AEROSPACE ENGINEERING MAJOR

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The Bachelor of Science in Aerospace Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Aerospace Engineering Program Criteria.

Aerospace engineering concerns processes involved in design, manufacture and operation of aerospace vehicles within and beyond planetary atmospheres. Vehicles range from helicopters and other vertical takeoff aircraft at the low-speed end of the flight spectrum, to spacecraft traveling thousands of miles per hour during launch, orbit, trans-planetary flight or re-entry at the high-speed end. Between are general aviation and commercial transport aircraft flying at speeds well below and close to the speed of sound, and supersonic transports, fighters and missiles. Although each speed regime and each vehicle poses its special problems, all aerospace vehicles can be addressed by a common set of technical specialties or disciplines.

Sub-disciplines of Aerospace Engineering are: aerodynamics, flight dynamics, propulsion, structures, and design. Aerodynamics addresses the flow of air and associated forces, moments, pressures, and temperature changes. Flight-dynamics addresses the motion of vehicles including trajectories, rotational dynamics, sensors, and control laws required for successful accomplishment of missions. Propulsion addresses the engines that have been devised to convert chemical (and occasionally other forms) energy into useful work to produce the thrust needed to propel aerospace vehicles. Structures addresses material properties, stresses, strains, deflection, and vibration along with manufacturing processes required to produce very light weight and rugged elements needed in aerospace vehicles. Aerospace design addresses the process of synthesizing vehicles and systems to meet defined missions and more general needs. This process draws on information from other sub-disciplines while embodying its own unique elements. The Aerospace Engineering program is designed to provide a firm foundation in various sub-disciplines.

Courses offered by this department may be found under the acronym: ENAE

Program Educational Objectives

1. Our graduates will be successful in their professional careers, including industry, government service, and academia, in the State of Maryland and beyond.
2. Our graduates will contribute to the creation of useful new products, or the generation of original research, by analyzing and implementing solutions to relevant problems in the component disciplines of Aerospace Engineering.
3. Our graduates will contribute effectively when part of an integrated team, clearly communicating with team members, supervisors, and clients.
4. Our graduates will understand the societal context in which their profession is practiced, and will successfully adapt to future developments in both technology and the employment market.

Student Learning Outcomes

As a result of completing our undergraduate program, our students should have developed the following skills:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

REQUIREMENTS

A minimum of 124 credits are required for an Aerospace Engineering degree:

Freshman Year

First Semester	Credits	Second Semester	Credits
ENES100[1]	3	MATH141	4
ENAE100	1	PHYS161	3
CHEM135	3	ENES102[1]	3
MATH140	4	ENAE202	3
General Education Program Requirements	3	General Education Program Requirements	3
	14		**16**

Sophomore Year

First Semester	Credits	Second Semester	Credits
ENES220	3	ENAE200	1
ENAE283	3	ENES232	3
MATH241	4	MATH246	3
PHYS260 & PHYS261	4	MATH461 or 240	3-4
ENES200 or ENEE 200	3	PHYS270 & PHYS271	4
		General Education Program Requirements	3
	17		**17-18**

Junior Year

First Semester	Credits	Second Semester	Credits
ENAE301	3	ENAE324	4
ENAE362	3	ENAE432	3

ENAE380	3	General Education Program Requirements	3
General Education Program Requirements	3	General Education Program Requirements	3
ENAE414 or ENAE 311[2]	3	ENAE311 or ENAE 404[3]	3
	15		**16**

Senior Year

First Semester	Credits	Second Semester	Credits
ENAE423	3	ENAE464	3
General Education Program Requirements	3	ENAE Elective[4]	3
Complete all 3 courses from one of the following tracks:	9	Technical Elective[5]	3
AERONAUTICAL TRACK		Select one course based on track:[6]	3
ENAE403		ENAE482 (AERONAUTICAL TRACK)	
ENAE455		ENAE484 (ASTRONA TRACK)	
ENAE481		General Education Program Requirements/ Elective[7]	2-3
ASTRONAUTICAL TRACK			
ENAE441			
ENAE457			
ENAE483			
	15		**14-15**

Total Credits 124-126

1. Can be taken first or second semester
2. Select ENAE414 for Aeronautical Track, or ENAE311 for Astronautical Track.
3. Select ENAE311 for Aeronautical Track, or ENAE404 for Astronautical Track
4. Only ENAE398H, or an approved 400 level ENAE course not required for the student's specific track, may be used for this elective.
5. One 300/400 level course in Engineering, Mathematics, or Physical Sciences that has been approved for this purpose by the Undergraduate Program Director.
6. Select ENAE482 for Aeronautical Track, or ENAE484 for Astronautical Track
7. Students may take an additional General Education or elective course to help bring them to the 124 credit minimum required to graduate.

Minimum Degree Requirements

The fulfillment of all department, school, and university requirements. A minimum of 124 credits are required for an Aerospace Engineering degree.

Students must select a track. All courses in either the Aeronautical or Astronautical track must be completed. Students in either track who wish to gain a broader education across the aeronautical or space application areas can take courses required in the other track as electives.

Academic Benchmarks

Students pursuing the major should review the academic benchmarks established for this program. See: http://4yearplans.umd.edu. Students will be periodically reviewed to insure they are meeting benchmarks and progressing to the degree. Students who fall behind program benchmarks are subject to special advising requirements and other interventions.

Aerospace Electives

The department offers a range of electives. The following courses have recently been offered as electives for the undergraduate degree:

Course	Title	Credits
ENAE398	Honors Research Project (ENAE398H - Honors Research)	1-3
ENAE415	Helicopter Theory	3
ENAE425	Mechanics of Composite Structures	3
ENAE471	Aircraft Flight Testing	3
ENAE488	Topics in Aerospace Engineering (ENAE488B - Intro to Computational Structural Dynamics)	3
ENAE488	Topics in Aerospace Engineering (ENAE488M - High Speed Aerodynamics)	3
ENAE488	Topics in Aerospace Engineering (ENAE488P - Product Design)	3
ENAE488	Topics in Aerospace Engineering (ENAE488R - Hybrid Rocket Design)	3
ENAE488	Topics in Aerospace Engineering (ENAE488W - Design of Remotely Piloted Vehicles)	3
ENAE499	Elective Research [1]	3

1. Repeatable to 6 credits

Other Requirements for the Major

See https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/ (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/) for minimum grade requirements in key prerequisite courses for engineering students. Students should follow the sequence of courses as outlined in the aerospace engineering degree requirements and four-year plan.

GRADUATION PLANS

Click here (https://eng.umd.edu/advising/four-year-plans/) for roadmaps for graduation plans in the A. James Clark School of Engineering.

Additional information on developing a graduation plan can be found on the following pages:

- http://4yearplans.umd.edu
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising/#success) section of this catalog