Doctor of Philosophy in Aerospace Engineering

Aerospace Engineering
The aerospace engineering discipline involves the design, production, operation, and support of aircraft and spacecraft. Aerospace engineers solve problems, design aircraft and spacecraft, conduct research, and improve processes for the aerospace industry.

Mission
KU aerospace engineering is an international leader in aerospace education and is committed to developing a global community of choice for students, educators, and researchers by strategically aligning teaching, research, and service missions. A world-class graduate and undergraduate education focused on designing, simulating, building, testing, and flying aerospace vehicles is provided. The department invests in research infrastructure and chooses outstanding students, faculty, and staff to conduct basic and applied research of relevance to aerospace vehicles and systems. The department supports the aerospace profession by educating the public, by maintaining the KU aerospace short-course program, and by advising policy-makers in government, industry, and disciplinary professional organizations.

Educational Objectives
Aerospace engineering prepares graduates for professional practice in the aerospace industry and graduate study in aerospace engineering. Achievement is measured through assessment of the performance of graduates three to six years after graduation. Graduates must demonstrate the following measurable learning outcomes:

1. Competence in the analysis, test, and design of aerospace systems and components using contemporary techniques, equipment, and software.
2. An understanding of the professional responsibilities associated with the special public safety and economic aspects of the aerospace industry.
3. The ability to communicate analysis, test, and design results to engineers and nonengineers.
4. The ability to work effectively in interdisciplinary teams.
5. An understanding of the need for lifelong learning.

Graduate Admission to the Department of Aerospace Engineering

Application Requirements
In order for applications to be considered complete, the following materials must be submitted online with the application by the posted deadline:

1. Transcripts from all degree granting institutions (If admitted, official transcripts must be sent for all applicants - including KU undergraduate students). In order for transcripts to be considered official, they must be sent directly from the institution either by mail or e-mailed directly to the university. **KU does not consider transcripts that come from applicants or that have been in the applicant’s possession as official.** You may be admitted by the department with the transcript you uploaded to the application; however, University Graduate Admissions must receive your official transcript - sent directly from your institution – before you will be officially admitted to the University. Degree conferral transcripts must be received by the end of your first semester of graduate enrollment to be eligible to continue enrollment. The official transcript must show that your undergraduate degree has been conferred.
2. Three letters of recommendation. Recommenders will receive instructions on submission at the time the application is submitted.
3. Resume or CV
4. GRE score report
5. Statement of Objectives
6. TOEFL or IELTS score report (International students only)
7. Statement of Financial Resources (International students only)

* Please note: All application materials must be received before any kind of decision is made. Documentation sent in addition to that requested above is not required and may be destroyed. Do not send paper documents unless requested.

Admissions Deadline
Our department priority deadlines for admission are:

Fall Admission: December 1 (all applicants)
Spring & Summer Admission: September 15 (all applicants)

For full consideration for fellowships, scholarships and research/teaching assistantships, applications should be received by December 1 (for fall admissions). Application materials should indicate the interest in financial assistance or research/teaching assistantships.

Application Fees
Domestic: $65
International: $85

Document Specifications

Letters of Recommendation
The letter of recommendation form should be completed and sent with a signed document from your chosen references. Recommenders will receive instructions on submission at the time the application is submitted.

Statement of Purpose
Only complete the Statement of Purpose Form. The essay should be no longer than the space provided on the form.

Statement of Financial Resources
As a part of the application process, all international students must submit credible evidence of financial support for the first year of study (http://iss.ku.edu/cost-sheets). Financial documents must be less than 6 months old, indicating the type and amount of currency in US dollars. If the bank account is not in the applicant's name, please attach a statement signed by the account holder indicating the relationship to the student for whom the support will be provided. There is no form for the Statement of Financial Resources, please send only the form(s) of documentation listed below.

Acceptable evidence includes:

• Bank statement from checking, savings, stock holdings and/or certificate of deposit
• Bank letter on letterhead indicating date account opened, average balance and current balance
• Scholarship or sponsorship letter verifying amount, source and dates of award

Contact Information
Aerospace Engineering Graduate Director:
Graduate Program Director
The University of Kansas
Aerospace Engineering
2120 Learned Hall
1530 W. 15th Street
Lawrence, Kansas, 66045
E-mail Graduate Program Director, Dr. Charlie Zheng, at aerohawk@ku.edu

KU Office of Graduate Studies:
The University of Kansas
Graduate Applications Processing Center
1450 Jayhawk Blvd, Room 313
Lawrence, Kansas 66045-7535
785-864-8040
E-mail the main university Office of Graduate Studies at Graduate@ku.edu or contact the School of Engineering Research & Graduate Studies office at GradEngr@ku.edu with general questions about admission.

KU (http://www.graduate.ku.edu) Graduate Studies Website (http://www.graduate.ku.edu)

Admissions Standards
Minimum Requirements for Doctoral Applicants
Students applying for admission to the Ph.D. or D.E. programs must have as a minimum an M.S. or M.E. in Aerospace Engineering, unless they are admitted on a Fast Track basis with a bachelor degree in engineering. The department graduate advisor will evaluate the total academic preparation to determine if additional courses are required to prepare the student for graduate work in aerospace engineering. Any undergraduate courses which must be taken do not carry graduate credit. Internships are not guaranteed.

Except for BSAE, MSAE or MEAE graduates from KU, all applicants must supply a recent Graduate Record Examination (GRE) and three letters of recommendation from individuals familiar with their academic record and performance. Applicants must have as a minimum a GPA of 3.5/4.0 for all courses taken during their M.S. or M.E. program.

GPA Requirements
Applicants must have a minimum GPA of 3.0 for a regular admission status. In exceptional cases applicants with a GPA between 2.75-2.99 may be granted provisional admission. In such instances the student must maintain a GPA of at least 3.0 during the first semester of graduate study at KU. Grades of D and F are not accepted. A student failing to maintain these standards will be dismissed from the graduate program. On rare occasions and as supported by other strong evidence of achievement (e.g., significant industrial experience), a provisional admission status may be granted to students with a cumulative GPA below 2.75. After one semester of full-time graduate studies and maintaining a GPA of at least 3.0, a provisionally-admitted students must file a petition to change his/her status to regular status.

Applicants from outside KU must submit Graduate Record Examination (GRE) scores and three letters of recommendation from individuals familiar with their academic performance.

Transfer Credit for Graduate Courses
Up to six hours of approved graduate work may be transferred to KU from other universities. Students with a B.S. degree from KU may transfer up to eight hours of approved graduate work from other universities.

GRE Requirements
Applicants must have a minimum of 50% on the Verbal and Analytical sections of the GRE and 85% on the Quantitative section. Applicants with lower scores, but otherwise exceptional record, will be considered for provisional admission.

English Proficiency Requirement
Receipt of an official copy (not student's copy) of an applicant's English proficiency standardized test scores (e.g. TOEFL) achieved not more than two years prior to the semester of first enrollment.

All students who are not native speakers of English and/or international students and who are admitted to campus-based programs are required to check in at the Applied English Center (http://www.aec.ku.edu) (AEC) upon arrival on campus. At that time, the AEC will confirm the student's level of English proficiency and determine if English courses are required.

Refer to link (http://policy.ku.edu/graduate-studies/english-proficiency-international-students) to for university policy.

Funding
Scholarships/Fellowships - The Aerospace Engineering department nominates applicants for University and School of Engineering scholarships and fellowships based on academic merit and other selection criteria.

Graduate Teaching Assistantships (GTAs) - Teaching Assistantships are available and are awarded competitively based on academic qualifications through the department or school.

Graduate Research Assistantships (GRAs) - Students work with their potential academic advisor/mentor to obtain a funded position on a research project.

A variety of scholarships, fellowships, and assistantships are available to graduate students through the School of Engineering and KU. Learn more at http://www.engr.ku.edu/prospective/graduate/scholarships.html

Visit Us
The graduate program staff is happy to work with all prospective students in determining the fit between the student and the program. In order to determine this, we feel that visiting our campus in Lawrence is a very important step. In order to facilitate your visit to KU, there are two main options:

The first, and most preferred, option entails simply applying for admission to the program. All prospective students are welcome to attend our Open House in early November and some highly qualified admitted students may be invited to participate in Visitation Days in late February or early March (prior to the fall semester of your intended matriculation). These
organized visitation opportunities will allow you time to gather a great deal of first-hand information which we hope will help you in making a final decision about whether to attend KU.

The second option is making arrangements to visit us on your own, outside of organized events. With early notification, we will do our best to work with you to provide information and schedule appointments with faculty when possible. Please contact us if you feel that this is the best option for you.

**Contact Information**

Please contact the AE Graduate Assistant at aerohawk@ku.edu or (785) 864-2960, to schedule a visit or with questions about the application process.

The University of Kansas
Aerospace Engineering
2120 Learned Hall
1530 W. 15th Street
Lawrence, Kansas, 66045

**Ph.D. Degree Requirements**

The Ph.D. program requires 60 credit hours beyond the B.S. These 60 credit hours consists of 36 credit hours of course work and at least 24 credit hours of dissertation.

Core courses of at least 9 credit hours of graduate mathematics beyond the B.S. are required. The 9 credit hours must include a minimum of 6 credit hours of graduate-level courses from the Mathematics Department. AE 712 is considered a mathematics-intensive engineering course. Graduate mathematics courses include MATH 590 or any math course 600-level or above.

Breadth courses consist of 12 credit hours distributed outside the area of specialization in aerodynamics, structures and materials, dynamics and controls, design, propulsion and astronautics.

Depth courses consist of 15 credit hours of technical courses (600-level and above) in the area of specialization.

Credit hours earned in completing a master’s degree can be used to satisfy a portion of these requirements when appropriate. Unique situations can be accommodated with the approval of the graduate advisor and the candidate’s major professor.

In addition to general rules and regulations, a student must meet departmental Ph.D. requirements. After 2 semesters following the completion of M.S. requirements (or at a comparable level for non-M.S. students), the student is evaluated. To be allowed to continue for the Ph.D., the student must

1. Have a minimum grade-point average of 3.5 in M.S. course work, and
2. Pass a Doctoral Qualifying Examination (DQE)

The DQE tests breadth of knowledge and determines the student’s ability to formulate mathematical representations of real physical situations. The examination covers mathematics and 2 of these 5 areas:

- Aerodynamics,
- Astronautics,
- Structures and materials
- Dynamics and controls, and
- Propulsion.

A student is allowed only 2 attempts to pass this examination. If a student has completed AE 712 with a grade of B or higher, the mathematics section of the qualifying exam is waived.

The aspirant forms a dissertation committee and completes a Plan of Study after the first semester and before the end of the second semester. The dissertation committee must have 5 members, including 3 tenured or tenure-track faculty from aerospace engineering and at least 1 member from a department other than aerospace engineering. The committee approves the aspirant’s program and administers the comprehensive examination and the formal oral defense and dissertation.

When the aspirant has completed most of the course work and satisfied the research skills, responsible scholarship and residency requirements, they must take the comprehensive examination. The research skill requirement provides the aspirant with a research skill distinct from, but strongly supportive of, the dissertation research. One research skill is required. Possible research skills include computer science, mathematics, statistics, specific laboratory skills, and specific skills in the physical or biological sciences. The selected research skill must be listed on the Plan of Study form. A separate statement attached to the Plan of Study must list the work to be completed to obtain the research skill. The responsible scholarship requirement serves to ensure that students are trained in responsible research practices. Aspirants can satisfy the responsible scholarship requirement by enrolling in 2 semesters of AE 690, Professional Development for Graduate Students. This course covers ethical behavior for graduate students, intellectual property, and technical writing. The residency requirement is met by completing 2 semesters, which may include 1 summer session, in resident study and enrollment in 6 credit hours or more. During the period of residence the student must be involved full time in academic pursuits, which may include up to half-time teaching or research.

The comprehensive examination is made up of two parts. The first part must consist of a written research proposal outlining in some detail the work to be done for the dissertation. The second part is an oral examination in which she or he must defend the research plans and demonstrate competence in her or his particular and related areas. Upon passing the comprehensive oral examination the aspirant becomes a candidate for the PhD AE degree. The dissertation committee directs preparation of the approved dissertation topic and research. The candidate now completes the dissertation work or research and writes the dissertation. The dissertation must contain an original contribution made by the candidate to the field. In addition, a comprehensive review of the pertinent literature must be included. This dissertation must be approved by the candidates’ dissertation committee. A formal oral and public defense of the dissertation is required before the candidate’s committee, any other interested members of the Graduate Faculty, and the general public. Candidates for the PhD must also satisfy the university’s general requirements for the degree.

To be awarded the Ph.D. degree a student must:

1. Complete all course work with a 3.0. Grades of D and F are not allowed.
2. Satisfy residency requirements.
3. Pass the Doctoral Qualifying Examination.
4. Satisfy the Research Skills and Responsible Scholarship requirements.
5. Pass the Comprehensive Exam.
6. Prepare and defend a PhD dissertation which must contain an original contribution to the field by the candidate.
Note well:
a. The dissertation must be publicly defended in the presence of the candidates dissertation committee. Public notice of this defense must be given at least two weeks before the defense. The dissertation defense must be public and reasonable questions from the public must be addressed by the candidate.

b. At least five months must elapse between passing the comprehensive oral examination and conducting the dissertation defense.

Maximum Tenure

The dissertation must be completed within eight years after being admitted to the PhD program in AE. In cases which require more than eight years, the dissertation committee may grant an appeal for an extension of this period.