**Engineering**

**Aerospace Engineering**

*University Park, College of Engineering (AERSP)*

PROFESSOR GEORGE A. LESIEUTRE, *Head, Department of Aerospace Engineering*

This major emphasizes the analysis, design, and operation of aircraft and spacecraft. Students learn the theories and practices in the fundamental subjects of aeronautics, astronautics, aerodynamics and fluid dynamics, aerospace materials and structures, dynamics and automatic control, aircraft stability and control and/or orbital and attitude dynamics and control, air-breathing and rocket propulsion, aircraft systems design and /or spacecraft systems design. All of these place significant weight on the development and use of teamwork and communications skills for effective problem-solving. Graduates in aerospace engineering find employment in the customary settings such as government laboratories, large and small aerospace firms, and in nontraditional positions that also require the use of systems-engineering approaches to problem-solving; they can also pursue graduate study in aerospace engineering and related fields.

Graduates with a Bachelor of Science in Aerospace Engineering will be able to:

1. analyze the dynamics and control characteristics of aerospace vehicles, including the basic translational and rotational dynamics, and the basic theory and practice used to control these motions,
2. analyze fluid dynamics, including the regimes of subsonic, transonic, and supersonic flows, inviscid and viscous flows, and laminar and turbulent flows,
3. apply knowledge of the fundamentals of aeronautics, including aerodynamic characteristics of aircraft, propulsion systems, airplane performance, and elementary aircraft stability and control,
4. apply knowledge of the fundamentals of astronautics, including orbital mechanics, attitude dynamics and control, rocket propulsion, and the space environment,
5. predict performance, and conduct preliminary design, of gas turbine and rocket-based propulsion systems and their components,
6. analyze the detailed dynamics, stability, and control of either aircraft or spacecraft,
7. analyze and design structural elements such as bars, beams, plates, and thin-walled structures,
8. make measurements to test hypotheses or to characterize the performance of physical systems (aerodynamic, structural, and control), and analyze and interpret the data in written reports,
9. complete the successive stages of conceptual, preliminary, and detailed design of an aircraft or spacecraft mission and the associated vehicles,
10. function effectively on teams to solve problems in complex aerospace systems that require knowledge of multiple disciplines,
11. apply an understanding of professional and ethical responsibility to realistic situations,
12. make effective oral and written presentations in a format appropriate for the setting,
13. explain how this profession affects society as a whole, and to demonstrate an appreciation of how technical issues guide societal actions,
14. demonstrate an awareness of the need to stay abreast of technical developments throughout their working careers, and demonstrate that they are able to maintain and extend their learning, and
15. make appropriate and effective use of computer software, hardware, and state-of-the-art laboratory instrumentation.

Two to three years after obtaining a B.S. in aerospace engineering, graduates shoubd be:

1. employed in the customary setting such as governmental laboratories, large and small aerospace firms, and nontraditional positions that also require the use of systems-engineering approches to problem-solving, and/or
2. pursuing graduate study in aerospace engineering or related fields.

The first two years of study are similar to those in other engineering majors and provide students with a basic education for the engineering profession. Students need to complete E MCH 212, CMPSC 201, MATH 220, MATH 230, and MATH 250 prior to the start of the junior year in order to meet graduation requirements in the following two years. Six of the nine technical-elective credits taken in the senior year must be aerospace engineering courses.

 ENTRANCE TO MAJOR -- In addition to the minimum grade point average (GPA) requirements\* described in the University Policies, all College of Engineering entrance to major course requirements must also be completed with a minimum grade of C: CHEM 110 (GN), MATH 140 (GQ), MATH 141 (GQ) and PHYS 211 (GN). All of these courses must be completed by the end of the semester during which the admission to major process is carried out.

\*In the event that the major is under enrollment control, a higher minimum cumulative grade-point average is likely to be needed and students must be enrolled in the College of Engineering or Division of Undergraduate Studies at the time of confirming their major choice.

For the B.S. degree in Aerospace Engineering, a minimum of 131 credits is required. This baccalaureate program in Aerospace Engineering is accredited by the Engineering Accreditation Commission of ABET, Inc., [www.abet.org (Opens New Window)](http://www.abet.org).

*Scheduling Recommendation by Semester Standing given like (Sem:1-2)*

**GENERAL EDUCATION:** 45 credits
(27 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

**FIRST-YEAR SEMINAR:**(Included in REQUIREMENTS FOR THE MAJOR)

**UNITED STATES CULTURES AND INTERNATIONAL CULTURES:**(Included in GENERAL EDUCATION course selection)

**WRITING ACROSS THE CURRICULUM:**(Included in REQUIREMENTS FOR THE MAJOR)

**REQUIREMENTS FOR THE MAJOR:** 113 credits
(This includes 27 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses; 9 credits of GWS courses.)

**PRESCRIBED COURSES** (72 credits)
CHEM 110 GN(3)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), EDSGN 100(3), MATH 140 GQ(4)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), MATH 141 GQ(4)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), PHYS 211 GN(4)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01) (Sem: 1-2)
E MCH 212(3)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), M E 201(3), MATH 220 GQ(2-3), MATH 230(4), MATH 250(3), PHYS 212 GN(4), PHYS 214 GN(2) (Sem: 3-4)
AERSP 301(3)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), AERSP 304(3), AERSP 305W(3), AERSP 306(3)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), AERSP 309(3)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), AERSP 311(3)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), AERSP 312(3), AERSP 313(3)[**[1]**](http://bulletins.psu.edu/bulletins/bluebook/college_campus_details.cfm?id=27&program=aersp.htm#mnote01), E MCH 315(2), E MCH 316(1) (Sem: 5-6)
AERSP 410(3), ENGL 202C GWS(3) (Sem: 7-8)

**ADDITIONAL COURSES** (29 credits)
Select 1 credit of First-Year Seminar (Sem: 1-2)
ECON 102 GS(3), ECON 104 GS(3), or ECON 014 GS(3) (Sem: 1-2)
Select 5 credits from E MCH 210(5), E MCH 211(3), E MCH 213(3) (Sem: 3-4)
ENGL 015 GWS(3) or ENGL 030 GWS(3) (Sem: 1-2)
CAS 100A GWS(3) or CAS 100B GWS(3) (Sem: 3-4)
CMPSC 201 GQ(3) or CMPSC 202 GQ(3) (Sem: 3-4)
AERSP 401A(3), AERSP 401B(2); or AERSP 402A(3), AERSP 402B(2) (Sem: 7-8)
AERSP 413(3) or AERSP 450(3) (Sem: 7-8)
AERSP 440(3), E E 210(3), or E E 212(4) (Sem: 7-8)

**SUPPORTING COURSES AND RELATED AREAS** (12 credits)
Select 9 credits of Aerospace Technical Elective (ATE) courses from department list. (Sem: 7-8)

Select 3 credits of Limited Elective (LE) courses from department list. (Sem: 7-8)

(Students who complete Basic ROTC may substitute 6 of the ROTC credits for 3 credits of LE and 3 credits of GHA.)

**[1]** A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2006

Blue Sheet Item #: 34-05-056

Review Date: 2/28/06

UCA Revision #1: 8/2/06
UCA Revision #2: 7/26/07

EN

Publications updated accreditation statement, per COE: 8/15/11