# AEROSPACE ENGINEERING

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Aerospace engineering is concerned with the design, construction, and science of aircraft and spacecraft. It is divided into two major and overlapping branches: aeronautical engineering and astronautical engineering. The former deals with craft that stay within Earth's atmosphere, and the latter with craft that operate outside it.

Aerospace engineers design, develop, and test aircraft, spacecraft, and missiles, and supervise their manufacture. Those who work with aircraft are called aeronautical engineers, and those working specifically with spacecraft are called astronautical engineers. Aerospace engineers develop new technologies for use in aviation, defense systems, and space exploration, often specializing in areas such as structures, propulsion systems, vehicle movement and control, communications, and overall vehicle design.

## PROGRAMS

### Major

- Aerospace Engineering Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/aerospace-engineering/aerospace-engineering-major/)
- Mechatronics Engineering Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/aerospace-engineering/mechatronics-engineering-major/)

## ADVISING

Advising is mandatory each semester. First year students and first semester transfer students are primarily advised by the Student Services staff members. After the first year, students are assigned to a faculty advisor whose permission is required for course registration each semester. An updated assigned faculty advisor list is maintained and the link is sent each semester via email to the undergraduate student listserv. Detailed information about advising is available on the department's website (https://aero.umd.edu/undergraduate/current-students/advising-support/).

Current and prospective students may also need to meet with a department (staff) advisor even after they are assigned to a faculty advisor. Examples of departmental staff advising include: C.A.R.E. (academic probation), double major/double degree planning, planning for study abroad, combined bachelors/masters planning, etc. Department staff advisors are also available to assist students who have unique circumstances and need additional help with their four-year degree planning.

The benefits associated with our faculty advising program are many; it also entails a number of obligations on the student's part. Students are responsible for preparing for each advising session and providing certain information to their faculty advisor. By complying with these responsibilities, the advisor is better able to guide and facilitate student development thus allowing students to get more out of the program.

1. Students should keep their faculty advisor informed about their academic progress, professional development, and any issues and/or concerns about academics or student life.
2. Students should meet with their faculty advisor every semester PRIOR to attempting to register for the next semester. Failure to do so can delay registration as all engineering students are required to be advised prior to registration each semester.
3. All students are assigned a specific registration date (view this date on Testudo under Appointment & Registration Status). Students should meet with their faculty advisor at least two weeks PRIOR to this assigned registration date.
4. Students should be prepared for each meeting with their advisor by monitoring their degree progress at u.achieve (https://uachieve.umd.edu/) (students should know the degree requirements of the college and AE major) and bring an updated copy of their 4-year plan (https://eng.umd.edu/sites/clark.umd.edu/files/resource_documents/Aerospace-4year-plan-Fall-2022_0.pdf), a copy of their unofficial transcript (https://testudo.umd.edu/), and a list of courses they plan to take the following semester.
5. While the advisor is there to provide guidance and structure, students are ultimately responsible for fulfilling their degree requirements and graduating in a timely matter. These responsibilities include making decisions about their class schedule, whether or not to pursue specific educational options, which GENED electives to take, and understanding and adhering to university policies as well as the Academic Policies (https://eng.umd.edu/advising/academic-policies/) of the Clark School.
6. Any concerns you are not able to discuss with your advisor, you may discuss with Dr. Robert Sanner (https://aero.umd.edu/clark/faculty/63/Robert-M-Sanner/) (Undergraduate Program Director), or Dr. Aileen Hentz (https://aero.umd.edu/clark/staff/865/Aileen-Hentz/) (Program Director, Student Services). General advising-related inquiries can be directed to aero_ugrad@umd.edu. If need be, you may also talk with an advisor in the Clark School's Engineering Academic Services Office (https://eng.umd.edu/advising/) located at 1131 Glenn L. Martin Hall, 301-405-9973.

## OPPORTUNITIES

### Undergraduate Research Experiences

Students can be employed and perform research in any of the department's research labs, centers, or facilities. Participation in an on- or off-campus internship, co-op, or other experiential learning opportunity is strongly encouraged. See the aerospace engineering undergraduate studies staff for information on performing research in a department lab and contact the Engineering Career Services (https://eng.umd.edu/careers/) office for assistance in obtaining off campus positions or experiences.

### Honors Program

The Aerospace Engineering Honors Program at the University of Maryland provides a rigorous and comprehensive education for a career in technical leadership and scientific or engineering research. Honors coursework encompasses the required curriculum for all University of Maryland Aerospace Engineering students at an advanced level.

At the end of each academic year, aerospace students are invited to register for honors courses based on their University of Maryland cumulative grade point average and progress toward their degree in Aerospace Engineering. Honors sections of ENAE283, ENAE311,

ENAE423, and ENAE457 (designated by an 'H' following the course number) are offered as part of this program. Eligible students wishing to pursue the Aerospace Honors citation will complete an honors research project, ENAE398H, which culminates in a scholarly paper and presentation at a professional conference. Students who complete the honors curriculum graduate with Aerospace Honors at the time of commencement.

## Student TEAMS, Societies and Professional Organizations

The department is home to student chapters of the American Institute of Aeronautics and Astronautics, Maryland Unmanned Aerial Systems team, Maryland Hypersonic team, Nearspace Balloon Payload Program, Satellite Development Program, Students for the Exploration and Development of Space, Society for Advancement of Materials and Process Engineering, Sigma Gamma Tau (aerospace engineering honors society), Terrapin Rocket team, Vertical Flight Society, Women in Aeronautics and Astronautics.

## Scholarships and Financial Assistance

The department offers academic scholarships, and recipients are chosen based on merit. All admitted and current students in the department are automatically considered for these awards. No separate application is required. The Office of Student Financial Aid (OSFA) administers all types of federal, state and institutional financial assistance programs and, in cooperation with other university offices, participates in the awarding of scholarships to deserving students. For information, visit: http://financialaid.umd.edu.

## Awards and Recognition

The department offers the following awards: Alfred Gessow Academic Achievement Awards for the seniors with the highest overall academic average at graduation; R.M. Rivello Scholarship Award and the Joseph Guthrie Memorial Award for highest overall academic average through the junior year; Chair Award for leadership and service to the department, Sigma Gamma Tau Outstanding Achievement Award for scholarship and service to the student chapter and the department; American Institute of Aeronautics and Astronautics Outstanding Achievement Award for scholarship and service to the student chapter and the department; Women in Aeronautics and Astronautics Outstanding Achievement Award for scholarship and service to the student organization and the department; John D. Anderson Scholarship in Aerospace Engineering to enable a rising senior to engage in summer research under the mentorship of a faculty member.

## Academic Programs and Departmental Facilities

The Aerospace Engineering Department has a number of facilities to support education and research across a range of special areas. The department has subsonic wind tunnels with test cross-sections ranging from 12 inch by 12 inch up to 7.75 feet by 11.00 feet as well as a supersonic tunnel with a 6 inch by 6 inch test section. The department also houses two hypersonic wind tunnels. The high-temperature Ludwieg tube is a medium-scale hypersonic wind tunnel capable of producing air flows with Mach numbers of 6.2 or 8, The shock tunnel is a flexible, smaller-scale facility, able to reproduce flows over a Mach-number ranging from 2 to 6. Flow measurement techniques include particle image velocimetry, particle tracking velocimetry, force/torque measurements, and surface-mounted pressure measurements. There are facilities for composite materials manufacturing, and additive manufacturing, and a range of instrumentation for inspecting composite or metallic structures. There are a several material test machines with capabilities ranging from 100 to 220,000 pounds for static loads and 5,000 pounds for dynamic loads, as well as high speed dynamic shock tables for high *g* loads. The department also has experimental facilities to test helicopter rotors in hover, in forward flight, and in vacuum to isolate inertial loads from aerodynamic loads. There is an anechoic chamber for the investigation of noise generated by aircraft. The Neutral Buoyancy Facility, which investigates the assembly of space structures in a simulated zero gravity environment, is supported by robots and associated controllers. Vacuum chambers are used to investigate new space propulsion technologies as well as the evolution of the surfaces of the Moon and asteroids. There are also many computers and workstations that provide local computing capability and extensive network access to campus mainframes, supercomputing centers, and all the resources of the Internet.