

Aerospace Engineering

Auburn University's Department of Aerospace Engineering, one of nine departments in the Samuel Ginn College of Engineering, was established in 1942 and has roots dating back to the Wright brothers' first flight school in Montgomery. Auburn is the largest university in Alabama. Founded in 1856, it is a state-assisted land grant institution that graduates more engineers than any other university in the state.

Student Advising

To ensure progress toward completion of degree requirements, an engineering advisor, the department head and a department graduate program officer are available to discuss and advise on curriculum choices and requirements. The program is supervised by a departmental graduate committee.

Contact Us

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Get detailed information in the Auburn University Bulletin
www.auburn.edu/student_info/bulletin



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AEROSPACE ENGINEERING

GRADUATE STUDY AND RESEARCH



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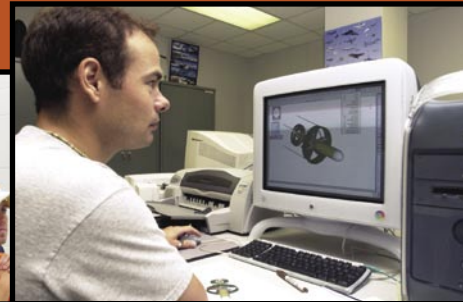
Graduate Program Overview

Degrees offered:

- Master of Aerospace Engineering (M.A.E.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Graduate study in aerospace engineering provides qualified students with opportunities to further their education with advanced courses in their area(s) of interest, as well as to exercise and sharpen skills developed as part of their undergraduate training. It provides the master's student the challenge of involvement in a meaningful research project under the guidance and supervision of a faculty member. At the doctoral level, it provides the challenge of independent research, with guidance but with minimal supervision.

Graduate students may specialize in aerodynamics, computational fluid dynamics, control theory, flight dynamics, orbital mechanics, propulsion, structures, or structural dynamics. Comprehensive programs are maintained in all of these areas. Graduate classes are small, permitting appropriate attention to particular educational needs. Interdisciplinary studies in other engineering-related fields such as physics, mathematics, and computer science provide the graduate student with a well-rounded education. Planning of each program is flexible to allow for varied interests and activities.



Degree Requirements

The M.S. degree requires 30 credit hours, including up to six hours of thesis, while the M.A.E. degree requires 33 credit hours without a thesis. The Ph.D. degree normally requires a minimum of 60 credit hours beyond the Bachelor of Science degree. In addition to passing a qualifying examination, doctoral candidates must successfully complete the general doctoral examination, a dissertation, and a final doctoral examination consisting of the dissertation defense.

Laboratory Facilities

Laboratory and computational facilities available for support of graduate research include:

- **Aerodynamics Laboratory** — low-speed smoke tunnel for flow visualization; closed-circuit, single-return, low-speed wind tunnel with test section; and three supersonic wind tunnels, 1"x3" Mach 2, 4"x4" and 7"x7". Data obtained in the low-speed and 7"x7" tunnels is collected and processed on a dedicated computer.
- **Adaptive Aerostructures Composite Materials Laboratory** — equipment and work space necessary to manufacture small thermoset composite parts and test specimens. A microprocessor-controlled floor model Blue-M convection oven is employed to cure the composite parts. Cold storage equipment is available for long-term thermoset prepreg storage. Structural test data is obtained for the manufactured composite specimens by using the servohydraulic testing machine and the data acquisition equipment contained in the structures laboratory.
- **Structures and Structural Dynamics Laboratory** — large loading frame and hydraulic loading system; tensile, compression, and fatigue testing devices; a shaker; and facilities for strain gauge and dynamic measurements. Experimental data is processed using a system-4000 data acquisition, data reduction system. The lab also has a fully integrated modal analysis package, computer, and dual channel FFT analyzer with structural graphics and data acquisition capabilities.
- **Flight Dynamics and Control Laboratory** — Sun Sparc station connected to the College of Engineering computer network, Pentium PCs and peripheral equipment, and presentation equipment. A variety of commercial and in-house software is operational on the SUN network and/or the PCs. Commercial software includes MATLAB, MACSYMA, DADS, Orbital Work Bench and Satellite Tool Kit. Xanalog hardware-in-the-loop equipment and software are used in demonstrations and research. Access to single- and multiple-engine flight simulators in the aviation simulation lab may be scheduled.
- **Laser Diagnostics Laboratory** — an argon ion laser and computer-controlled, cooled CCD camera form the basis of an optical setup that can be used to conduct measurements of primary flow field parameters without perturbing the flow. These nonintrusive measurements are obtained using laser-induced fluorescence techniques.
- **Flow Visualization Laboratory** — test section water tunnel; argon ion CW, pulsed IR and dual pulsed YAG lasers for laser induced fluorescence, and diagnostics using high speed imaging/motion analyses and particle image velocimetry; dye injection system and hydrogen bubble probes for flow visualization; and hot film anemometer for turbulence measurements.
- **Navigation and GPS Laboratory** — Trimble GPS equipment (base station and GeoExplorer II with access to more advanced field equipment); PathFinder software for post-processing field data; Geodyn II precision orbit determination software; GNSS Matlab Toolbox (Constel, Inc.); and Satellite Tool Kit (Analytical Graphics, Inc.). The GPS base station is operated in support of university, city, state, and commercial projects.
- **Computer Facilities** — dedicated computers for the aerodynamics and structures labs; a Linux computing cluster composed of 30 AMD 424 Opteron compute nodes for a total of 60 available computing processors. The College of Engineering operates a network of Sun Sparc workstations and personal computers for instruction and research.

Faculty

There is considerable interaction between faculty and students. An informal, personalized environment exists in which the student is challenged to grow as a professional colleague. The graduate faculty has diverse, practical experience, maintains a relationship with industry and government laboratories, and finds teaching and research mutually reinforcing. Our faculty members have established national and international reputations. One is a fellow of the American Astronautical Society and several are associate fellows of the American Institute of Aeronautics and Astronautics (AIAA), having served as members of AIAA national technical committees. Meet our faculty at www.eng.auburn.edu/programs/aero/faculty.

Distance Education

Lectures are given on campus, digitized and delivered by the Business and Engineering Graduate Outreach Program, which provides distance education services to more than 500 students per semester throughout the world. Each lecture is sent to the student on a high quality DVD-R that arrives within three to five business days. Students need a DVD player and a computer with Windows and Internet access. All students are required to have an Auburn ID and Auburn Internet account. Students can contact the instructor via e-mail, phone or, in some cases, Internet chatroom.

Handouts, examinations and solutions are available on WEBCT, a course management system available via the Internet to all Auburn students. Other delivery technologies, such as realtime and delayed video streaming over the Internet, are being considered. Video conferencing for simulcasting is available through the Alabama Technology Network and may be possible if special arrangements can be made before the course begins.

Admission Requirements

Requirements for admission include graduation with a B or better average in aerospace engineering (or its equivalent) from an institution of recognized standing. Degrees in mathematics, physics, and certain other engineering disciplines may also be appropriate. Students must take the Graduate Record Examination. Applicants from foreign countries are further required to take the Test of English as a Foreign Language exam.

Financial Opportunities

Students with strong academic records may qualify as graduate research or graduate teaching assistants (GRAs or GTAs). GRAs work with faculty members on sponsored research projects. GTAs assist faculty members with teaching duties, teach laboratory sections, and occasionally teach elementary courses. GRA and GTA stipends are competitive and vary with the student's qualifications and level in graduate school. Out-of-state tuition differentials are waived for students receiving GRA and GTA appointments of one-quarter time or more. Students may also qualify for full tuition scholarships as a GRA or GTA.

