# AEROSPACE ENGINEERING SCIENCES - DOCTOR OF PHILOSOPHY (PHD)

Students typically complete their PhD in aerospace engineering sciences within 4 to 6 years, depending on whether they enter the program with a master's degree.

The primary focus of a PhD student is to perform novel research guided by their faculty advisor. At the time of admission, PhD students must have a faculty advisor who agrees to accept the student into their research program and mentor their academic progress. PhD students are supported through research and teaching assistantships and are also encouraged to apply for their own source of funding.

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

## Requirements

### Course Requirements

- A minimum of 30 credit hours of courses numbered 5000 or above (at least 15 of these must be in ASEN) with a minimum of 3.25 GPA.
- 30 credit hours of dissertation credit are required for the degree.
- A maximum of 21 credit hours may be transferred from another accredited institution and applied toward a PhD degree if approved by the Graduate School.
- All courses taken for the master's degree at the 5000 level or above at the University of Colorado may be applied toward the doctoral degree at the university.

### Preliminary Examination

Students must pass the preliminary exam by the fifth semester as a CU Boulder PhD student, although most students take the exam in their third semester. If a student enters the PhD program with a master's degree in aerospace engineering, their faculty advisor can require the exam be taken by their third semester. The preliminary exam is composed of an oral exam in front of a committee of three AES graduate faculty members. The exam focuses upon both research preparation and fundamental knowledge in key subject areas.

The oral exam will be composed of three components:

1. A presentation summarizing the literature review conducted by the student followed by an examination of the presented concepts.
2. Two subject area exams based on approved courses.

### Doctoral Practicum

The Doctoral Practicum (DP) is a required element of the PhD program in Smead AES that complements the primary research and academic experiences which are core to the awarding of a doctorate. The objective of the DP is to provide students with an experience to use their advanced education to teach, mentor and serve as role models. The emphasis of the practicum is on using technical skills, education and insights in service to others. The expectation is that this activity (which should consist of about 40 total hours of work) will help students grow confidence and skills as leaders. The process is formative, and students are responsible for articulating how their chosen practicum will be structured toward achieving the following goals:

1. Provide meaningful educational or societal benefit/impact to others.
2. Provide intrinsic value to the student's professional or personal development.
3. Leverage the research and/or educational skills developed in the PhD program towards the two goals above (I.e., societal benefit and personal development).

### Comprehensive Examination

Students must pass the comprehensive exam to become doctoral candidates. This exam is in front of the student's doctoral committee, which is made up of the student's research advisor and four (or more) other graduate faculty members chosen by the student. Before the exam, the student provides a written proposal for their thesis research to the doctoral committee. The oral exam consists of the student presenting their proposal and any initial research findings to their committee, who then examines the student on the proposal and related technical concepts. After incorporating input from the committee through the Comprehensive Exam and passing this exam, the student will have a plan for their thesis research and will become a doctoral candidate.

### PhD Dissertation

Students must write a dissertation based on original research conducted under the supervision of a graduate faculty member. The dissertation must fulfill all Graduate School requirements. After the dissertation is completed, an oral final examination on the dissertation and related topics is conducted by the student's doctoral committee.

### Time Limit

All degree requirements must be completed within six years of the date of commencing coursework.

## Learning Outcomes

By the completion of the program, students will have:

- Expertise in one or more of the core areas of aerospace engineering and/or aerospace-related sciences.
- Ability to conduct original research in their core area.
- Ability to communicate and defend research motivation, methodology and results through written documentation.
- Ability to communicate and defend research motivation, methodology and results through oral presentation.
- Experience using the skills developed in the PhD program to benefit the community through the doctoral practicum.