

Aerospace Engineering
College of Engineering
1845 Fairmount Hall, Box 44
Wichita, KS 67260-0044

Phone: 316-978-3410

Web address: www.wichita.edu/aerospace

Program overview

The aerospace engineering department at Wichita State is the sixth oldest in the nation. Located in Air Capital of the World, we have long benefitted from and contributed to Wichita's rich aviation history, home to such names as Airbus, Boeing, Bombardier-Learjet, Cessna, Hawker Beechcraft and Spirit AeroSystems.

WSU's Cooperative Education program gives students the opportunity to work locally and at NASA centers -- gaining resume experience and making contacts in aerospace and other industries that hire our graduates.

We're hands-on in the classroom, too. Our laboratories, including those at WSU's National Institute for Aviation Research, are among the best in the nation and the WSU Honors Program and Aerospace Engineering Honors Track provide top students with additional challenges and rewards.

- **About the program:**

About our degrees – acceptance information:

Bachelor -

<http://www.admissions.wichita.edu/factsheets/ENAerospaceEngineering.pdf>

Master -

[http://webs.wichita.edu/depttools/depttoolsmemberfiles/gradschool/GBAerospace.p
df](http://webs.wichita.edu/depttools/depttoolsmemberfiles/gradschool/GBAerospace.pdf)

Doctor –

[http://webs.wichita.edu/depttools/depttoolsmemberfiles/gradschool/GBAerospace.p
df](http://webs.wichita.edu/depttools/depttoolsmemberfiles/gradschool/GBAerospace.p
df)

Degree requirements:

Master –

Applicants for the M.S. degree program will be admitted to the graduate program under one of the following categories if they meet the associated requirements.

- Admission to Full Standing - A minimum grade point average of 3.0 on a 4.0 scale during the last two years or sixty credit hours of prior studies, or
- Admission on Probation - A minimum grade point average of 2.75 to 3.0 during the last two years or sixty credit hours of prior studies

International applicants who did not receive their prior degrees from an English-speaking university are expected to score 213 on the computer-based or 79 on the internet-based version of the TOEFL. We now also accept an IELTS score of 6.5 or above. Graduate coordinators may impose additional admission requirements for applicants whose previous degrees are not in aerospace engineering.

Doctor –

Admission to any PhD program in engineering requires that the student has completed (or nearly completed) a master's degree in engineering or physical science. Scores for the General Test of the Graduate Record Examination (GRE) must be submitted. Some students may find it necessary to take prerequisite courses to be able to meet the course breadth requirements. The student is recommended to the graduate dean for admission by the department chairperson in consultation with the graduate coordinator of the department.

About our courses:

Undergraduate - The aerospace engineering program at Wichita State University specializes in the study of both aircraft and spacecraft. Courses are offered in the following general areas:

Aerodynamics - What keeps the vehicle in the air?

Performance - How fast and how high will the vehicle go?

Propulsion - What makes the vehicle move?

Stability and Control - What keeps the vehicle stay on course?

Structures - What holds the vehicle together?

The aerospace engineering curriculum is designed to develop skills in these five areas, as well as in math, physical science, general engineering, digital computation, and written and oral communication. When you're a senior, you'll be ready for courses in

aerospace design. The aerospace engineering department has well-equipped laboratory facilities for required courses and student projects. You'll have access to laboratory facilities that are among the finest found in academic institutions nationwide - five wind tunnels, a water tunnel, and structural testing lab. College of engineering students also have access to computer laboratories and a campus-wide wireless network.

About our faculty:

Located in the "Air Capital of the World," faculty benefit from Wichita's rich aviation heritage and close proximity to major aircraft companies.

See a list of our aerospace engineering faculty at

http://webs.wichita.edu/depttools/depttoolsmemberfiles/wsunews/aerospace_faculty.pdf

Practical experience and special academic opportunities:

Undergraduate Students

You may want to participate in cooperative education, a voluntary program in which you'll have the opportunity to integrate formal course work with periods of relevant off-campus employment. Our co-op students have worked at such facilities as the NASA Johnson Space Center, Spirit AeroSystems, Boeing, Cessna, Bombardier Learjet, Hawker Beechcraft, and the Federal Aviation Administration.

The following information outlines research opportunities for students. The basic project title is listed, along with any special requirements, and links or contact information.

Graduate Students

- **NASA Funded Controls Research** - US Citizens/Permanent Residents only, undergraduate or graduate, contact [Dr. Chakravarthy](#)
- **NASA/WSU Experimental Aerodynamics Fellowship (EAF) Program** - US Citizens only, link [here](#)
- **Small Aircraft Design, Prototyping, & Testing** - AE majors only, send 1-page resume and 1/2-page letter of introduction to [Dr. Miller](#)
- **Development of Astronautics Related Mathematical Techniques and/or Computational Tools** - AE majors only. Work includes analyzing orbit-raising mission scenarios for all-electric spacecraft and determining optimal strategies for coordinated task execution by multi-vehicular systems (for Dr. Dutta, but send 1-page resume and 1/2-page letter of introduction in care of [Dr. Miller](#))

Undergraduate Students

- **NASA Funded Controls Research** - US Citizens/Permanent Residents only, undergraduate or graduate, contact [Dr. Chakravarthy](#)
- **NASA/WSU Experimental Aerodynamics Fellowship (EAF) Program** - US Citizens only, link [here](#)
- **Development of Astronautics Related Mathematical Techniques and/or Computational Tools** - AE majors only. Work includes analyzing orbit-raising mission scenarios for all-electric spacecraft and determining optimal strategies for coordinated task execution by multi-vehicular systems (for Dr. Dutta, but send 1-page resume and 1/2-page letter of introduction in care of [Dr. Miller](#))

Extracurricular activities:

To see information about our student organizations and activities, go to http://webs.wichita.edu/?u=aero_eng&p=/xaestudentorgan.

To see information on the Bronze Propeller Competition, go to http://webs.wichita.edu/?u=aero_eng&p=/the_bronze_propeller.

To see information on WSU & NASA in Kansas Jump Start Program - Undergraduate Fellowships, go to http://webs.wichita.edu/?u=aero_eng&p=/wsu_nasa_jump_start_program.

To see information on the NASA/WSU Experimental Aerodynamics Fellowship, go to http://webs.wichita.edu/?u=aero_eng&p=/NASA_EAF_Program/.

Links to further information about this program:

Undergraduate catalog: http://soar.wichita.edu/bitstream/handle/10057/3552/UG_2011-2012.pdf?sequence=3

Undergraduate admissions:

<http://www.wichita.edu/thisis/admissions/index.asp?role=freshmen>

Graduate admissions: <http://webs.wichita.edu/?u=gradschool&p=/Forms/AdmissionForms/>

Department of Aerospace Engineering: www.wichita.edu/aerospace

College of Engineering: www.wichita.edu/engineering

• Degrees

Degrees Offered:

Undergraduate: BS

Graduate MS, Ph.D.

Advisement: For information on the engineering advising process, go to <http://webs.wichita.edu/?u=engadvising&p=/stepsintheadvisingprocess>.

Transfer policy: For information on College of Engineering transfer policies, go to <http://webs.wichita.edu/?u=ENGINEERING&p=/Prospective/transferstudent/>.

Aerospace Engineering BS:

The undergraduate program requires the completion of 135 semester credit hours for graduation. The suggested course of study for aerospace engineering students is given in the following table. A printable version (often called the "check sheet") can be found [here](#).

Sequence of Courses

Freshman Year

Course	Hrs
Engl. 101 or 100 and 102, College English I and II	6
Chem. 111Q, General Chemistry	5
Math. 242Q and 243, Calculus I and II	10
Phys. 313Q and 315Q, University Physics I and Lab	5
IME 222, Engineering Graphics	3
AE 227, Engineering Digital	3

Sophomore Year

Course	Hrs
Comm. 111, Public Speaking	3

Math. 344, Calculus III	3
Math. 555, Ordinary Differential Equations	3
Phys. 314Q, University Physics II	4
AE 223, Statics	3
AE 324, Fundamentals of Atmospheric Flight	3
AE 333, Mechanics of Materials	3
AE 373, Dynamics	3
ME 250, Materials Engineering	3
ME 398, Thermodynamics I	3
Humanities and fine arts or social and behavioral sciences electives***	6

Junior Year

Course	Hrs
AE 415, Introduction to Space Dynamics	3
AE 424, Aerodynamic Theory	4
AE 502, Aerospace Propulsion I	3
AE 512, Experimental Methods in Aerodynamics	2
AE 514, Flight Mechanics and Controls	3
AE 525 and 625, Flight Structures I and II	6
ME 521, Fluid Mechanics	3
IEN 255, Engineering Economy	3

Phil. 385, Engineering Ethics	3
Humanities and fine arts or social and behavioral sciences electives***	3

Senior Year

Course	Hrs
AE 607, Flight Control Systems	3
AE 528 and 628, Aerospace Design I and II	8
ECE 282, Circuits I	4
Technical electives*	9
Natural sciences elective**	3
Humanities and fine arts or social and behavioral sciences electives***	6

*A maximum of 3 credit hours of course work outside the AE department may be applied towards technical elective credit (double majors will be exempt). A maximum of 3 credit hours of approved lower division work may be applied towards technical elective credit. All upper division course work must have Math 242 or higher as a prerequisite.

**To be chosen from a list of approved courses available from the college student records office.

***Refer to the graduation requirements of the university catalog for details.

MS degree plan of study:

The Plan of Study is a tailored schedule of academic work. Graduate committee membership and the degree option (e.g., Thesis, Project, or Non-Thesis) are also defined. The final plan must be approved by the advisor and graduate school. Each student must file a Plan of Study before the completion of 12 hours of course work, and it must include the following:

- At least 12 credit hours in the Major, and
- At least 3 credit hours in Math, beyond differential equations, or statistics

Major courses covered on the Exit Exam, for students pursuing the Non-Thesis Option, include:

- Aerodynamics and Fluid Mechanics - AE 711, AE 716, and AE 812
- Structures and Solid Mechanics - AE 722, AE 731, and AE 777
- Flight Dynamics and Control - AE 707, AE 714, and AE 773

The Plan of Study form can be obtained from the [M.S. Program Coordinator](#).

Application

Interested individuals are invited to contact the [Graduate School](#) for application materials at the following address:

Wichita State University

Graduate School

Wichita, KS 67260-0004

Phone: (316) 978-3095

All applications need to be made directly to the Graduate School. Additional information about graduate studies in Aerospace Engineering can be obtained from:

[Dr. Kamran Rokhsaz](#)

Graduate Coordinator, M.S. Program

Wichita State University

Department of Aerospace Engineering

Wallace Hall, Room 200

1845 North Fairmount

Wichita, Kansas 67260-0044

Ph.D. plan of study:

Ph.D. Degree Admission Requirements

Admission to any PhD program in engineering requires that the student has completed (or nearly completed) a master's degree in engineering or physical science. Scores for the General Test of the Graduate Record Examination (GRE) must be submitted. Some students may find it necessary to take prerequisite courses to be able to meet the course breadth requirements. The student is recommended to the graduate dean for admission by the department chairperson in consultation with the graduate coordinator of the department.

Ph.D. Course Requirements

To ensure proper breadth of course work, the Plan of Study must include at least 15 hours in the student's major field and 18 hours outside the major area. The 18 hours must include a minimum of six hours in a minor area (defined by the advisory

committee) and a minimum of six hours of mathematics/statistics. A Plan of Study normally contains about 60 hours of course work, including courses from the master's degree, and should have a minimum of 60 percent of the hours (24 dissertation hours included) beyond the master's work at the 800-900 level or equivalent.

Ph.D. Plan of Study and Advisory Committee

Within the first 12 hours of PhD course work, the department chairperson, in consultation with the graduate coordinator and the student, recommend to the Engineering Graduate Committee an advisory committee for each student. The committee will be composed of a minimum of five graduate faculty, with at least four having full membership including the chairperson who also must have authorization to chair doctoral committees. A majority of the advisory committee members must be from the major department and at least one member must be outside the student's major department. The chairperson of the advisory committee should be the student's dissertation advisor. The student and advisory committee chairperson will formulate a Plan of Study and a tentative dissertation topic for approval by the advisory committee, the department chairperson, the engineering graduate committee, and the graduate dean. The Plan of Study will include designation of major and minor fields and all graduate level course work which is applicable to the degree.

Ph.D. Comprehensive Examination

After the PhD Plan of Study has been approved, and after sufficient course work has been completed, the student must take the comprehensive examination given by the advisory committee. The comprehensive examination will cover the major field and any course that the advisory committee deems necessary. The student's advisory committee is responsible for ensuring that the student takes the comprehensive examination at the appropriate time. No part of the comprehensive examination may be attempted more than twice. Upon passing the comprehensive examination, a student is known as an Aspirant for the PhD.

Ph.D. Time Limits and Residency Requirements

From the time the student is admitted to the program, no more than six years may elapse until requirements for the degree have been completed. However, the student may petition the advisory committee for a leave of absence to pursue full-time professional activities related to his/her doctoral program and long-range professional goals. At least two semesters shall be spent in residency on the WSU campus involved in full-time academic pursuits. This may include up to half-time teaching and research. Well-designed plans for obtaining dissertation research experience under the supervision of the student's advisor will be considered in lieu of the residency requirement.

Ph.D. Dissertation Approval Examination (DAE)

When the PhD aspirant has completed the major portion of the course work, the advisory committee can petition for permission to administer the DAE. The aspirant will submit a written dissertation proposal to the advisory committee. After reading the proposal and receiving permission of the graduate dean, the advisory committee will conduct an oral examination to determine the aspirant's ability to carry out the proposed research and whether or not this research qualifies as a PhD dissertation. Any essential change in the project requires committee approval. After passing the DAE, the student is known as a Candidate for the PhD Degree. A candidate must be continuously enrolled in PhD Dissertation for a minimum of six hours each semester and two hours in the Summer Session until completion of the dissertation or 24 hours of PhD Dissertation have been taken. After this, two hours per semester and one hour per summer are required. In any case, no less than 24 hours of enrollment for PhD Dissertation will be required. The dissertation may be performed in absentia with the approval of the advisory committee.

Ph.D. Final Dissertation Examination

The student must defend the dissertation before the advisory committee. At least five months must elapse between the DAE and the final examination. The final examination will be open to the public. Invited guests or external examiners may be invited if the committee desires.

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Wichita, KS 67260-0004

Phone: (316) 978-3095

All applications need to be made directly to the Graduate School. Additional information about graduate studies in Aerospace Engineering can be obtained from:

[Dr. Klaus A. Hoffmann](#)

Graduate Coordinator, Ph.D. Program

Wichita State University

Department of Aerospace Engineering

Wallace Hall, Room 200

1845 North Fairmount

Wichita, Kansas 67260-0044

- **Courses**

Undergraduate aerospace engineering courses:

Freshman:

IME 222, Engineering Graphics	3
AE 227, Engineering Digital	3

Sophomore:

AE 223, Statics	3
AE 324, Fundamentals of Atmospheric Flight	3
AE 333, Mechanics of Materials	3
AE 373, Dynamics	3
ME 250, Materials Engineering	3
ME 398, Thermodynamics I	3

Junior:

AE 415, Introduction to Space Dynamics	3
AE 424, Aerodynamic Theory	4
AE 502, Aerospace Propulsion I	3
AE 512, Experimental Methods in Aerodynamics	2
AE 514, Flight Mechanics and Controls	3
AE 525 and 625, Flight Structures I and II	6
ME 521, Fluid Mechanics	3
IEN 255, Engineering Economy	3
Phil. 385, Engineering Ethics	3

Senior:

AE 607, Flight Control Systems	3
AE 528 and 628, Aerospace Design I and II	8
ECE 282, Circuits I	4

- **Faculty**

See a list of our aerospace engineering faculty at

http://webs.wichita.edu/depttools/depttoolsmemberfiles/wsunews/aerospace_faculty.pdf

- **Careers**

Employment opportunities - doing analysis, design, testing, simulation, and research - exist in the defense, government, commercial, and private sectors.

Spin-off employment opportunities exist in industries that demand lightweight and optimized performance products. As a result, aerospace engineers also work in the automotive (including racing), energy, and medical fields.

The city is full of airplane companies and opportunities. WSU has many extremely successful graduates (including a Boeing vice president, test pilots, a Space Ship One/Two engineer, a White House advisor, UAV designers, NASA researchers, and industry engineers).

If you like the idea of designing and testing exciting things – like airplanes, helicopters, rockets, missiles, spacecraft, racecars, and wind turbines - then aerospace engineering is for you! It is a challenging, innovative, and rewarding career.