

PROPOSED 2015 CATALOG COPY

Aerospace Engineering - B.S.

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Description The Bachelor of Science degree in Aerospace Engineering focuses on the application of engineering principles to the design, manufacturing and functionality of aerospace vehicles such as aircraft and spacecraft, to include autonomous and semi-autonomous unmanned aerial systems. Students will gain an in-depth knowledge of aerodynamics, aerospace materials, structures, propulsion, flight mechanics and stability and control while being briefly exposed to orbital mechanics, control, space structures and rocket propulsion.

Career Opportunities Aerospace engineers design aircraft, spacecraft, satellites and missiles. In addition, they test prototypes to make sure that they function according to design. They may develop new technologies for use in aviation, defense systems and spacecraft. They often specialize in areas such as aerodynamic fluid flow; structural design; guidance, navigation and control; instrumentation and communication; robotics; and propulsion and combustion. Aerospace engineers can specialize in designing different types of aerospace products, such as commercial and military airplanes and helicopters; remotely piloted aircraft and rotorcraft; spacecraft, including launch vehicles and satellites; and military missiles and rockets. They often become experts in one or more related fields: aerodynamics, thermodynamics, celestial mechanics, flight mechanics, propulsion, acoustics and guidance and control systems.

Aerospace engineers are employed in industries where workers design or build aircraft, missiles, systems for national defense or spacecraft. They work primarily for firms that engage in analysis and design, manufacturing, research and development, as well as for the federal government. Aerospace engineers now spend more of their time in an office environment than they have in the past, because modern aircraft design requires the use of sophisticated computer equipment and software design tools, modeling, and simulations for tests, evaluation and training. (Source: The U.S. Bureau of Labor Statistics)

Admission Requirements **Freshmen Students:** The admission to the program is selective. Prospective candidates must have a minimum 3.0 high school GPA; a minimum 24 ACT composite score (minimum 24 ACT sub-scores in both in English and math) or minimum 1700 SAT composite score (mathematics, critical reasoning and writing); and the capability of being placed directly into MATH 12002 Analytic Geometry and Calculus I (or its equivalent).

Students who do not meet these requirements may apply for admission to the aeronautical systems engineering technology concentration within the Aeronautics major and apply for transfer into the Aerospace Engineering major at the conclusion of their freshman year. Admissions at that time will require a minimum 3.200 cumulative Kent State GPA and a minimum B grade in both MATH 12002 Analytic Geometry and Calculus I and PHY 23101 General University Physics I.

Transfer Students: Entry into the Aerospace Engineering major requires 12 or more semester hours in college-level coursework with a minimum 3.2 cumulative GPA and a minimum B grade in both MATH 12002 Analytic Geometry and Calculus I and PHY 23101 General University Physics I (or their equivalents).

Transfer students who have completed less than 12 semester hours of college-level coursework will be evaluated on both collegiate and high school records and must submit a final high school transcript and an ACT or SAT score.

Graduation Requirements Minimum 131 credit hours with 39 upper-division hours. Minimum 2.750 major GPA and 2.500 cumulative GPA.

Program Learning Outcomes Graduates of the program will be able to:

1. Apply knowledge of mathematics, science and engineering.
2. Design and conduct experiments, and analyze and interpret data.
3. Design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
4. Function on multidisciplinary teams.
5. Identify, formulate and solve engineering problems.
6. Understand professional and ethical responsibility.
7. Communicate effectively, via both written and verbal means.
8. Understand the impact of engineering solutions in a global, economic, environmental and societal context.
9. Recognize the need for, and able to engage in life-long learning.
10. Be aware of contemporary issues in the aerospace industry.
11. Use the techniques, skills and modern engineering tools necessary for engineering practice.

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Aerospace Engineering - B.S. Program Requirements

Type Legend: **DD** Diversity–Domestic; **DG** Diversity–Global; **ELR** Experiential Learning; **KAD** Kent Core Additional; **KBS** Kent Core Basic Sciences; **KCM** Kent Core Composition; **KFA** Kent Core Fine Arts; **KHU** Kent Core Humanities; **KMC** Kent Core Mathematics and Critical Reasoning; **KSS** Kent Core Social Sciences; **WIC** Writing Intensive

I. DESTINATION KENT STATE: FIRST YEAR EXPERIENCE (1 credit)				
Type	Course	Title	Credits	Min. Grade
	US 10097	Destination Kent State: First Year Experience ¹	1	
II. MAJOR PROGRAM REQUIREMENTS (67 credits) Courses count in major GPA				
Type	Course	Title	Credits	Min. Grade
	AERN 15300	Introduction to Engineering Analysis Using Matlab	3	
	AERN 15500	Introduction to Aerospace Engineering	3	C
	AERN 25200	Statics	2	
	AERN 25400	Dynamics	3	
	AERN 25500	Aerodynamics for Engineers	3	C
	AERN 35150	Aircraft Structures	3	
	AERN 35200	Thermal-Fluid Engineering	3	
	AERN 35201	Thermal-Fluid Engineering Laboratory	1	
	AERN 35300	Aerospace Vehicle Performance	3	
	AERN 35400	System Dynamics and Control	3	
	AERN 35500	Signals and Circuits	3	
	AERN 35501	Signals and Circuits Laboratory	1	
	AERN 35600	High-Speed Aerodynamics	3	
	AERN 45121	Advanced Aerospace Propulsion	3	
	AERN 45291	Aerospace Senior Seminar	1	
	AERN 45600	Aircraft Stability and Control	3	
	AERN 45601	Aircraft Stability and Control Laboratory	1	
	AERN 45700	Aircraft Design	4	
	AERN 45850	Aircraft Design II	3	
	AERN 45900	Aeroelasticity	3	
	AERN	Elective Courses	6	
	TECH 13580	Engineering Graphics I	3	
	TECH 33111	Strengths of Materials	3	
	TECH 36620	Project Management in Engineering and Technology	3	
III. ADDITIONAL PROGRAM REQUIREMENTS (60 credits)				
Type	Course	Title	Credits	Min. Grade
KBS	CHEM 10050	Fundamentals of Chemistry	3	
KSS	ECON 22060	Macroeconomics	3	
KMC	MATH 12002	Analytic Geometry and Calculus I	5	
	MATH 12003	Analytic Geometry and Calculus II	5	
	MATH 21001	Linear Algebra With Applications	3	
	MATH 22005	Analytic Geometry and Calculus III	4	
	MATH 32044	Introduction to Ordinary Differential Equations	3	
	MATH 42045	Introduction to Partial Differential Equations	3	
KBS	PHY 23101	General University Physics I	5	
KBS	PHY 23102	General University Physics II	5	
		Kent Core Composition	6	
		Kent Core Humanities and Fine Arts (minimum one course from each)	9	
		Kent Core Social Sciences (cannot be from ECON)	3	
		Kent Core Additional	3	
MINIMUM TOTAL			128	

- US 10097 is not required of transfer students with 25 credits or students age 21+ at time of admission.

[Note: College will seek WIC designation for AERN 45700 Aircraft Design in the near future.]



This roadmap is a recommended semester-by-semester plan of study for this major. However, courses and milestones designed as critical (!) must be completed in the semester listed to ensure a timely graduation.

Critical	Course Subject and Title	Credit Hours	Upper Div.	Min. Grade	Major GPA	Type	Term Taken
Semester One [15 Credits]							
!	AERN 15300 Introduction to Engineering Analysis Using Matlab	3			■		
!	CHEM 10050 Fundamentals of Chemistry	3				KBS	
!	MATH 12002 Analytic Geometry and Calculus I	5				KMC	
	US 10097 Destination Kent State: First Year Experience ¹	1					
	Kent Core Requirement	3					
Semester Two [16 Credits]							
!	AERN 15500 Introduction to Aerospace Engineering	3		C	■		
!	MATH 12003 Analytic Geometry and Calculus II	5					
!	PHY 23101 General University Physics I	5				KBS	
!	TECH 13580 Engineering Graphics I	3			■		
Semester Three [17 Credits]							
!	AERN 25200 Statics	2			■		
!	MATH 21001 Linear Algebra With Applications	3					
!	MATH 22005 Analytic Geometry and Calculus III	4					
!	PHY 23102 General University Physics II	5				KBS	
	Kent Core Requirement	3					
Semester Four [15 Credits]							
!	AERN 25400 Dynamics	3			■		
!	AERN 25500 Aerodynamics for Engineers	3		C	■		
!	MATH 32044 Introduction to Ordinary Differential Equations	3	■				
!	TECH 33111 Strengths of Materials	3			■		
	ECON 22060 Macroeconomics	3				KSS	
Semester Five [16 Credits]							
!	AERN 35150 Aircraft Structures	3	■		■		
!	AERN 35200 Thermal-Fluid Engineering	3	■		■		
!	AERN 35201 Thermal-Fluid Engineering Laboratory	1	■		■		
!	AERN 35300 Aerospace Vehicle Performance	3	■		■		
!	AERN 35400 System Dynamics and Control	3	■		■		
	Kent Core Requirement	3					
Semester Six [16 Credits]							
!	AERN 35500 Signals and Circuits	3	■		■		
!	AERN 35501 Signals and Circuits Laboratory	1	■		■		
!	AERN 35600 High-Speed Aerodynamics	3	■		■		
!	AERN 45121 Advanced Aerospace Propulsion	3	■		■		
!	TECH 36620 Project Management in Engineering and Technology	3	■		■		
	Kent Core Requirement	3					
Semester Seven [17 Credits]							
!	AERN 45600 Aircraft Stability and Control	3	■		■		
!	AERN 45601 Aircraft Stability and Control Laboratory	1	■		■		
!	AERN 45700 Aircraft Design	4	■		■		
!	MATH 42045 Introduction to Partial Differential Equations	3	■				
	AERN Elective	3					
	Kent Core Requirement	3					
Semester Eight [16 Credits]							
!	AERN 45291 Aerospace Senior Seminar	1	■		■		
!	AERN 45850 Aircraft Design II	3	■		■		
!	AERN 45900 Aeroelasticity	3	■		■		
	AERN Elective	3					
	Kent Core Requirement	3					
	Kent Core Requirement	3					

Graduation Requirements Summary

Minimum Total Hours	Minimum Upper-Division Hours	Minimum Kent Core Hours	Minimum	
			Major GPA	Overall GPA
128	39	36	2.75	2.500



1. US 10097 is not required of transfer students with 25 credits or students age 21+ at time of admission.

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