Aerospace Engineering

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Major: Aerospace Engineering
Degrees Offered: M.S. and Ph.D.

Online Program: Aerospace Engineering M.S.

Graduate Degree Programs

The Department of Aerospace Engineering (AE) offers graduate programs leading to the degrees of Master of Science and Doctor of Philosophy. The AE graduate program provides students with a strong background in engineering and applied science while placing emphasis on aircraft and spaceflight engineering. Students may major in one of the following general areas: aerodynamics, astrodynamics, combustion and propulsion, control systems, dynamical systems, fluid mechanics, structural mechanics, and materials.

Opportunity also exists for specializing in:

1. computational science and engineering via the Computational Science and Engineering (CSE), (http://www.cse.illinois.edu/education) transcriptable certificate
2. energy and sustainability engineering via the Energy and Sustainability Engineering (EaSE) Option, (http://ease.illinois.edu)

Admission

The Department of Aerospace Engineering accepts applications for admission to the graduate program for both fall and spring semesters. The application deadline for the fall semester for the Ph.D. and M.S. with Thesis programs and for full consideration for funding opportunities is January 1. The application deadline for the MS Non-thesis programs for the fall semester is July 1. The deadline for spring admission for all programs is October 8.

Typically, the prerequisite for graduate study is the equivalent of the B.S. in Aerospace Engineering (https://aerospace.illinois.edu/academics/undergraduate); however, graduates of curricula leading to degrees in other fields of engineering, the physical sciences, or mathematics may also be admitted to advanced study. A minimum grade point average of 3.00 (A = 4.00) for the last two years of undergraduate study is required. However, having a GPA higher than the minimum is no guarantee of admission. Scores on the Graduate Record Examination (GRE) (http://ets.org) general test are required of all applicants. There are no minimum score requirements.

Applicants to the Aerospace Engineering graduate program are asked to complete a supplemental form that will capture additional information about their specific interests. Applicants receive an email after submitting the online application which contains the link to the supplemental form. Applicants may select up to three areas from the following list:

- additive manufacturing
- aeroacoustics
- aerodynamics
- aeroelasticity
- aerospace materials
- aerospace structures
- aerospace systems design and simulation
- applied aerodynamics
- astrodynamics
- autonomous vehicles
- combustion and propulsion
- composite materials
- computational fluid mechanics
- computational mechanics
- controls, dynamical systems and estimation
- experimental fluid mechanics
- flow control
- fracture mechanics and fatigue
- GPS
- hypersonics
- information technology
- laser and optical diagnostics
- nanomechanics and micromechanics
- nanosatellites
- plasma physics
- robotics
- space environment and space mission design
- space systems
- structural mechanics/structural dynamics design
- unmanned aerial vehicles

All applicants whose native language is not English are required to submit a minimum TOEFL (http://www.toefl.org) score of 103 (iBT), 257 (CBT), or 613 (PBT); or minimum International English Language Testing System (IELTS) (http://www.ielts.org) academic exam scores of 7.0 overall and 6.0 in all subsections. No exemptions from the TOEFL are granted by the department. Full admission status (http://grad.illinois.edu/admissions/instructions/04c) is granted for those meeting the minimum requirements and having taken the TOEFL or IELTS since the scores required for admission to Aerospace Engineering are above the minimum scores demonstrating an acceptable level of English language proficiency. Applicants wishing to be considered for teaching assistantships must score 24 on the SPEAK portion of the TOEFL exam.

Full information on admission requirements and how to apply, see the department’s graduate programs Web site (https://aerospace.illinois.edu/academics/graduate).

Graduate Teaching Experience

M.S. students are not required to hold a teaching assistantship. Ph.D. students are required to hold a 25% teaching assistantship for at least one semester in order to meet the requirements for the Department of Aerospace Engineering doctoral program. Information about teaching
Assistantships can be found in the department’s Web site (https://aerospace.illinois.edu/academics/graduate).

**Faculty Research Interests**

Research activities in the AE Department encompass a wide range of problem areas in aerospace engineering and related engineering disciplines cited in the Graduate Programs section above and more fully described at the department’s research area Web site (https://aerospace.illinois.edu/research).

**Centers, Programs, and Institutes**

Several nationally renowned interdisciplinary centers exist within the College of Engineering in which Aerospace Engineering faculty members along with many other campus faculty engage in research. A list of these, along with links to full descriptions, appears at the department’s interdisciplinary centers Web site (https://aerospace.illinois.edu/research). Among these are the Beckman Institute for Advanced Science and Technology, the Center for the Simulation of Advanced Rockets (CSTAR), the Coordinated Science Laboratory (CSL), the Micro and Nanotechnology Laboratory, and the National Center for Supercomputing Applications (NCSA).

**Facilities and Resources**

Members of the Aerospace Engineering Department have access to a wide range of excellent research facilities. These laboratories support a wide range of activity and are described at the department’s research Web site (https://aerospace.illinois.edu/research).

**Financial Aid**

Students in the M.S. non-thesis option are not provided funding by the department. Financial aid for graduate students in thesis graduate programs is available in the form of fellowships, teaching and research assistantships. A block grant from the National Aeronautics and Space Administration supports a multidisciplinary research and training program. Qualified candidates are considered for financial support upon application. In addition, graduate students making satisfactory progress toward their degrees may also be considered for financial support. All applicants, regardless of U.S. citizenship, whose native language is not English and who wish to be considered for teaching assistantships must demonstrate spoken English language proficiency (http://www.grad.illinois.edu/admissions/taengprof.htm) by achieving a minimum score of 24 on the speaking subsection of the TOEFL iBT or 8 on the speaking subsection of the IELTS. For students who are unable to take the iBT or IELTS, a minimum score of 4CP is required on the EPI test (http://cte.illinois.edu/testing/oral_eng/epi_overview.html), offered on campus. All new teaching assistants are required to participate in the Graduate Academy for College Teaching (http://cetc.illinois.edu/programs/ta_train.html) conducted prior to the start of the semester.

The Aerospace Engineering Department offers two Masters programs:

- **Aerospace Engineering, M.S.** (http://catalog.illinois.edu/graduate/graduate-majors/aero-engin/ms-aero-engin)
- **Aerospace Engineering, M.S. - Online** (p. 3)

**Aerospace Engineering, PhD**

For the degree of Doctor of Philosophy: Major in Aerospace Engineering

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### Entering with an approved M.S. Degree

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 599</td>
<td>Thesis Research (min-max applied toward degree)</td>
<td>40</td>
</tr>
<tr>
<td>AE 590</td>
<td>Seminar (continuous registration through the 4th semester after the qualifying exam for 0 hours)</td>
<td>0</td>
</tr>
</tbody>
</table>

One advanced 500-level mathematics course from an approved list.

Elective courses – chosen in consultation with advisor (subject to Other Requirements and Conditions below).

**Total Hours**

64

### Other Requirements and Conditions

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
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<tbody>
<tr>
<td>Minimum GPA:</td>
<td>3.0</td>
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<tr>
<td>A minimum of 8 hours of AE course credit overall at the 500-level, beyond the master’s degree.</td>
<td></td>
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<tr>
<td>A minimum of 16 credit hours overall at the 500 level, beyond the master’s degree, including the 8 hours of 500-level AE courses.</td>
<td></td>
</tr>
<tr>
<td>A maximum of 4 hours of AE 597 (or other independent study) may be applied toward the elective coursework requirement.</td>
<td></td>
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<tr>
<td>A 25% or more teaching assistantship for at least one semester.</td>
<td></td>
</tr>
<tr>
<td>Qualifying exam</td>
<td>Yes</td>
</tr>
<tr>
<td>Preliminary exam</td>
<td>Yes</td>
</tr>
<tr>
<td>Final exam or dissertation defense</td>
<td>Yes</td>
</tr>
<tr>
<td>Dissertation deposit</td>
<td>Yes</td>
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### Entering with an approved B.S. degree

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<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 599</td>
<td>Thesis Research (min-max applied toward degree)</td>
<td>48</td>
</tr>
</tbody>
</table>

Coursework:

24 Hours of 500-level coursework, including 12 hours of 500-level AE coursework

7-8 hours of Math (4 of the 7-8 taken must be at the 500-level and count toward the 24 hour requirement)

20-21 hours of 400/500 elective AE coursework per advisor approval

**Total Hours**

96

Information listed in this catalog is current as of 07/2019.
Other Requirements and Conditions

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</thead>
<tbody>
<tr>
<td>Minimum GPA</td>
<td>3.0</td>
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<tr>
<td>A maximum of 4 hours of AE 597 (or other independent study) may be applied toward the elective course work requirement.</td>
<td></td>
</tr>
<tr>
<td>A 25% or more teaching assistantship for at least one semester.</td>
<td></td>
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<td>Dissertation deposit</td>
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1 For additional details and requirements refer to the department’s Website (https://aerospace.illinois.edu) and the Graduate College Handbook (http://grad.illinois.edu/gradhandbook).

Aerospace Engineering, M.S.

Online Program

The degree requirements are the same as for the on-campus non-thesis M.S. program (https://aerospace.illinois.edu/academics/graduate/ms-degree-program)—32 hours of course work—and the degree awarded to online students is the same degree awarded to resident students. Online students have five years to complete the program.

Students should develop a course program plan in consultation with their advisor. Suggested program tracts (https://aerospace.illinois.edu/academics/graduate/suggested-program-tracks) are provided for each of the three main technical divisions in the department:

1. Aerodynamics, Fluid Mechanics, Combustion and Propulsion (AFMCP);
2. Astrodynamics, Controls and Dynamical Systems (ACDS); and

The Aerospace Systems Engineering option (https://aerospace.illinois.edu/academics/graduate/ms-degree-program/ms-degree-non-thesis-campus/aerospace-system-engineering) is also available online.

Non-Thesis Option

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 590</td>
<td>Seminar (registration for 0 hours every term while in residence)</td>
<td>0-12</td>
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</tbody>
</table>

Aerospace Engineering breadth requirement (https://aerospace.illinois.edu/academics/graduate/breadth-and-mathematics-requirements/breadth-and-mathematics-requirements)

One mathematics course from an approved list (https://aerospace.illinois.edu/academics/graduate/breadth-and-mathematics-requirements)

Elective courses chosen in consultation with an advisor (subject to Other Requirements and Conditions below)

Total Hours 32

Other Requirements and Conditions

<table>
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<tr>
<th>Requirement</th>
<th>Description</th>
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<tbody>
<tr>
<td>Other Requirements and Conditions</td>
<td>A minimum of 16 hours of AE course work at the 400-level and above.</td>
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<tr>
<td></td>
<td>A minimum of 12 500-level credit hours overall applied toward the degree, with 8 hours being AE courses.</td>
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<tr>
<td></td>
<td>Attendance at all Aerospace Engineering AE 590 seminars each semester while on campus.</td>
</tr>
<tr>
<td>Minimum GPA</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>Generally, students holding a research assistantship will not be allowed in the non-thesis option.</td>
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<tr>
<td></td>
<td>A departmental petition is required to change from the thesis to the non-thesis option and vice-versa.</td>
</tr>
</tbody>
</table>

1 For additional details and requirements refer to the department’s Website (https://aerospace.illinois.edu) and the Graduate College Handbook (http://grad.illinois.edu/gradhandbook).

Joint M.B.A. Program

Students in this unit may choose to earn their major degree and simultaneously complete an M.B.A., with 12 fewer required hours than when pursuing both degrees independently. Students must be enrolled in the M.B.A. program for three terms and complete all the requirements of their primary degree. Interested students should see the joint program requirements (http://catalog.illinois.edu/graduate/graduate-majors/bus-admin-mba/master-ba-fulltime) (link to MBA POS) and contact the M.B.A. program and their major department office for more information.

Information listed in this catalog is current as of 07/2019