Aerospace Engineering

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

Online Program: Aerospace Engineering. M.S.

Medical Scholars Program: Doctor of Philosophy (Ph.D.) in Aerospace Engineering and Doctor of Medicine (M.D. through the Medical Scholars Program (http://www.med.illinois.edu/msp))

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,
2. energy and sustainability engineering, and
3. systems engineering within the department's graduate programs via the Computational Science and Engineering (CSE) Option (http://cse.illinois.edu/education-programs/graduate-program), the Energy and Sustainability Engineering (EaSE) Option, (http://ease.illinois.edu) and the Systems Engineering Option (SE) (http://aerospace.illinois.edu/graduate-programs/aerospace-systems-engineering).

The Medical Scholars Program (http://www.med.illinois.edu/msp) permits highly qualified students to integrate the study of medicine with study for a graduate degree in a second discipline, including Aerospace Engineering. Additional information about the Aerospace Engineering graduate program may be found on the department's graduate program Web site (http://www.aerospace.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 and the MS Non-thesis Systems Engineering option 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 (http://aerospace.illinois.edu/undergraduate-programs); 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:

- aerodynamics
- aerelasticity
- astrodynamics
- combustion
- computational mechanics
- control and estimation
- dynamical systems
- experimental mechanics
- fluid mechanics
- information technology
- materials
- propulsion
- robotics
- structural mechanics-structural dynamics
- systems engineering

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.

Students may apply to the Medical Scholars Program prior to beginning graduate school or while in the graduate program. Applicants to the Medical Scholars Program must meet the admissions standards for and be accepted into both Aerospace Engineering and the College of Medicine. An application to the Medical Scholars Program will also serve as the application to the Aerospace Engineering graduate program. Further information on this program is available by contacting the Medical Scholars Program (125 Medical Sciences Building, (217)-333-8146, mspo@illinois.edu).

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

Medical Scholars Program

Students in the Medical Scholars program must meet the specific requirements for both the medical (http://med.illinois.edu/mdphd) and
graduate degrees. On average, students take eight years to complete both degrees. The first year of the combined program is typically spent meeting requirements of the Aerospace Engineering graduate degree.

**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 (http://aerospace.illinois.edu).

**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 (http://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 (http://aerospace.illinois.edu/research/interdisciplinary-centers). 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 laboratories Web site (http://aerospace.illinois.edu/research/research-laboratories).

**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/epl_overview.html), offered on campus. All new teaching assistants are required to participate in the Graduate Academy for College Teaching (http://cte.illinois.edu/programs/ta_train.html) conducted prior to the start of the semester.

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**Master of Science in Aerospace Engineering**

**Thesis Option**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 599</td>
<td>Thesis Research (min-max applied toward the degree)</td>
<td>8</td>
</tr>
<tr>
<td>AE 590</td>
<td>Seminar (registration of 0 hours every term while in residence)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Aerospace Engineering breadth requirement (<a href="http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements">http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements</a>)</td>
<td>6-8</td>
</tr>
<tr>
<td></td>
<td>One mathematics course from an approved list (<a href="http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements">http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements</a>)</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>Elective courses chosen in consultation with an advisor (subject to Other Requirements and Conditions below)</td>
<td>12-15</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>32</td>
</tr>
</tbody>
</table>

**Other Requirements and Conditions**

Other Requirements and Conditions may overlap:

- A minimum of 16 hours of AE course work at the 400-level and above. (May include up to 8 hours of AE 599.)
- A minimum of 12 500-level credit hours overall applied toward the degree, with 8 hours being AE courses. (May include up to 4 hours of AE 599.)
- No hours of AE 597 (or other independent study) may be applied in this option.
- Attendance at all Aerospace Engineering AE 590 seminars each semester while on campus.
- Minimum GPA: 3.0
- A departmental petition is required to change from the thesis to the non-thesis option.

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

**Non-Thesis Option**

<table>
<thead>
<tr>
<th>Course</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</td>
</tr>
<tr>
<td></td>
<td>Aerospace Engineering breadth requirement (<a href="http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements">http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements</a>)</td>
<td>9-12</td>
</tr>
<tr>
<td></td>
<td>One mathematics course from an approved list (<a href="http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements">http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements</a>)</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>Elective courses chosen in consultation with an advisor (subject to Other Requirements and Conditions below)</td>
<td>16-20</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>32</td>
</tr>
</tbody>
</table>
**Other Requirements and Conditions** ¹

Other Requirements and Conditions may overlap

<table>
<thead>
<tr>
<th>Item</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>A minimum of 16 hours of AE course work at the 400-level and above.</td>
<td></td>
</tr>
<tr>
<td>A minimum of 12 500-level credit hours overall applied toward the degree, with 8 hours being 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 course work requirement.</td>
<td></td>
</tr>
<tr>
<td>Attendance at all Aerospace Engineering AE 590 seminars each semester while on campus.</td>
<td></td>
</tr>
<tr>
<td>Minimum GPA:</td>
<td>3.0</td>
</tr>
</tbody>
</table>

1. Generally, students holding a research assistantship will not be allowed in the non-thesis option.

A departmental petition is required to change from the thesis to the non-thesis option and vice-versa.

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

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**Doctor of Philosophy**

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 599</td>
<td>Thesis Research (min-max applied toward degree)</td>
<td>32</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 mathematics course from an approved list (3-4 hours) (http://aerospace.illinois.edu/graduate-programs/graduate-degree-programs/breadth-and-mathematics-requirements) 3-4

Elective courses – chosen in consultation with advisor (subject to Other Requirements and Conditions below) 28-29

Total Hours 64

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**Other Requirements and Conditions** ¹

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
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<tbody>
<tr>
<td>A Master’s degree is not required for admission to the Ph.D. program, but the Master’s level requirements must be met (32 hours).</td>
<td></td>
</tr>
<tr>
<td>Qualifying exam²</td>
<td></td>
</tr>
<tr>
<td>Preliminary exam</td>
<td></td>
</tr>
<tr>
<td>Final exam or dissertation defense</td>
<td></td>
</tr>
<tr>
<td>Dissertation deposit</td>
<td></td>
</tr>
<tr>
<td>Minimum GPA: 3.0</td>
<td></td>
</tr>
</tbody>
</table>

² Qualifying Exam information

Direct Entry

In addition to the traditional Ph.D., a "Direct" Ph.D. is available. This program allows a student with a bachelor's degree to go directly into the Ph.D. program without writing a M.S. thesis. For the Direct Ph.D., a B.S. student submits a graduate application. Generally, admission to the Direct Ph.D. program is granted for GPA equal to 3.75 and higher. Students currently in the M.S. program may petition the AE Graduate Policy Committee for entry into the Direct Ph.D. program before the end of the second semester after enrollment.

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**Online Program**

The degree requirements are the same as for the on-campus non-thesis M.S. program (p. 2)—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 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 is also available online.

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**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.