please view the Degree Audit for this information.
    - **Freshman Projects/Engineering Elective.** By and large most students who matriculate into the College of Engineering and Applied Science (or are in the Pre-Engineering Program) in their freshman year take a freshmen projects course like GEEN 1400, ASEN 1400 or ECEN 1400. Students who are pre-med are allowed to use MCDB 1150 to fulfill this elective. Freshmen who are pursuing a CS Minor are allowed to take CSCI 2270 in the spring semester to fulfill this elective. Students who

transfer into the aerospace program as sophomores are not eligible to take freshmen projects but are eligible to take another class (usually a lower-division technical course in science or engineering). A full list of approved options for the Engineering Elective can be found in the Degree Audit.

- **COEN/GEEN 1500 Intro to Engineering.** This course was a requirement for students who matriculated into the Aerospace Program as freshman from Fall 2012 to Spring 2016. As of Fall 2016, COEN 1500 will no longer be a requirement for the aerospace degree. Students are still welcome to take this class as a Free Elective. Students who transferred into the aerospace sophomore year between Fall 2012-Spring 2016 and were not able to take COEN/GEEN 1500 have had a 1 credit hour course replacement for this course. Please check your Degree Audit for more information.
- Please contact your advisor if you have questions or feel that there are inaccuracies in your degree audit.

➢ Meet with your academic advisor to review your progress
- Make an appointment with your academic advisor through MyCUHub.
- Contact your academic advisor if you are planning to do a change in your degree plan (Change of Major, adding a Double Degree, Minor and/or Certificate, BS/MS, Study Abroad, etc.)
  - Students pursuing a double major, minor or certificate must first meet with the advisor in the other major/minor/certificate to ascertain course requirements, prerequisites, course term offerings, etc. prior to meeting with their ASEN advisor. Students should bring a draft degree plan including the minor/certificate/double major courses to the meeting with their ASEN advisor so that their advisor can review & approve the plan. Many students create their draft degree plan in Excel.
  - Students interested in changing their major are encouraged to do a "What If" Degree Audit to view the requirements for the new major.
  - Students interested in the BS/MS program must first:
    - Read the BS/MS website: http://www.colorado.edu/aerospace/current-students/undergraduates/bsms-degree
    - Read the current Graduate Handbook: http://www.colorado.edu/aerospace/current-students/graduates
    - Select a Focus Area. Students who are not sure which Focus Area to select are encouraged to discuss it with their Faculty Mentor. http://www.colorado.edu/aerospace/current-students/graduates/curriculum
    - Students with additional questions about the BS/MS not covered in the above links should contact Carrie Simon the AES Graduate Advisor

➢ Consider Herbst course work for Humanities/Social Science electives: http://www.colorado.edu/engineering/herbst

➢ Consider pursuing a Minor or a Certificate.

Registration Holds & Problems with Registration

Students with the Registration hold "registration to do list" just need to answer the questions, update their address, etc. Advisors do not have the ability to lift this hold. The student must complete this step.

Study Abroad

Students interested in pursuing Study Abroad opportunities should complete Study Abroad 101, and then follow the directions to meet with an advisor in Study Abroad prior to meeting with their ASEN advisor. http://abroad.colorado.edu/

ROTC

If you're planning on participating in ROTC, please take a look at the course planning forms:
Air Force ROTC
Navy ROTC & Navy ROTC with Marine option

Freshman Year/Entering Transfer Information

- Find out what AP/IB or transfer credit(s) is useful for your AES degree plan.
  - Advanced Placement with AES Equivalent
    International Baccalaureate with AES Equivalent
    Transferology
    - Be sure that you have requested your AP scores, IB scores, and/or transcripts to be sent to the Office of Admissions.
    - After the Office of Admissions has received the scores they will be uploaded into the Degree Audit so you'll be able to view which degree requirements these courses fulfill.
- Make sure you choose the right Calculus class.
  - Some good information about which calculus course to choose can be found on the College's website here. Even if you have AP/IB/transfer credit for Calculus, it's best that you base your decision on which calculus course to take by how well you score on one of the old APPM finals. For example, if you've taken AP Calculus BC (which could give you credit for Calculus 1 and 2) you'll want to start by taking APPM 1350 and 1360. To take the exam, allot 2 & 1/2 hours with no calculator or notes. Then grade yourself with the solutions to see how well you did. If you score well on the exam (i.e. 85% or higher)

then you probably have the knowledge to go to the next level of APPM classes. If you do poorly it is highly suggested that you take the APPM class. A strong foundation in Calculus is critical for your success in AES. It's better to take a step back and repeat calculus than to try and rush. Rushing tends to lead to low grades and GPAs, which can result in academic probation and/or suspension.

- Please see this video from Dr. Anne Dougherty, academic advisor for Applied Math.

❖ Create a Humanities & Social Science plan. Do the same if you have a MAPS deficiency.

- You're required to complete 9 hours of lower-division humanities & social science (LDHSS - 1000 or 2000 level), 6 hours of upper-division humanities & social science (UDHSS - 3000 or 4000 level), and 3 hours of upper-division writing (specifically WRTG 3030, 3035, HUEN 3100 or HUEN 1010 if taken in the freshmen year). More information about HSS requirements can be found here.
  - It often helps to begin making a HSS plan beginning with the UDHSS classes you'd like to take and working backwards since most UDHSS classes have course pre-requisites of LDHSS classes. When making your plan you should also include AP/IB/Transfer credits if they fulfill the HSS requirements.
  - Information on selecting HSS courses.
- Students who have a Minimum Academic Preparation Standards (MAPS) deficiency should make a plan of how they will complete the deficiency prior to graduation. Common MAPS deficiencies for AES are in Foreign Language and Social Science.
  - The college requires that students complete 3 years of high school coursework in the same foreign language. So, if you took two years of Spanish you can elect to take the third level equivalent of Spanish (SPAN 2110) or take two semesters of a new foreign language to meet the requirement. If you took 1 year of French, you can elect to take the second and third semester level equivalent of French or 3 semesters of a new foreign language to meet the requirement. Please note that if you plan to take a foreign language course beyond the introductory course, you must take the language placement test with the department of the language you'd like to pursue. If you are proficient in a language other than English you may want to see about testing out of the MAPS requirement. If you have any additional questions about MAPS, please email your academic advisor.

❖ Figure out if you would like to declare a minor or certificate.

- A minor or certificate is not required, but you may find that there is a subject you enjoy and would like to learn more about. Minors and certificates can be good additions to your transcript and resume. Depending on the minor or certificate you choose you can often fulfill either humanities/social science or Professional Area Elective requirements. Your academic advisor can provide additional information about how certain requirements can be fulfilled depending on the minor or certificate you choose. Every minor/certificate is different and will require some research on your part to find out what courses you would need to take to fulfill the requirements.
  - Minor Programs in the College of Engineering & Applied Science
  - Certificate Options in the College of Engineering & Applied Science
  - Minor Programs in the College of Arts & Sciences
  - Certificate Options in the College of Arts & Sciences
  - Minor Program in the Leeds School of Business

        - Certificate Programs in the Leeds School of Business
        - Minor Program in the School of Education
- ❖ Check degree audit for degree progress
    - ➢ Run your degree audit through MyCUInfo. Your degree audit will display any MAPS deficiencies, completed courses, incomplete courses, and provide you a list of options for future Professional Area Electives.
        - Instructions on how to run your degree audit can be found here.
- ❖ Familiarize yourself with the resources on campus. Learn how to study, learn how to ask for help & sharpen time management skills.
    - ➢ Tutoring options can be found on this Academic Support link. Sigma Gamma Tau (SGT) is the Aerospace Honors Society and they offer free tutoring for many courses. Please visit the SGT Website for more information.
        - Consider going to tutoring early in the semester. It's better to begin with tutoring options before you're desperate for help.
        - Make sure you're going to your professor and TA's office hours on a regular basis. They have office hours in order to help you.
        - An excellent resource is the PDF "Being Smart is Not Enough" written by a professor in the Civil Engineering Department: http://www.colorado.edu/engineering-advising/resources-support/tips-success
    - ➢ Counseling and Psychiatric Services/Wardenburg Health Services
    - ➢ Office of Victim's Assistance
    - ➢ Disability Services
- ❖ Read the College's Academic Policies, Calendar/Deadlines, and Engineering Student FAQs: http://www.colorado.edu/engineering-advising/get-your-degree/academic-expectations-policies
- ❖ Registrar's Office Academic Calendar - including drop and add deadlines
- ❖ Current Student FAQs
- ❖ Familiarize yourself with the Honor Code and prepare for the Honor Code quiz.
    - ➢ You're expected to take the Honor Code quiz (receiving a score of 100%) at the beginning of the fall semester. Holds will be placed on your file that will prevent registration for the spring semester if you fail to take the quiz or score 100%, and you will also be required to write a paper addressing the importance of academic integrity. This paper will then be reviewed and must be approved before your hold will be released.
- ❖ Decide which AES faculty member you might like as your faculty mentor. Potential faculty mentors can be found here: https://www.colorado.edu/aerospace/spotlight/faculty. Each faculty member's page will include their research interests. New freshmen and transfer students have the first three weeks in June to choose their faculty mentor. After that, faculty mentors will be assigned.
    - ➢ All undergraduate ASEN majors are encouraged to meet with their faculty mentor in the fall semester. Juniors are encouraged to meet with their faculty mentor in the spring semester when selecting Professional Area Electives for the senior year.
    - ➢ This person will remain your mentor throughout your undergraduate years here in the Department of Aerospace Engineering Sciences.

- Your faculty mentor wants to talk with you about your interests and direction in aerospace engineering, research opportunities, in-depth aerospace course information (which Professional Area Electives to take based on career or research interest, etc.), graduate schools and how to prepare for graduate school, career development and aerospace engineering in general.
- Aerospace students are welcome to establish a relationship with several faculty members throughout their undergraduate career. A great way to do this is through office hours.

❖ Set up Career Buffs account to receive job postings and career events, attend Career Services events and career fairs, meet with a Career Counselor: http://www.colorado.edu/career/
- On the site you can see available internships/positions by logging into Career Buffs with your CU Identikey and password. You may also want to participate in the CU Buffs Professional Program. This program will help you find future employment through workshops, mock interviews, and more.

Sophomore Year

❖ Prepare for sophomore ASEN courses by reviewing MATLAB, calculus and physics prior to the fall semester.
- MATLAB is free to CU-Boulder students and can be found here: http://www.colorado.edu/oit/software-hardware/site-licenses
- Students can take old APPM exams for calculus here: http://www.colorado.edu/amath/academics/exam-archives

❖ In the fall semester of the sophomore year students should make sure that they are enrolled in APPM 2350, ASEN 2001, ASEN 2002 & ASEN 2012. These courses area all co-requisites for each other. Students who have already completed APPM 2350 Calculus 3 with a grade of C or better are encouraged to take APPM 2360 Differential Equations with Linear Algebra with the fall ASEN sophomore classes.

❖ Check degree audit for degree progress
- Run your degree audit through MyCUInfo. Your degree audit will display any MAPS deficiencies, completed courses, incomplete courses, and provides you a list of options for future Professional Area Electives.
- Instructions on how to run your degree audit can be found here.

❖ In the spring of the sophomore year students should be enrolled in APPM 2360, ASEN 2003 & ASEN 2004 as they are all co-requisites with each other. In order to be eligible for the spring ASEN classes, ASEN 2003 & 2004 students need to get a grade of C or better in APPM 2350, ASEN 2001, 2002 & 2012. Please check course descriptions for specific prerequisites information.

❖ Attend Career Services events and career fairs, meet with a Career Counselor, update your CareerBuffs account: http://www.colorado.edu/career/
- Create a LinkedIn account and upload your resume

- During the summer before the junior year, we encourage students to review final exams for APPM 2350 as well as for APPM 2360 as they map very closely to the aerospace junior level classes. In addition, please use the Course Sequence site to see what other prerequisites are used for the junior courses and review them.

Junior Year

- Review available Professional Area Electives on degree audit and decide which courses to take. Faculty mentors are also available to assist students with options most applicable to future career choices.
- Apply for the BS/MS program, if applicable.
- Apply for internships, attend career fairs and other career events, meet with a career counselor
- Meet with your academic advisor to do a graduation checkout in the spring of the junior year. Prior to the meeting, students should review their degree audit for inaccuracies or questions. Students should bring a hard copy of their degree audit to the meeting.

Senior Year

- Check degree audit for degree progress
- Meet with your academic advisor to review your graduation degree requirements and ensure all necessary paperwork is complete.
- Complete any remaining major course and elective requirements.
- Apply for graduation online through the student center portal under Academic Resources. Make sure any minors are declared (or dropped) prior to applying for graduation online.
- Apply for full-time jobs, attend career fair and other career events, meet with a career counselor.
- Complete senior survey.
- Be sure to read and keep any materials sent to you concerning graduation (cap and gown, announcements, recognition ceremony, commencement, etc.). University Commencement website: http://www.colorado.edu/commencement/students & Engineering Recognition Ceremony: http://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements
- Settle outstanding University debts (e.g., parking tickets, library materials), stops, etc. You can view and pay your bill on MyCUInfo.colorado.edu. (See instructions on the Bursar's Office website.)
- Update your permanent address at MyCUInfo.edu to ensure you receive your diploma, enrollment deposit refund, and all other pertinent information without delay. Enrollment deposit refunds, less any outstanding charges, will be mailed eight weeks after graduation.
- For more items on the pre-graduation checklist, please visit this website: http://www.colorado.edu/commencement/students/pre-graduation-checklist

Some of the most common reasons students DO NOT GRADUATE:

* Student did not complete MAPS requirements in Foreign Language

* Online Credit through the Division of Continuing Education courses not completed on time.

* Incomplete grades from past semesters not completed by the deadline.

* Failed required course(s) in their final semester.

* Did not earn the minimum passing grade for a major course(s).

* Major or cumulative GPA below the minimum requirement.

* Did not meet the College's minimum 128 credit hour requirement.

Senior Design Projects

For Additional Information on the Aerospace Engineering Sciences Capstone Student Projects see, http://aeroprojects.colorado.edu/index.shtml

The 2-semester Senior Projects course concludes the AES Bachelor of Science program:

- ASEN 4018 Senior Projects I: Design Synthesis
- ASEN 4028 Senior Projects II: Design Practicum

The fundamental course objective of the AES Senior Projects sequence is to teach students how to ENGINEER a complex, inter/multidisciplinary design and implementation problem in a group environment. Senior Projects focuses on the synthesis and application of the basic science, mathematics, engineering theory and design skills taught in the sophomore and junior years. It also provides the students with the opportunity to exercise and apply the more advanced material taught in the senior year. The course teaches basic knowledge in component and systems engineering design and provides an introduction into project management, including financial responsibility.

The Prerequisites for senior projects is a grade of C or better in ASEN 1022, 3111, 3112, 3113, 3128, 3200, 3300.

Exceptions for taking Senior Projects

Potentially can take one junior-level course with Senior Projects if all other grades are C or better.

In fall 2005, the Aerospace faculty voted to increase the minimum prerequisite grade from a grade of C- to a grade of C to indicate the level of minimum competency in the subject matter. The faculty made this change because many of the students whose prerequisite grade was C- failed the next level course. Since this change, many more students are successful in the Program and do well in the subsequent course when they repeat a course in which they received a grade of C- or lower.

Students who received a grade of C- or lower in one of the junior-level prerequisite courses for Senior Projects may petition to go on to Senior Projects the following year with one missing prerequisite, while repeating that prerequisite course concurrently with Senior Projects. Although students should have already completed ASEN 1022 with a grade of C or better as of Fall 2013, ASEN 1022 is now a prerequisite for Senior Projects. The petition process for Senior Projects is as follows:

The student submits their petition (form found here: http://www.colorado.edu/engineering-advising/sites/default/files/attached-files/petition.pdf) and also a copy of their transcript to the undergraduate advisor. Then the faculty members who have taught the 3000-level ASEN courses that year vote on whether or not the student should be allowed to go on to Senior Projects with one missing prerequisite course. This allows the faculty to look at the entire academic background of the student; it also is helpful because each faculty member can give input on the student's performance and whether or not they will be able to contribute to their team and have the necessary technical background to perform in Senior Projects. Students who receive a grade of C- or lower in two of the required prerequisites for Senior Projects must complete both classes with a grade of C or better prior to moving on to Senior Projects. Students who receive a grade of F in any of the required junior courses will not be allowed to move forward into Senior Projects and will need to repeat the course and receive a grade of C or better. Students should include in their justification that they will not do a lead in the area that they have the deficiency and should list alternate sub-system leads that they may be interested in pursuing during senior projects. In addition, students should be aware that if their petition is approved, their graduation may be delayed since they will be required to repeat the deficient course at the same time that they take senior projects. Thus, they may have to take a Professional Area Elective in the summer to balance their course load during their senior year.

Time Conflict Petition Procedures/Process

Seniors who have a time-conflict (15 minute overlap) with a course and the Senior Projects lab (spring only) are eligible to petition to take both classes. Students will need to submit a completed (and signed) Petition Form and attach a copy of their unofficial transcript and emails

from both instructors approving the time conflict. They then submit the petition to their academic advisor, who will circulate the petition to the appropriate faculty members.

BS/MS Concurrent Degree Program

http://www.colorado.edu/aerospace/current-students/undergraduates/bsms-degree

The concurrent BS/MS program in Aerospace Engineering Sciences enables the program's top BS students to be admitted to the MS program during their senior year, and to work thereafter toward both the BS and MS degrees in ASEN. Students may apply in the first semester of their senior year.

This program allows for early planning of the MS portion of the student's education, taking graduate courses as part of the BS degree requirements, more flexibility in the order in which courses are taken, and more efficient use of what would otherwise be a final semester with a light credit hour load. For more information, please contact the graduate program advisor.

Up to six (6) credit hours may be counted toward both the BS and MS degree programs. Therefore the minimum number of credit hours required for the BS/MS degree will be 152.

Minimum requirements for admission to the BS/MS program are:

- Completion of nine core ASEN courses (ASEN 1022, 2001, 2002, 2012, 2003, 2004, 3111, 3112, 3113);
- No MAPS deficiencies;
- A minimum overall Boulder Campus GPA of 3.25;
- A minimum GPA of 3.25 in ASEN course work;
- Focus Area declared;
- Concurrent Degree Application completed,
- BS/MS application for admission completed,
- An unofficial transcript provided.
- Grad Data Form completed (link sent after application has been submitted)

Transfer students

In place of 1) above, must take at least three (3) ASEN core courses on the Boulder campus as a matriculated Engineering student and have completed course work at another institution(s) which is approved (via an official Departmental transfer credit evaluation) as equivalent Boulder campus ASEN core course work. Additionally, the transfer student must have completed a minimum of 12 credit hours of engineering course work (including ASEN core course work) on the Boulder campus as a matriculated Engineering student.

Regulations

Until a student in this BS/MS program passes a total of 128 credit hours of course work applicable to the BS or MS degrees in ASEN, the student will be governed by the rules and regulations applicable to any undergraduate student in ASEN unless specified otherwise herein. After a student has completed the BS requirements, he/she will be governed by the rules and regulations applicable to any graduate student in ASEN unless specified otherwise herein. It is the intention of the Department that, as far as possible, a student in this program is treated on the same basis as any other student in the Department at a comparable stage of the academic career. Seniors accepted into this program may be eligible for Teaching Assistantships or Research Assistantships only if they have advanced to graduate status.

Once admitted into the BS/MS Aerospace program, the student must maintain a minimum GPA of 3.0 in all ASEN (undergraduate and graduate) course work taken in order to remain in good academic standing in the program.

Advising

Students in the BS/MS program will receive advising on the BS portion of their program from their undergraduate advisor, and will receive advising for the MS portion of their program from the graduate advisor.

Graduation Checklist

1. Successfully complete a minimum of 128 semester credit hours according to the curriculum in effect at the time the student was officially admitted to the AES degree program (i.e. the Plan Requirement Term). The last 45 credit hours must be earned as a degree student in classes at the Boulder campus after admission to the College of Engineering and Applied Science unless exempted by prior petition.

2. Achieve a cumulative grade point average of 2.25 or better in all courses taken at the University of Colorado (all campuses), as well as a grade point average of 2.25 or better in all ASEN courses. All students need a minimum grade of C or better in all prerequisite courses.

3. Satisfy any outstanding MAPS deficiencies. These deficiencies should have been resolved in the first year or two of enrollment in CEAS, but students cannot graduate without having met the basic requirements in effect at the time of their admission.

4. Meet with your Undergraduate Academic Advisor two to three semesters prior to intended graduation for a comprehensive review and approval of remaining courses needed to satisfy graduation requirements.

5. Complete the Application for Graduation online using MyCuInfo. Deadlines for completion of the application process will be announced by the Registrar's Office, the Engineering Dean and the undergraduate advisor.

6. If you are completing a minor, please meet with the Minor advisor to confirm the satisfactory completion of the minor. Some departments require a hard-copy Minor Completion Form which should be submitted to the undergraduate advisor prior to graduation. Other departments confirm the minor completion via the Degree Audit.

It is the responsibility of each student to be certain that all degree requirements have been met and to keep the Department informed of any change in graduation plans

Business & Engineering Management Minors, Certificates & Masters Programs

Business Minor

Students need to apply for the Business Minor and should do so early in their academic career. Students should keep track of the deadlines and apply as soon as the application process opens as this is a competitive minor and spaces are limited. All of the business courses except two courses count as Free Electives for Aerospace Students. The following courses count as PAEs - BUSM 3002 & BUSM 4001.
http://www.colorado.edu/business/academic-programs/minor-business

CUBIC Program

Students who do not have room in their schedule for the Business Minor but would like to gain skills in business are encouraged to pursue the CUBIC Program which is a fast-paced business certificate that can be completed in Maymester. Please visit this site for more information:
http://www.colorado.edu/business/academic-programs/certificate-programs/cu-business-intensive-certificate-cubic

MBA

Admission into MBA programs requires two years of full-time work experience. Most aerospace companies are much more interested in students getting a MBA than doing an undergraduate double degree in aerospace and business. Many companies would prefer a BS/MS in Aerospace with a minor in CS, EE or CE as well as a business minor. Most companies will pay for the MBA.

MS in Supply Chain Management

Supply Chain Management is very important in the aerospace industry. The Leeds School of Business now offers a MS in Supply Chain Management. For more information please visit: http://www.colorado.edu/business/ms-programs/masters-program-supply-chain-management

•Engineering Management Minor & Engineering Management Certificate are both good options for students. Please visit their website for more information. http://www.colorado.edu/emp/

Opportunities & Resources

Resources for Academic Success

- Faculty Office Hours – students should take advantage of faculty office hours for all of their math, physics, programming and aerospace classes. This is the number one resource for academic success.
- Being Smart is Not Enough PDF: http://www.colorado.edu/engineering-advising/resources-support/tips-success
- Academic Resources on Campus: http://www.colorado.edu/engineering-advising/resources-support/academic-support-tutoring
- Sigma Gamma Tau – Aerospace Honors Society – free tutoring: http://www.colorado.edu/studentgroups/sigmagammatau/
- Disability Services: http://www.colorado.edu/disabilityservices/
- Counseling and Psychiatric Services: A Community Action Center: http://www.colorado.edu/health/counseling
- AEROBuds Program
  - This program was started by two PhD students in Aerospace who completed their BS & MS in the Aerospace Department at the University of Colorado Boulder. The goal is to help aerospace students with time management & study skills and other items that help aerospace students succeed in this challenging program. The program runs for the first 7 weeks of the semester and an announcement about the program will go out via email during the first week of classes.
- Students are encouraged to review prerequisites prior to taking classes. Prerequisites can be viewed online through the course descriptions or in the Course Sequence section of the aerospace website.
- Students who are struggling in their classes (or in other ways) should schedule an appointment with their academic advisor (through MyCUHub) to discuss strategies for success and campus resources.

Learning Opportunities, Research, Internship & Job Search

- Consider Active Learning opportunities: http://www.colorado.edu/activelearningprogram/
- For a list of opportunities in various categories, please visit the ASEN website: http://www.colorado.edu/aerospace/undergraduates/opportunities-0
- Learn how to find an internship or full-time job
  - Career Services – one stop shopping for everything about careers and looking for a job. Attend Career Services events, meet with a Career Counselor, update your CareerBuffs Account and much, much more: http://www.colorado.edu/career/
    - Make sure that your Career Buffs account is up to date and active. A lot of aerospace companies post positions on Career Buffs and often have a short timeline for the application cycle so make sure you are set up to receive information about these types of positions as well as company visits, on-campus interviews, etc. If you have questions please contact Career Services. Companies like SpaceX, Ball Aerospace, Lockheed Martin, Textron and others often post positions on this site and summer internship positions (as well as full-time positions for May graduates) often show up as early as September or October.
    - Freshmen are encouraged to join the Buffs Professionals Program because it is a structured way to obtain career skills (resume writing, interviewing, networking, career counseling, etc.) but it is not very time consuming and can be customized and completed at your own pace. Students who complete the program will receive a CU Buffs Professional Certificate. http://www.colorado.edu/career/events-fairs-programs/cu-buffs-professional-program
    - Schedule an appointment with a Career Counselor at Career Services to learn how to apply for internships, write resumes, cover letters, gain interviewing skills, make the most out of your LinkedIn account, salary negotiation, and much more.
  - Another opportunity is to take COEN 2500 Industry 101. This one credit hour class counts as a Free Elective and gives students the basics for job searches, etc. This is a great class to take during the freshman year.
  - Students need to apply online at the aerospace company's website in order to apply for internships and full-time jobs.
  - A list of internship & job search links can be found on this website: http://www.colorado.edu/aerospace/undergraduates/opportunities-0
- Students are encouraged to get involved in undergraduate research opportunities
  - Discovery Learning Apprenticeship (DLA): http://www.colorado.edu/activelearningprogram/discovery-learning
  - Undergraduate Research Opportunity (UROP): http://www.colorado.edu/suep/urop
  - Research Experiences for Undergraduates (REU): http://www.nsf.gov/crssprgm/reu/
  - Meet with your Aerospace Faculty Mentor to learn about research opportunities in their research lab. Students on the research and PhD track can get involved in research as early as the second semester of the freshman year or the summer after the freshman year. Students interested in pursuing research early in their academic career should already have some technical skills like programming and should have a cumulative CU-Boulder GPA of 3.20 or above.

Scholarships, Awards, Competitions, & Fellowships

There are many opportunities for awards, scholarships and competitions – several of them are at the national level.

- Scholarships, Awards & Competitions:
  - The NASA Website lists a lot of scholarship programs, competitions, resources, etc.: http://www.aeronautics.nasa.gov/education.htm
  - Many Scholarships, Awards & Competitions are sent through the AES Weekly email and some of them can be found on the AES Website.

  - **Scholarships:**
    - University of Colorado Boulder Top Scholarships Office http://www.colorado.edu/suep/top-scholarships/why-apply/undergraduate-scholarships
      - Astronaut Scholarship: http://astronautscholarship.org/scholars/scholarship-program-details/. Students interested in this scholarship should be involved in undergraduate research.
      - Goldwater Scholarship: https://goldwater.scholarsapply.org/
    - The Dr. Robert H. Goddard Memorial Scholarship: http://www.spaceclub.org/education/goddard.html
    - Women in Aerospace Foundation Scholarship http://www.womeninaerospacefoundation.org/foundation/index.html
    - Other scholarship opportunities or websites:
      - A full list of scholarships for CU-Boulder can be found on the Financial Aid website: http://www.colorado.edu/scholarships/
      - Other scholarship opportunities on campus: http://www.colorado.edu/scholarships/continuing-undergraduate
      - A great link for a lot of scholarship options: http://www.colorado.edu/suep/top-scholarships/resources/other-scholarship-opportunities

  - **Awards:**
    - Aviation Week & Space Technology's 20 Twenties: http://demo2.aviationweek.com/datasheet/aviation-week-space-technology-s-20-twenties-supplement
    - College of Engineering & Applied Science Active Learning Award: http://www.colorado.edu/activelearningprogram/discovery-learning/discovery-learning-awards-0
    - Outstanding Graduate Awards - these awardees are selected by the College of Engineering Selection Committee as the top graduate for each category. Students may not apply for the awards – it is by department nomination only. For more in-depth information on factors that determine eligibility for these

awards, please visit the Outstanding Graduate Awards section of this handbook (see below).

- **Competitions:**
  - AIAA Region V Student Competition: https://region5.aiaastudentconference.org/
  - The Revolutionary Aerospace Systems Concepts – Academic Linkages (RASC-AL Competitions): http://www.nianet.org/education/educational-outreach/higher-ed-prog/

- **Fellowships:**
  - NSF Graduate Research Fellowships: http://www.nsfgrfp.org/
  - Graduate Student Fellowships: http://www.gradschools.com/financial-aid/graduate-fellowships-scholarships/fellowships-for-graduate-students

Outstanding Graduate Awards

The College of Engineering and Applied Science recognizes 5 outstanding graduates (BS students graduating in May or August, or BS/MS students graduating with both concurrent degrees in May or August) at the May Engineering Recognition Ceremony. The Outstanding Graduate of the College is also recognized at the University Commencement.

One student per category is nominated by each department. A College of Engineering and Applied Science committee selects one student for each of the 5 categories listed below.

- **Outstanding Graduate of the College** – for overall demonstrated excellence in academics, service, and research
- **Outstanding Graduate for Research** – for demonstrated excellence in research
- **Outstanding Graduate for Service** – for outstanding service contributions
- **Outstanding Graduate for International Engagement** – for outstanding engagement in the international arena
- The graduating student with the highest CU undergraduate GPA after the Fall 2015 semester will be designated the **Outstanding Graduate for Academic Achievement** *[no nomination needed]*

Scoring Rubric for Outstanding Graduate Awards

Faculty who have worked with an undergraduate student who they think is outstanding, will propose prospective nominees to the student's department chair or program director. Departments/programs may nominate one student per major for each category. Nominations need to include:

1) a letter of nomination from the Chair, Undergraduate Chair, or Program Director of the student's department/program
2) at least two support letters from faculty and/or staff (internal or external to CU)

3) the student's resume

It is possible that students nominated for a particular category may be selected for an award in a different category. It is also possible that an award will not be made in one or more categories in a given cycle if the nominations are not strong. Awards will be made based on the strength of the nomination packages, not on personal knowledge of students.

The following criteria will be applied to determine award selections:

Academic Achievement

Automatically determined by student who has highest CU undergraduate GPA from those who have applied for graduation. Nominations are not applicable for this category. Ties are possible.

International Engagement

This award recognizes a student with outstanding engagement in the international arena (e.g., research, service, professional, study abroad, EWB, EDC, Global Engineering, etc.). The engagement does not need to be service-oriented, but engagement should demonstrate positive impact in increasing international awareness on CU campus or community and/or bringing CU out into the world.

Minimum CU GPA of 3.300

Initiative demonstrated toward fostering global understanding

Substantiveness of engagement

- Duration
- Depth of interaction
- Number of interactions

Impact of engagement on host community (bringing CU to the world) or on the CU campus

Evidence of ***Global Learning***, such as:

- Appreciation of other cultures and knowledge systems
- Ability to communicate and deliver technical practice across cultures

Service

This award recognizes a student with outstanding service contributions, particularly volunteer, non-paid, or non-mandatory service in support of college departments or programs.

Minimum CU GPA of 3.300

Voluntary service

Service imparted since becoming a college student

Initiative demonstrated in starting, expanding, reinventing, or leading a service activity

Substantiveness of service

- Hours volunteered
- Duration (over time)
- Depth of focused service (vs. "dabbling")

Impact of service

- Department
- College
- Campus
- Community/society

Research

This award recognizes a student with demonstrated excellence in research.

Minimum CU GPA of 3.500

Research could be an extension of academic work or DLA appointment, but student should demonstrate one or more of the following:

- Peer-reviewed journal publication
- Conference/symposium presentation (paper or poster)
- Research spanning more than one field (transdisciplinary)
- Research extended beyond CU (at another university, national lab, etc.)

Significance and ***Impact*** of research

- New knowledge
- Extends progress in a given field
- Societal
- Financial

Overall

This award recognizes a student with overall demonstrated excellence in multiple areas: academics, research, and service or international engagement.

Minimum CU GPA of 3.500

Relevant criteria from above categories

Guidelines for Extenuating Circumstances

How to address documented issues like extended medical issues, death of a family member, psychological issues, etc.

Students who experience extended medical issues or emergencies, death of a family member, or other documented situations outside of the student's control should meet with their academic advisor as soon as possible to discuss academic options and campus resources. There are several options and the academic advisor can walk the student through each option to see which one is the best option for the student.

If a student experiences a medical issue during the semester that is not an extended illness he/she should contact the instructor immediately and follow the directions set in the course syllabus. The student must make-up the course work missed. Students should contact the individual instructor for each class that they need to make-up their coursework.

Extended Illness

Students who have missed a good portion of the semester because of a documented extended illness should know their options. Usually, the student (or parent) will contact the advisor and instructor. Students basically have four options to withdraw from the semester.

1. Before 10th week of Semester
    a. Drop a portion of their course load. Students can drop a course on MyCUInfo up until the 10th week of the semester without instructor signature.
    b. If the student decides to do this, they should contact the instructor to let them know that the student dropped the class and they should also alert their academic advisor of this change.
2. After the 10th week of the semester the student can drop all of their courses through the Office of the Registrar. They will receive a grade of W for all of their classes and will not receive a tuition refund. This causes the student to be withdrawn from the university. Students are encouraged to participate in the Stay Connected Program if the student plans to return to CU-Boulder Engineering and is in good academic standing
3. After the 10th week of the semester if the student has medical documentation (i.e. a letter from the student's physician stating that they recommend due to medical reasons that the student should drop the course), students are eligible to petition to drop the class.
4. Students can also work with Wardenburg Health Center to do a medical withdrawal only if they have been seeing a Wardenburg Health Center counselor for at least three sessions.

Death of Family Member or Friend

Students that experience the death of a family member or friend during school can see an adverse effect on their attendance and/or grades. In many instances, these students will take time away from their studies for various reasons (emotional, support family, funeral and/or financial arrangements). Students should take advantage of campus resources like the Office of Victim's Assistance and CAPS (links listed above). See above 'Extended Illness' for administering drop procedures, if applicable.

Appendix:

Degree Tracks/Course Sequence by Matriculation Year (Fall 2011 to present)
Faculty Mentor Form
Honors Thesis Defense Form