

# BS in Aerospace and Aeronautical Engineering

---

The Aerospace and Aeronautical Engineering curriculum is designed for students who desire to enter the aerospace or related industry or to pursue advanced studies in these areas. The curriculum provides a broad range of courses in the areas of aerodynamics, aerospace structures and aerospace and aeronautic vehicle design.

## Vision

The Aerospace and Aeronautical Engineering Program strives to graduate aerospace engineers of the highest quality and to conduct state-of-the-art research.

## Mission

The Aerospace and Aeronautical Engineering program at The University of Texas at El Paso seeks to prepare students for careers in aerospace engineering and related disciplines. Successful achievement of this objective will be met if:

- The majority of our graduates obtain meaningful employment in the aerospace or related industry after graduation
- After five years most graduates are working in engineering
- After five years most graduates have achieved their initial career goals and advanced their careers, i.e. promotion, pursuit of advanced degree, etc.
- All graduates feel well served by the education they received at UTEP.

The program will consist of a largely common initial two years with the current B.S. in Mechanical Engineering degree program at UTEP but have course, laboratory and project experiences in the last two years of the curriculum that prepare students in:

- Aerodynamics,
- Propulsion,
- Aerostructures,
- Aerospace dynamics and controls, and
- Aerospace systems engineering

## Admission Requirements

There are no additional admission requirements to the program above those of admission to the University of Texas at El Paso and to eligible to take MATH 1411 Calculus I or equivalent.

## Degree Requirements

The degree requires 128 SCH which includes:

1. completion of the university core curriculum (42 SCH)
2. 56 SCH of prescribed courses,
3. 30 SCH of engineering electives

## Degree Plan

Code	Title	Hours
<b>Designated Core</b>		
CHEM 1305 & CHEM 1105	General Chemistry and Laboratory for CHEM 1305	4
MATH 1508 or MATH 1310 or MATH 1411	Precalculus Trigonometry and Conics Calculus I	3-5
PHYS 2320 & PHYS 2120	Introductory Mechanics and Laboratory for PHYS 2320	4
<b>University Core Curriculum(All courses require a grade of C or better.)</b>		
Complete the University Core Curriculum requirements. (p. 3)		42
<b>Aerospace Engineering (Other Requirements) (All courses require a grade of C or better.)</b>		
Required Courses: Some of these are included in the core.		
MATH 1411	Calculus I	4
MATH 1312	Calculus II	3

MATH 2313	Calculus III	3
MATH 2326	Differential Equations	3
<b>Math/Science Elective</b>		
Select one of the following: (Math courses in this section cannot be used to satisfy other degree requirements)		3
MATH 3323	Matrix Algebra	
MATH 3335	Applied Analysis I	
MATH 4326	Linear Algebra	
MATH 4329	Numerical Analysis	
MATH 4336	Applied Analysis II	
PHYS 2325	Survey of Modern Physics	
PHYS 3351	Analytical Mechanics I	
STAT 3320	Probability and Statistics	
<b>Science Elective</b>		
Select one of the following:		4
CHEM 1306 & CHEM 1106	General Chemistry and Laboratory for CHEM 1306	
PHYS 2321 & PHYS 2121	Introductory Electromagnetism and Laboratory for PHYS 2321	
<b>Math Elective</b>		
Select one of the following:(Math courses in this section cannot be used to satisfy other degree requirements)		
MATH 3323	Matrix Algebra	3
MATH 3335	Applied Analysis I	3
MATH 4329	Numerical Analysis	3
MATH 4336	Applied Analysis II	3
STAT 3320	Probability and Statistics	3
<b>Aerospace Engineering Major</b>		
Required Courses:		
MECH 1305	Graphic & Design Fundamentals <sup>c</sup>	3
MECH 1321	Mechanics I-Statics <sup>c</sup>	3
MECH 2103	Engineering Computations <sup>c</sup>	1
MECH 2311	Intro to Thermal-fluid Sci <sup>c</sup>	3
MECH 2322	Mechanics of Materials <sup>c</sup>	3
MECH 2340	Mechanics II -Dynamics <sup>c</sup>	3
MECH 2342	Electro Mechanical Systems <sup>c</sup>	3
MECH 3352	Engineering Analysis II	3
AERO 2131	Aerospace Materials Lab	1
AERO 2331	Aerospace Materials	3
AERO 3312	Aerodynamics 1	3
AERO 3323	Aerospace Structures I	3
AERO 3343	Systems Modelling and Control	3
AERO 4322	Aerospace Propulsion	3
AERO 4364	Aerospace Communications	3
AERO 4365	Aerospace Systems Engineering	3
AERO 4366	Aerospace Senior Design	3
<b>Select two of the following: Laboratory Experience</b>		<b>2</b>
MECH 3103	Mechatronics Lab	
MECH 3113	Thermo-fluid Lab	
MECH 3123	Solid Mechanics Lab	
<b>Concentration Electives: Must take 3 from one Concentration <sup>1</sup></b>		<b>9</b>
<b>Aircraft Concentration:</b>		
AERO 4311	Flight Dynamics and Controls	
AERO 4312	Aircraft Design	

AERO 4313	Aerospace Structures II	
AERO 4319	Special Topics in Aeronautics	
<b>Launch Vehicles and Missiles Concentration</b>		
AERO 4331	Aerodynamics II	
AERO 4332	Hypersonic Vehicle Design	
AERO 4335	Structural Dynamics	
AERO 4339	Special Topics in Hypersonics	
<b>Satellite Concentration</b>		
AERO 4351	Orbit and Attitude Dynamics	
AERO 4353	Spacecraft Environments	
AERO 4355	Space Mission Design	
AERO 4359	Special Topics in Astronautics	
<b>Technical Electives</b> <sup>2</sup>		<b>6</b>
<b>Total Hours</b>		<b>128</b>

C Course requires a grade of C or better

1 Must declare a concentration and take three classes from the declared concentration area

2 Must be an aerospace class from outside your declared aerospace concentration area or from any MECH 4XXX course. AERO 4329 counts towards Technical Electives.

3 Must be in the last full semester and have a 2.0 GPA or better in major.

## University Core Curriculum

The department may make specific suggestions for courses which are most applicable towards your major.

All courses require a C or better

### I. Communication (six hours)

Code	Title	Hours
The objective of the communication component is to enable the student to communicate effectively in clear and correct prose or orally in a style appropriate to the subject, occasion, and audience.		
Select six hours of the following:		6
For students whose secondary education was in English:		
COMM 1611	Written and Oral Communication	
ENGL 1313	Writing About Literature	
RWS 1301	Rhetoric & Composition I	
RWS 1302	Rhetoric & Composition 2	
RWS 1601	Rhetoric, Composition & Comm	
For students whose secondary education was not in English:		
ESOL 1311	Expos Engl Compos-Spkr Esl	
ESOL 1312	Res & Crit Writng Spkr Esl	
<b>Total Hours</b>		<b>6</b>

### II. American History (six hours)

Code	Title	Hours
The objectives of the history component are to expand students' knowledge of the origin and history of the U.S., their comprehension of the past and current role of the U.S. in the world, and their ability to critically evaluate and analyze historical evidence. U.S. history courses (three hours must be Texas history) include:		
HIST 1301	History of U.S. to 1865	3
HIST 1302	History of U.S. Since 1865	3
<b>Total Hours</b>		<b>6</b>

**III. Language, Philosophy & Culture (three hours)**

Code	Title	Hours
The objective of the humanities component is to expand students' knowledge of the human condition and human cultures, especially in relation to behaviors, ideas, and values expressed in works of human imagination and thought. Through study in disciplines such as literature and philosophy, students engage in critical analysis and develop an appreciation of the humanities as fundamental to the health and survival of any society.		
Select one of the following:		3
AFST 2300	Intro-African Amer Studies	
CHIC 2302	Latina/o Presence in the U.S.	
ENGL 2311	English Literature	
ENGL 2312	English Literature	
ENGL 2313	Intro to American Fiction	
ENGL 2314	Intro to American Drama	
ENGL 2318	Intro to American Poetry	
FREN 2322	Making of the "Other" Americas	
HIST 2301	World History to 1500	
HIST 2302	World History Since 1500	
PHIL 1301	Introduction to Philosophy	
PHIL 2306	Ethics	
RS 1301	Introduct to Religious Studies	
SPAN 2340	Seeing & Naming: Conversations	
WS 2300	Introduction to Womens Studies	
WS 2350	Global Feminisms	
<b>Total Hours</b>		<b>3</b>

**IV. Mathematics (three hours)**

Code	Title	Hours
The objective of the mathematics component is to develop a quantitatively literate college graduate. Every college graduate should be able to apply basic mathematical tools in the solution of real-world problems.		
Select one of the following:		3
MATH 1309	College Algebra	
MATH 1310	Trigonometry and Conics	
MATH 1319	Math in the Modern World	
MATH 1320	Math for Social Sciences I	
MATH 1411	Calculus I	
MATH 1508	Precalculus <sup>1,2</sup>	
MATH 2301	Math for Social Sciences II	
STAT 1380	Statistical Literacy	
STAT 2480	Elementary Statistical Methods	
1 A higher-level course in the calculus sequence can be substituted.		
2 TCCN MATH 1314 will also satisfy this requirement.		
<b>Total Hours</b>		<b>3</b>

**V. Life & Physical Sciences (six hours)**

Code	Title	Hours
The objective of the study of the natural sciences is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the bases for building and testing theories. The courses listed are for non-majors; the major courses in the discipline can be substituted for the non-major sequence. A minimum of two semesters of lecture and one semester of laboratory associated with one of the courses, or two semesters of combined (3 credit) lecture-laboratory courses (Only six hours apply toward the required 42.):		
Select one of the following:		1-4
ASTR 1107	Astronomy Lab I	
ASTR 1307	Elem Astronomy-Solar System	

ASTR 1308	Elem Astr Stars & Galaxies
BIOL 1103	Introductory Biology Lab
BIOL 1104	Human Biology Laboratory
BIOL 1107	Topics in Study of Life I
BIOL 1108	Organismal Biology Laboratory
BIOL 1203	Introductory Biology
BIOL 1304	Human Biology
BIOL 1305	General Biology
BIOL 1306	Organismal Biology
BIOL 2111	Human Anat/Physio Lab I
BIOL 2113	Human Anat/Physio Lab II
BIOL 2311	Human Anat/Physiology I
BIOL 2313	Human Anat/Physiology II
CHEM 1105	Laboratory for CHEM 1305
CHEM 1106	Laboratory for CHEM 1306
CHEM 1107	Intro General Chemistry Lab
CHEM 1108	Intro Organic & Biochem Lab
CHEM 1305	General Chemistry
CHEM 1306	General Chemistry
CHEM 1307	Intro to General Chemistry
CHEM 1308	Intro Organic & Biochemistry
ESCI 1101	Environmental Sci. Lab
ESCI 1102	Non-major Lab for ESCI 1301
ESCI 1202	Intro to Environment Science 2
ESCI 1301	Intro to Environmental Sci
GEOG 1106	Laboratory for GEOG 1306
GEOG 1306	Physical Geography
GEOL 1103	Lab for GEOL 1313
GEOL 1104	Lab for GEOL 1314
GEOL 1111	Principles of Earth Sci - Lab
GEOL 1112	Laboratory for Geology 1212
GEOL 1211	Principles of Earth Sciences
GEOL 1212	Principles of Earth Science
GEOL 1230	The Blue Planet
GEOL 1231	Natural Hazards
GEOL 1313	Intro to Physical Geology
GEOL 1314	Intro to Historical Geol
HSCI 2302	Fundamentals of Nutrition
HSCI 2303	Wellness Dynamics
MICR 2330	Microorganisms and Disease
PHYS 1403	General Physics I
PHYS 1404	General Physics II
PHYS 2120	Laboratory for PHYS 2320
PHYS 2121	Laboratory for PHYS 2321
PHYS 2320	Introductory Mechanics
PHYS 2321	Introductory Electromagnetism

**Total Hours****6****VI. Political Science (six hours)**

Code	Title	Hours
------	-------	-------

The objectives of the political science component are to expand students' knowledge of the origin and evolution of the U.S. and Texas political systems, focusing on the growth of political institutions, and on the constitutions of Texas and the United States; and to enhance their understanding of federalism, states rights, and individual civil liberties, rights, and responsibilities.

## Required Courses:

POLS 2310	Introduction to Politics	3
POLS 2311	American Gover & Politics	3
<b>Total Hours</b>		<b>6</b>

**VII. Social and Behavioral Sciences (three hours)**

Code	Title	Hours
------	-------	-------

The objective of the social and behavioral science component is to increase students' knowledge of how social and behavioral scientists discover, describe, and explain the behaviors and interactions among individuals, groups, institutions, events, and ideas. Such knowledge will better equip students to understand themselves and the roles they play in addressing the issues facing humanity.

Select one of the following: 3

ANTH 1301	Intro-Phys Anth/Archeolog	
ANTH 1302	Intro-Cultural Anthropology	
ANTH 1310	Cultural Geography	
ANTH 2320	Intro to Linguistics	
CE 2326	Econ for Engrs & Scientists	
ASIA 2300	Asian American Studies	
COMM 2350	Interpersonal Communication	
COMM 2372	Mass Media and Society	
ECON 2303	Principles of Macroeconomics	
ECON 2304	Principles of Microeconomics	
EDPC 1301	Introduction to Ed Psychology	
EDU 1342	Action Research in Classrooms	
ENGL 2320	Introduction to Linguistics	
GEOG 1310	Cultural Geography	
LEAD 2300	Community Service	
LING 2320	An Intro. to Linguistics	
LING 2340	Lang. Inside & Out: Sel Topics	
PSYC 1301	Introduction to Psychology	
SOCI 1301	Introduction to Sociology	
SOCI 1310	Cultural Geography	
<b>Total Hours</b>		<b>3</b>

**VIII. Creative Arts (three hours)**

Code	Title	Hours
------	-------	-------

The objective of the visual and performing arts component is to expand students' knowledge and appreciation of the human imagination as expressed through works of visual art, dance, music, theatre and film. Through study in these disciplines, students will form aesthetic judgments and develop an appreciation of the arts as fundamental to the health and survival of any society.

Select one of the following: 3

ART 1300	Art Appreciation	
ARTH 1305	History of Art I	
ARTH 1306	History of Art II	
CHIC 1311	Chicana/o Fine Arts Appreciat	
DANC 1304	Dance Appreciation	
FILM 1390	Intro-Art of Motion Pict.	
MUSL 1324	Music Appreciation	
MUSL 1327	Jazz to Rock	
MUSL 2321	Music, Culture, and Society	
THEA 1313	Introduction to Theatre	
<b>Total Hours</b>		<b>3</b>

**IX. Component Area Option (six hours)**

Code	Title	Hours
The objective of the institutionally designated option component is to develop the critical thinking skills and academic tools required to be an effective learner. Special emphasis is placed on the use of technology in problem-solving, communications, and knowledge acquisition.		
Select two of the following:		6
BUSN 1301	Intro to Global Business	
COMM 1301	Public Speaking	
COMM 1302	Business/Profession Comm	
CS 1310	Intro-Computational Thinking	
CS 1320	Computer Programming Sci/Engr	
EL 1301	Eng Innovation and Leadership	
LEAD 1300	Introduction to Leadership	
SCI 1301	Inquiry in Math & Science	
UNIV 1301	Seminar/Critical Inquiry	
<b>Total Hours</b>		<b>6</b>

**4-Year Sample Degree Plan****BS Aerospace and Aeronautical Engineering(Starting with Calculus)**

Code	Title	Hours
<b>BACHELOR OF SCIENCE IN AEROSPACE AND AERONAUTICAL ENGINEERING</b>		
<b>FRESHMAN</b>		
<b>Fall</b>		
MECH 1305	Graphic & Design Fundamentals <sup>+</sup>	3
RWS 1301	Rhetoric & Composition I <sup>+</sup>	3
MATH 1411	Calculus I <sup>+</sup>	4
PHYS 2320	Introductory Mechanics	3
PHYS 2120	Laboratory for PHYS 2320	1
UNIV 1301	Seminar/Critical Inquiry <sup>+</sup>	3
<b>Spring</b>		
MECH 1321	Mechanics I-Statics <sup>+</sup>	3
HIST 1301	History of U.S. to 1865 <sup>+</sup>	3
RWS 1302	Rhetoric & Composition 2 <sup>+</sup>	3
MATH 1312	Calculus II <sup>+</sup>	3
CHEM 1305 & CHEM 1105	General Chemistry and Laboratory for CHEM 1305 <sup>+</sup>	4
<b>SOPHOMORE</b>		
<b>Fall</b>		
MECH 2322	Mechanics of Materials <sup>+</sup>	3
MATH 2313	Calculus III <sup>+</sup>	3
AERO 2331	Aerospace Materials <sup>+</sup>	3
AERO 2131	Aerospace Materials Lab <sup>+</sup>	1
HIST 1302	History of U.S. Since 1865 <sup>+</sup>	3
Science Elective <sup>+, 1</sup>		4
<b>Spring</b>		
MECH 2340	Mechanics II -Dynamics <sup>+</sup>	3
MECH 2311	Intro to Thermal-fluid Sci <sup>+</sup>	3
MECH 2103	Engineering Computations <sup>+</sup>	1
MECH 2342	Electro Mechanical Systems <sup>+</sup>	3
CE 2326	Econ for Engrs & Scientists <sup>+</sup>	3
MATH 2326	Differential Equations <sup>+</sup>	3
<b>JUNIOR</b>		
<b>Fall</b>		

Laboratory Experience <sup>2</sup>		1
MECH 3352	Engineering Analysis II	3
AERO 3312	Aerodynamics 1	3
AERO Concentration Course		3
POLS 2310	Introduction to Politics <sup>+</sup>	3
Math Elective <sup>+,3</sup>		3
<b>Spring</b>		
Laboratory Experience <sup>2</sup>		1
COMM 1302	Business/Profession Comm <sup>+</sup>	3
AERO 3343	Systems Modelling and Control	3
AERO 3323	Aerospace Structures I	3
Aero Concentration I <sup>5</sup>		3
Science/Math Elective <sup>+,4</sup>		3
<b>SENIOR</b>		
<b>Fall</b>		
Language, Philosophy, and Culture Course <sup>+</sup>		3
AERO 4322	Aerospace Propulsion	3
Aero Concentration III <sup>5</sup>		3
Technical Elective		3
AERO 4365	Aerospace Systems Engineering	3
AERO 4312	Aircraft Design	3
<b>Spring</b>		
AERO 4366	Aerospace Senior Design	3
AERO 4364	Aerospace Communications	3
Technical Elective		3
POLS 2311	American Gover & Politics <sup>+</sup>	3
Creative Arts Course <sup>+</sup>		3
<b>Notes:</b>		
+Grade of C or better required		
1. Must be either CHEM 1306 with CHEM 1106, PHYS 2421 or by permission of advisor.		
2. From the department approved list of Laboratory Experience courses.		
3. Selected from MATH 3323, 3335, 4326, 4329, 4336, STAT 3320. By completing 3 of these electives you may be eligible for a Mathematics minor, interested students should consult the Department of Mathematics.		
4. Approved courses are: PHYS 2325, PHYS 3351, PHYS 4348 or any course listed in NOTE 3 (not already taken). Also, as per the UTEP core curriculum requirements two of your science classes must be in the same area (either PHYS, OR CHEM).		
5. Must take at least three classes from one aerospace concentration area.		
6. Two technical electives selected from any MECH or AERO 3XXX or 4XXX courses. At least one elective must be at the 4XXX level.		
<b>Total Hours</b>		<b>131</b>