B.S. in Aerospace Engineering

The Bachelor of Science in Aerospace Engineering provides broad exposure to engineering fundamentals and prepares the graduating student for a wide range of engineering positions in industry or government. The program also is an excellent preparation for graduate school in a number of disciplines. The program's focus is primarily on the engineering of mission-oriented vehicles for atmospheric and space flight. In addition to the general education requirements, the student will study aerodynamics, structures, propulsion, space systems, controls, materials, instrumentation, electrical fundamentals, computer applications, orbital mechanics, and design. Students choose to integrate their knowledge in either an aircraft or spacecraft capstone design project. Design projects in a number of courses will develop and refine the students' ability to integrate their knowledge, communicate both verbally and in writing, and work in a team environment. A large number of hands-on experiences will expose the student to practical engineering to balance the theoretical analysis required to understand aircraft and spacecraft systems.

The overall objective of the Aerospace Engineering program at Prescott is to produce graduates who will be successful practitioners of aerospace engineering. The program objectives to measure our accomplishment of this goal are engineers who:

- Demonstrate achievements in their chosen profession
- Contribute to the profession and the university
- Demonstrate professional preparation
- Exhibit professional ethics and integrity

The Aerospace Engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org.

Students will:

- Have an ability to to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Have 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.
- Have an ability to communicate effectively with a range of audiences.
- Have 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.
- Have 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.
- Have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Have an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements

The Bachelor of Science in Aerospace Engineering program requires successful completion of a minimum of 129 credit hours. The program may be completed in eight semesters assuming appropriate background and full-time enrollment. A minimum cumulative grade point average of 2.00 is needed for all required AE, EGR, EP, ES, and ME courses, excluding technical electives. The courses necessary to earn this degree are listed below.

Students should be aware that many courses have prerequisites and/or corequisites. **Students must have a C or better in all prerequisites for all required AE, EGR, EP, ES, COM 221, ME, and SYS courses.**

Program Requirements

General Education

Embry-Riddle degree programs require students to complete a minimum of 36 hours of General Education coursework. For a full description of Embry-Riddle General Education guidelines, please see the General Education section of this catalog.

Students may choose other classes outside of their requirements, but doing so can result in the student having to complete more than the degree's 129 credit hours. This will result in additional ***time and cost*** to the student.

Communication Theory and Skills	9
Computer Science/Information Technology Elective	3
Mathematics	6
Physical and Life Sciences (Natural Sciences)	6
Humanities and Social Sciences	12
3 hours of Lower-Level Humanities	
3 hours of Lower-Level Social Science	
3 hours of Lower-Level or Upper-Level Humanities or Social Science	
3 hours of Upper-Level Humanities or Social Science	
Total Credits	**36**

Aerospace Engineering Core (92 Credits)

The following course of study outlines the quickest and most cost-efficient route for students to earn their B.S. in Aerospace Engineering. Students are encouraged to follow the course of study to ensure they complete all program required courses and their prerequisites within four years.

Courses in the core with a # will satisfy your general education requirements.

AE 302	Aerodynamics II	3
AE 318	Aerospace Structures I	3
AE 430	Control System Analysis and Design	3
CHM 113	General Chemistry for Engineering #	3
COM 122	English Composition #	3
COM 221	Technical Report Writing (Must earn a C or better to pass COM 221) #	3
COM 420	Advanced Technical Communication I #	1
COM 430	Advanced Technical Communication II #	2
EC 225	Engineering Economics #	3
EE 335	Electrical Engineering I	2
EE 336	Electrical Engineering I Laboratory	1
EGR 101	Introduction to Engineering	2
EGR 115	Introduction to Computing for Engineers #	3
EGR 200	Computer Aided Design of Aerospace Systems	3
or EGR 201	Computer Aided Design of Mechanical Systems	
ES 201	Statics	3
ES 202	Solid Mechanics	3
ES 204	Dynamics	3
ES 206	Fluid Mechanics	3
ES 208	Thermodynamics	3
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
ES 324	Measurements and Instrumentation	2
ES 325	Measurements and Instrumentation Lab	1
General Education - Humanities or Social Science Lower-Level or Upper-Level Elective #		3

General Education - Humanities Lower-Level Elective [#]		3
HU 330	Values and Ethics (OR Study Abroad in HU/SS Upper-Level) [#]	3
or HU 335	Technology and Modern Civilization	
MA 241	Calculus and Analytical Geometry I [#]	4
MA 242	Calculus and Analytical Geometry II [#]	4
MA 243	Calculus and Analytical Geometry III	4
MA 345	Differential Equations and Matrix Methods	4
Math or Natural Science Upper Level Elective [^]		3
PS 161	Physics I & II for Engineers	4
PS 250	Physics for Engineers III [#]	3
PS 253	Physics Laboratory for Engineers [#]	1
Total Credits		**92**

Astronautics Option (31 Credits)

AE 313	Space Mechanics	3
AE 324	Experimental Space Sys Engineering	2
AE 326	Experimental Space Systems Engineering Lab	1
AE 414	Space Propulsion	3
AE 426	Spacecraft Attitude Dynamics	3
AE 427	Spacecraft Preliminary Design	4
or AE 420	Aircraft Preliminary Design	
AE 445	Spacecraft Detail Design	4
CEC 325	Fundamentals of Applied Microcontrollers	3
CEC 326	Fundamentals of Applied Microcontrollers Laboratory	1
CS 125	Computer Science I	4
EP 394	Space Systems Engineering	3
Total Credits		**31**

Aeronautics Option (31 Credits)

AE 301	Aerodynamics I	3
AE 314	Experimental Aerodynamics	1
AE 315	Experimental Aerodynamics Laboratory	1
AE 317	Aircraft Flight Mechanics and Performance	3
AE 420	Aircraft Preliminary Design	4
AE 421	Aircraft Detail Design	4
AE 423	Airplane Stability, Dynamics, and Control	3
EGR 310	Advanced Engineering Computation	3
ME 309	Airbreathing and Rocket Propulsion	3
Astronautics Elective		3
Structures Elective		3
Total Credits		**31**

Technical Electives (6 Credits)

Technical Electives		6
Total Credits		**129**

Three Technical Elective credits must be upper-level College of Engineering courses not specifically listed in the student's degree requirements.

AE		
Upper-level, except Directed Studies		
With prior approval from the Aerospace Engineering Department.		
Cooperative Education Courses		
With prior approval from the Aerospace Engineering department. See Career Advisor for more information.		
CEC		
Upper-level, except Directed Studies		
CS		
CS 325	Programming in ADA	3
CS 420	Operating Systems [*]	3
EE		
Upper-level, except Directed Studies		
EGR		
Upper-level		
EP		
Upper-level, except Directed Studies		
ES		
Upper-level, except Directed Studies		
MA		
MA 348	Numerical Analysis I	3
MA 412	Probability and Statistics	3
MA 432	Linear Algebra	3
MA 441	Mathematical Methods for Engineering and Physics I	3
MA 442	Mathematical Methods for Engineering and Physics II	3
MA 443	Complex Variables	3
ME		
Upper-level, except Directed Studies		
PS		
PS 303	Modern Physics [**]	3
PS 321	Classical Mechanics I [*]	3
PS 322	Classical Mechanics II [**]	3
PS 350	Quantum Mechanics I [**]	3
PS 375	Planetary Science	3
PS 420	Remote Sensing	3
SE		
SE 300	Software Engineering Practices [**]	3
SIS		
SIS 365	Project Management	3
SYS		
SYS 301	Introduction to Systems Engineering	3
SYS 304	Trade Studies, Risk and Decision Analysis	3
SYS 415	Systems Engineering Practices: Specialty Engineering	3

* Offered in Fall Only
** Offered in Spring Only
*** Structures Elective may be satisfied with AE 409, AE 418, ES 322/323, ES 412, ES 414 (or as approved by Department Chair).
**** UNIV 101 is taken in excess of degree requirements of meets open elective credits.
***** Astronautics Elective may be satisfied with AE 313 (or as approved by Department Chair).
^ This course could be filled by any 300/400 level MA/PS/CHM/BIO/WX course (or approved by the department chair).
# General Education Course

All Army ROTC students are required to complete SS 321 - U.S. Military History 1900-Present (3 credits) in order to commission.

Aeronautics Option

Freshman Year		
Fall		**Credits**
CHM 113	General Chemistry for Engineering	3
COM 122	English Composition	3

	Humanities or Social Science Lower-Level or Upper-Level Elective	3
EGR 101	Introduction to Engineering	2
MA 241	Calculus and Analytical Geometry I	4
UNIV 101	College Success	(1)
	Credits Subtotal	**15.0**
Spring		
EC 225	Engineering Economics	3
EGR 115	Introduction to Computing for Engineers	3
	Humanities Lower-Level Elective	3
MA 242	Calculus and Analytical Geometry II	4
PS 161	Physics I & II for Engineers	4
	Credits Subtotal	**17.0**
Sophomore Year		
Fall		
COM 221	Technical Report Writing (Must earn a C or better to pass COM 221)	3
ES 201	Statics	3
ES 208	Thermodynamics	3
MA 243	Calculus and Analytical Geometry III	4
PS 250	Physics for Engineers III	3
PS 253	Physics Laboratory for Engineers	1
	Credits Subtotal	**17.0**
Spring		
AE 317	Aircraft Flight Mechanics and Performance	3
EGR 310	Advanced Engineering Computation	3
ES 202	Solid Mechanics	3
ES 206	Fluid Mechanics	3
MA 345	Differential Equations and Matrix Methods	4
	Credits Subtotal	**16.0**
Junior Year		
Fall		
AE 301	Aerodynamics I	3
AE 318	Aerospace Structures I	3
EE 335	Electrical Engineering I	2
EE 336	Electrical Engineering I Laboratory	1
EGR 200	Computer Aided Design of Aerospace Systems	3
or EGR 201	Computer Aided Design of Mechanical Systems	
ES 204	Dynamics	3
	Credits Subtotal	**15.0**
Spring		
AE 302	Aerodynamics II	3
AE 314	Experimental Aerodynamics	1
AE 315	Experimental Aerodynamics Laboratory	1
AE 423	Airplane Stability, Dynamics, and Control	3
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
	Math or Natural Science Upper-Level Elective	3
ME 309	Airbreathing and Rocket Propulsion	3
	Credits Subtotal	**17.0**
Senior Year		
Fall		
AE 420	Aircraft Preliminary Design	4
AE 430	Control System Analysis and Design	3
COM 420	Advanced Technical Communication I	1
ES 324	Measurements and Instrumentation	2
ES 325	Measurements and Instrumentation Lab	1
	Structures Elective	3
	Technical Elective	3
	Credits Subtotal	**17.0**
Spring		
AE 421	Aircraft Detail Design	4
	Astronautics Elective	3
COM 430	Advanced Technical Communication II	2
HU 330	Values and Ethics (OR HU/SS Upper-Level Study Abroad)	3
or HU 335	Technology and Modern Civilization	
	Technical Elective	3
	Credits Subtotal	**15.0**
	Credits Total:	**129.0**

Astronautics Option

Freshman Year		
Fall		**Credits**
CHM 113	General Chemistry for Engineering	3
COM 122	English Composition	3
	Humanities or Social Science Lower-Level or Upper-Level Elective	3
EGR 101	Introduction to Engineering	2
MA 241	Calculus and Analytical Geometry I	4
UNIV 101	College Success	(1)
	Credits Subtotal	**15.0**
Spring		
EC 225	Engineering Economics	3
EGR 115	Introduction to Computing for Engineers	3
	Humanities Lower-Level Elective	3
MA 242	Calculus and Analytical Geometry II	4
PS 161	Physics I & II for Engineers	4
	Credits Subtotal	**17.0**
Sophomore Year		
Fall		
COM 221	Technical Report Writing (Must earn a C or better to pass COM 221)	3
ES 201	Statics	3
ES 208	Thermodynamics	3
MA 243	Calculus and Analytical Geometry III	4
PS 250	Physics for Engineers III	3
PS 253	Physics Laboratory for Engineers	1
	Credits Subtotal	**17.0**
Spring		
CS 125	Computer Science I	4
EGR 200	Computer Aided Design of Aerospace Systems	3
or EGR 201	Computer Aided Design of Mechanical Systems	
ES 202	Solid Mechanics	3
ES 204	Dynamics	3
MA 345	Differential Equations and Matrix Methods	4
	Credits Subtotal	**17.0**
Junior Year		
Fall		
AE 313	Space Mechanics	3
AE 318	Aerospace Structures I	3
EE 335	Electrical Engineering I	2
EE 336	Electrical Engineering I Laboratory	1
ES 206	Fluid Mechanics	3
	Math or Natural Science Upper-Level Elective	3
	Credits Subtotal	**15.0**
Spring		

AE 302	Aerodynamics II	3
AE 324	Experimental Space Sys Engineering	2
AE 326	Experimental Space Systems Engineering Lab	1
CEC 325	Fundamentals of Applied Microcontrollers	3
CEC 326	Fundamentals of Applied Microcontrollers Laboratory	1
EP 394	Space Systems Engineering	3
ES 324	Measurements and Instrumentation	2
ES 325	Measurements and Instrumentation Lab	1
	Credits Subtotal	**16.0**
Senior Year		
Fall		
AE 414	Space Propulsion	3
AE 426	Spacecraft Attitude Dynamics	3
AE 427	Spacecraft Preliminary Design	4
or AE 420	Aircraft Preliminary Design	
COM 420	Advanced Technical Communication I	1
ES 320	Engineering Materials Science	2
ES 321	Engineering Materials Science Laboratory	1
	Technical Electives	3
	Credits Subtotal	**17.0**
Spring		
AE 430	Control System Analysis and Design	3
AE 445	Spacecraft Detail Design	4
COM 430	Advanced Technical Communication II	2
HU 330	Values and Ethics (OR HU/SS Upper-Level Study Abroad)	3
or HU 335	Technology and Modern Civilization	
	Technical Electives	3
	Credits Subtotal	**15.0**
	Credits Total:	**129.0**