AEROSPACE ENGINEERING

Graduate Program Head	Amy Pritchett
Program Code	AERSP
Campus(es)	University Park (Ph.D., M.S., M.Eng.)
Degrees Conferred	Doctor of Philosophy (Ph.D.) Master of Science (M.S.) Master of Engineering (M.Eng.)
The Graduate Faculty	View (https://secure.gradsch.psu.edu/gpms/?searchType=fac&prog=AERSP)

Opportunities for graduate study are available in the following areas:

- low-speed aerodynamics
- airplane and helicopter aerodynamics
- V/STOL aircraft
- turbulence
- astrodynamics
- turbomachinery
- air breathing propulsion
- aeroacoustics
- gas dynamics
- stability and control of aerospace vehicles
- aerospace structures
- structural dynamics
- aeroelasticity
- rotorcraft engineering
- computational fluid dynamics
- experimental fluid dynamics
- space propulsion
- space vehicle dynamics
- high-performance computing

Admission Requirements

Applicants apply for admission to the program via the Graduate School application for admission (https://gradschool.psu.edu/graduate-admissions/how-to-apply/). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (https://gradschool.psu.edu/graduate-education-policies/).

The entering M.Eng. or M.S. student must hold a bachelor's degree in engineering, physical science, or mathematics, and may be required to complete (without degree credit) undergraduate course work in fluid and solid mechanics and intermediate mathematical analysis, if not already completed. The department will consider students with a 3.0 junior/senior grade-point average (GPA) on a 4.0 scale; students with special backgrounds, abilities, or interests may request a waiver to this GPA requirement. The best-qualified applicants will be accepted up to the number of spaces that are available.

Admission to the Ph.D. program requires satisfactory completion of a master's program in engineering, physical science, or mathematics. Admission to the Ph.D. program prior to completion of a master's degree may be considered upon the student passing the Ph.D. qualifying exam. A student must have completed at least 18 course credits beyond the baccalaureate degree in order to take the Ph.D. qualifying exam, and is not granted official status as a doctoral candidate until the comprehensive exam has been passed.

Degree Requirements

Master of Engineering (M.Eng.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-700 Professional Degree Policies (https://gradschool.psu.edu/graduate-education-policies/).

Core Requirements

1. Basic field theory. Complete three courses for 9 credits, one from a prescribed list in each of the following categories: fluid dynamics, solid mechanics, and dynamics & control.
2. Applied mathematics. Complete one 3-credit, 500-level course from a prescribed list.
3. Teaching assistants and teaching aides who have classroom or laboratory instructional responsibilities must satisfactorily complete ENGR 888. Those with responsibilities limited to grading, holding office hours, and offering problem sessions must take ENGR 888 or a grading seminar.

The M.Eng. degree is a non-thesis professional master's degree. A total of 32 credits at the 400, 500, and 800 level is required, including courses in the core requirements. Students must take two credits of AERSP 590 Colloquium. A minimum of 18 credits must be taken at the 500 level, in addition to the two credits in AERSP 590. At least 18 credits in Aerospace Engineering courses are required in addition to AERSP 590. Students may count a maximum of 9 credits of 400-level course work toward the degree. Each student must either take the capstone course EDSGN 558 or complete a capstone project supervised by a member of the Graduate Faculty, completed while enrolled in AERSP 596. The capstone project requires students to work individually or within a group on an aspect of aerospace engineering of their choosing. The project should demonstrate the ability of the student to integrate and apply concepts and techniques learned in the program courses.

Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (https://gradschool.psu.edu/graduate-education-policies/)

Core Requirements

1. Basic field theory. Complete three courses for 9 credits, one from a prescribed list in each of the following categories: fluid dynamics, solid mechanics, and dynamics & control.
2. Applied mathematics. Complete one 3-credit, 500-level course from a prescribed list.
3. Teaching assistants and teaching aides who have classroom or laboratory instructional responsibilities must satisfactorily complete ENGR 888. Those with responsibilities limited to grading, holding office hours, and offering problem sessions must take ENGR 888 or a grading seminar.

A total of 32 credits at the 400, 500, 600, and 800 level is required, including courses in the core requirements, with least 18 credits at the 500 and 600 level, combined. Fourteen credits must be in Aerospace Engineering courses, with at the least 8 credits at the 500 level. Students must take two credits of AERSP 590. Students may count a maximum of 6 credits of 400-level course work toward the degree. Six credits of thesis research (AERSP 600 or AERSP 610) are also required. A completed M.S. thesis and its public presentation is required for graduation. The thesis

must be accepted by the student's advisers and/or committee members, the head of the graduate program, and the Graduate School.

Doctor of Philosophy (Ph.D.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (https://gradschool.psu.edu/graduate-education-policies/)

Core Requirements

1. Basic field theory. Complete three courses for 9 credits, one from a prescribed list in each of the following categories: fluid dynamics, solid mechanics, and dynamics & control.
2. Applied mathematics. Complete one 3-credit, 500-level course from a prescribed list.
3. Teaching assistants and teaching aides who have classroom or laboratory instructional responsibilities must satisfactorily complete ENGR 888. Those with responsibilities limited to grading, holding office hours, and offering problem sessions must take ENGR 888 or a grading seminar.

There is no foreign language requirement for the Ph.D. degree; however, students must demonstrate proficiency in reading, writing, and speaking English through an examination administered by the department. This must be completed to satisfy the Graduate Council requirement before taking the comprehensive exam. The student's Ph.D. committee decides which, if any, courses are required in addition to those specified in the core requirements; this typically involves 24 course credits beyond the M.S. degree. Ph.D. students must also demonstrate evidence of experimental experience.

Over the course of a Ph.D. program, the department and Ph.D. committee administer three examinations: The qualifying examination is given as a preliminary aptitude test before the end of the second semester following admission to the program. A comprehensive examination, which covers the major and minor fields of study, is administered after the student has substantially completed the required course work. The final oral examination, which is related mainly to the dissertation, is given after the candidate has satisfied all other degree requirements. All Ph.D. students must maintain continuous registration until the dissertation is approved. A completed Ph.D. dissertation and its public defense (the Final Oral Examination) are required for graduation. The dissertation must be accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School.

Minor

A graduate minor is available in any approved graduate major or dual-title program. The default requirements for a graduate minor are stated in Graduate Council policies listed under GCAC-600 Research Degree Policies (https://gradschool.psu.edu/graduate-education-policies/) and GCAC-700 Professional Degree Policies (https://gradschool.psu.edu/graduate-education-policies/), depending on the type of degree the student is pursuing:

- GCAC-611 Minor - Research Doctorate (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-611-minor-research-doctorate/)
- GCAC-641 Minor - Research Master's (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-641-minor-research-masters/)
- GCAC-709 Minor - Professional Doctorate (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-709-professional-doctoral-minor/)
- GCAC-741 Minor - Professional Master's (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-741-masters-minor-professional/)

Student Aid

Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (https://gradschool.psu.edu/graduate-funding/) section of The Graduate School's website. Students on graduate assistantships must adhere to the course load limits (https://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants/) set by The Graduate School.

Courses

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Aerospace Engineering (AERSP) Course List (https://bulletins.psu.edu/university-course-descriptions/graduate/aersp/)

Learning Outcomes

Master of Engineering (M.Eng.)

1. Graduates will be able to demonstrate an understanding of advanced core principles and methods from selected sub-fields of Aerospace Engineering at a depth appropriate with their course of study.
2. Graduates will be able to analyze and synthesize knowledge within the field of Aerospace Engineering to address a complex problem of practical relevance.
3. Graduates will be able to apply their knowledge of selected sub-fields of Aerospace Engineering to formulate and solve engineering problems.
4. Graduates will be able to demonstrate high level of proficiency in oral and written communication.
5. Graduates will be able to demonstrate an understanding of, and a commitment to, the standards for scholarship and research integrity.

Master of Science (M.S.)

1. Graduates will be able to demonstrate an understanding of advanced core principles and methods from selected sub-fields of Aerospace Engineering at a depth appropriate with their course of study.
2. Graduates will be able to analyze and synthesize knowledge within the field of Aerospace Engineering to extend existing knowledge through a research experience.
3. Graduates will be able to apply their knowledge of selected sub-fields of Aerospace Engineering to formulate and solve engineering problems.
4. Graduates will be able to demonstrate high level of proficiency in oral and written communication.
5. Graduates will be able to demonstrate an understanding of, and a commitment to, the standards for scholarship and research integrity.

Doctor of Philosophy (Ph.D.)

1. Graduates will be able to demonstrate an understanding of advanced core principles and methods as well as modern research findings from different sub-fields of Aerospace Engineering at a depth appropriate for a Ph.D. candidate.
2. Graduates will be able to demonstrate the ability to analyze and synthesize appropriate literature, to critically review their work in context of the literature, and to formulate and defend conclusions based on their research that represent new scholarly findings.
3. Graduates will be able to apply their knowledge of selected sub-fields of Aerospace Engineering in formulating and executing a research plan.
4. Graduates will be able to demonstrate high level of proficiency in oral and written communication.
5. Graduates will be able to demonstrate an understanding of, and a commitment to, the standards for scholarship and research integrity.

Contact

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