

# AEROSPACE ENGINEERING - B.S.

College of Aeronautics and Engineering  
www.kent.edu/cae

## About This Program

Aerospace engineers are at the forefront of exciting advances in rockets, advanced air-mobility, drone development and logistics and advanced aircraft. Our program prepares students to contribute to these exciting developments through theoretical and practical courses; internships; group projects; and a multiple major, two-semester capstone experience. Read more...

## Contact Information

- cae@kent.edu | 330-672-2892
- Speak with an Advisor
- Chat with an Admissions Counselor

## Program Delivery

- **Delivery:**
  - In person
- **Location:**
  - Kent Campus

## Examples of Possible Careers and Salaries\*

### Aerospace engineers

- 2.8% slower than the average
- 66,400 number of jobs
- \$118,610 potential earnings

### Mechanical engineers

- 3.9% about as fast as the average
- 316,300 number of jobs
- \$90,160 potential earnings

### Architectural and engineering managers

- 2.6% slower than the average
- 198,100 number of jobs
- \$149,530 potential earnings

## Accreditation

The Bachelor of Science degree in Aerospace Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org, under the General Criteria and the Program Criteria for Aerospace Engineering and Similarly Named Programs.

\* Source of occupation titles and labor data comes from the U.S. Bureau of Labor Statistics' Occupational Outlook Handbook. Data comprises projected percent change in employment over the next 10 years; nation-wide employment numbers; and the yearly median wage at

which half of the workers in the occupation earned more than that amount and half earned less.

## Admission Requirements

The university affirmatively strives to provide educational opportunities and access to students with varied backgrounds, those with special talents and adult students who graduated from high school three or more years ago.

Admission to the Aerospace Engineering major is selective.

**New Students:** Admission into this major requires:

- Minimum 3.0 high school GPA
- Clear demonstration of an ability to be placed directly into MATH 12002 (or its equivalent); this will occur if the student is currently taking or has taken a calculus, pre-calculus or trigonometry course with a minimum C grade

Students who do not meet the above requirements will be admitted to the Aeronautical Systems Engineering Technology major, provided they meet the minimum program requirements.

**Note:** Applicants should understand that this is a math-intensive program. Students admitted to the program are expected to demonstrate prerequisite knowledge on a math placement exam (the ALEKS exam) prior to starting their first semester. Students who do not obtain the minimum score required to place into MATH 12002 will have their major changed to Aeronautical Systems Engineering Technology prior to their freshman year.

**Current Students:** Students accepted into the Aeronautical Systems Engineering Technology major may request a change in major to Aerospace Engineering as soon as placement into MATH 12002 has been demonstrated (prior to the beginning of freshman year). Otherwise, students may request to change their major to Aerospace Engineering after their freshman year if they meet the following criteria:

- Minimum 3.000 overall Kent State GPA
- Minimum C grade in both MATH 12002 and PHY 23101

**Transfer Students:** Admission into this major requires:

- Minimum 12 credit hours of college-level coursework
- Minimum 3.000 overall GPA
- Minimum C grade in both MATH 12002 and PHY 23101 (or their equivalents)

Transfer students who have completed fewer than 12 credit hours of college-level coursework will be evaluated on both collegiate and high school records and must submit a final high school transcript.

**International Students:** All international students must provide proof of English language proficiency (unless they meet specific exceptions to waive) by earning a minimum 71 TOEFL iBT score, minimum 6.0 IELTS score, minimum 47 PTE score or minimum 100 DET score, or by completing the ELS level 112 Intensive English Program. For more information on international admission visit the admissions website for international students.

## Program Requirements

### Major Requirements

Code	Title	Credit Hours
<b>Major Requirements (courses count in major GPA)</b>		
AERN 35150	AIRCRAFT STRUCTURES	3
ENGR 11001	INTRODUCTION TO ENGINEERING	2
ENGR 11002	INTRODUCTION TO ENGINEERING LABORATORY	1
ENGR 13586 & ENGR 13587 or MERT 12001	COMPUTER AIDED DESIGN I and COMPUTER AIDED DESIGN I LABORATORY	3
ENGR 15300	INTRODUCTION TO ENGINEERING ANALYSIS USING MATLAB®	2
ENGR 15301	INTRODUCTION TO ENGINEERING ANALYSIS USING MATLAB® LAB	1
ENGR 20000	PROFESSIONAL DEVELOPMENT IN ENGINEERING	1
ENGR 20002	MATERIALS AND PROCESSES	3
ENGR 25200	STATICS (min C grade)	3
ENGR 25400	DYNAMICS (min C grade)	3
ENGR 25500	AERODYNAMICS FOR ENGINEERS I (min C grade)	3
ENGR 33041	CONTROL SYSTEMS	3
ENGR 35200	THERMAL FLUID ENGINEERING	3
ENGR 35201	THERMAL FLUID ENGINEERING LABORATORY	1
ENGR 35300	AIRCRAFT PERFORMANCE AND STABILITY I	3
ENGR 35500	SIGNALS AND CIRCUITS	3
ENGR 35501	SIGNALS AND CIRCUITS LABORATORY	1
ENGR 35600	AERODYNAMICS FOR ENGINEERS II	3
ENGR 42111	STRENGTH OF MATERIALS FOR ENGINEERS	3
ENGR 42363	MATERIALS SELECTION IN DESIGN AND APPLICATIONS	3
ENGR 45121	AEROSPACE PROPULSION FOR ENGINEERING	3
ENGR 45600	AIRCRAFT PERFORMANCE AND STABILITY II	3
ENGR 45901	INTRODUCTION TO FINITE ELEMENT METHOD AND APPLICATIONS	3
ENGR 48001	ORBITAL MECHANICS	3
ENGR 48099	ENGINEERING CAPSTONE I (ELR) <sup>1</sup>	3
ENGR 48199	ENGINEERING CAPSTONE II (ELR) (WIC) <sup>1,2</sup>	3
Specialization, choose from the following:		3
Engineering Internship		
CAE 45092	AERONAUTICS AND ENGINEERING INTERNSHIP/COOPERATIVE EDUCATION (ELR) (WIC) <sup>2</sup>	
Machine Design		
ENGR 43580	COMPUTER-AIDED MACHINE DESIGN	
Materials		
ENGR 42710 & ENGR 42711	ADDITIVE MANUFACTURING and ADDITIVE MANUFACTURING LABORATORY	
Patent and Engineering Law		
ENGR 35550	LAW AND ETHICS FOR ENGINEERS	
Space Applications		
ENGR 48002	SPACECRAFT ATTITUDE DYNAMICS, DETERMINATION AND CONTROL	
ENGR 48003	SPACECRAFT DESIGN	
Systems Engineering and Optimization		
ENGR 42410	ENGINEERING OPTIMIZATION	

ENGR 47200	SYSTEMS ENGINEERING	
Undergraduate Research		
CAE 45096	INDIVIDUAL INVESTIGATION IN AERONAUTICS AND ENGINEERING	
<b>Additional Requirements (courses do not count in major GPA)</b>		
CHEM 10060	GENERAL CHEMISTRY I (KBS)	4
ECON 22060	PRINCIPLES OF MICROECONOMICS (KSS)	3
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
UC 10001	FLASHES 101	1
Additional Mathematics Electives, choose from the following: <sup>3</sup>		8-10
MATH 21001 & MATH 22005 & MATH 32044	LINEAR ALGEBRA and ANALYTIC GEOMETRY AND CALCULUS III and ORDINARY DIFFERENTIAL EQUATIONS	
MATH 32051 & MATH 32052	MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I and MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II	
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each)		9
Kent Core Social Sciences (must be from two disciplines)		3
Kent Core Additional		1
<b>Minimum Total Credit Hours:</b>		<b>124</b>

<sup>1</sup> ENGR 48099 and ENGR 48199 must be taken during the same academic year.

<sup>2</sup> A minimum C grade must be earned to fulfill the writing-intensive requirement.

<sup>3</sup> To reduce the total number of required credit hours, students are advised to take MATH 32051 and MATH 32052. The other alternative courses are listed for students who have already taken college coursework elsewhere or are off track with respect to the roadmap.

## Graduation Requirements

Minimum Major GPA	Minimum Overall GPA
2.750	2.500

## Roadmap

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

Semester One		Credits
ENGR 11001	INTRODUCTION TO ENGINEERING	2
ENGR 11002	INTRODUCTION TO ENGINEERING LABORATORY	1
ENGR 15300	INTRODUCTION TO ENGINEERING ANALYSIS USING MATLAB®	2
ENGR 15301	INTRODUCTION TO ENGINEERING ANALYSIS USING MATLAB® LAB	1
! MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
UC 10001	FLASHES 101	1
Kent Core Requirement		3
<b>Credit Hours</b>		<b>15</b>

<b>Semester Two</b>		
CHEM 10060	GENERAL CHEMISTRY I (KBS)	4
ENGR 13586	COMPUTER AIDED DESIGN I	3
& ENGR 13587	and COMPUTER AIDED DESIGN I LABORATORY	
or	or COMPUTER-AIDED DESIGN	
MERT 12001		
!	MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II	5
!	PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
<b>Credit Hours</b>		<b>17</b>
<b>Semester Three</b>		
ENGR 20000	PROFESSIONAL DEVELOPMENT IN ENGINEERING	1
!	ENGR 25200 STATICS	3
!	PHY 23102 GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
!	Additional Mathematics Elective	4
!	Additional Mathematics Elective or Kent Core Requirement	3
<b>Credit Hours</b>		<b>16</b>
<b>Semester Four</b>		
ECON 22060	PRINCIPLES OF MICROECONOMICS (KSS)	3
ENGR 20002	MATERIALS AND PROCESSES	3
!	ENGR 25400 DYNAMICS	3
!	ENGR 25500 AERODYNAMICS FOR ENGINEERS I	3
!	Additional Mathematics Elective	3-4
<b>Credit Hours</b>		<b>16</b>
<b>Semester Five</b>		
ENGR 35200	THERMAL FLUID ENGINEERING	3
ENGR 35201	THERMAL FLUID ENGINEERING LABORATORY	1
ENGR 35500	SIGNALS AND CIRCUITS	3
ENGR 35501	SIGNALS AND CIRCUITS LABORATORY	1
!	ENGR 35600 AERODYNAMICS FOR ENGINEERS II	3
ENGR 42111	STRENGTH OF MATERIALS FOR ENGINEERS	3
	Kent Core Requirement	0-3
<b>Credit Hours</b>		<b>14</b>
<b>Semester Six</b>		
ENGR 33041	CONTROL SYSTEMS	3
!	ENGR 35300 AIRCRAFT PERFORMANCE AND STABILITY I	3
ENGR 42363	MATERIALS SELECTION IN DESIGN AND APPLICATIONS	3
ENGR 45121	AEROSPACE PROPULSION FOR ENGINEERING	3
	Kent Core Requirement	3
<b>Credit Hours</b>		<b>15</b>
<b>Semester Seven</b>		
AERN 35150	AIRCRAFT STRUCTURES	3
!	ENGR 45600 AIRCRAFT PERFORMANCE AND STABILITY II	3
!	ENGR 48099 ENGINEERING CAPSTONE I (ELR)	3
	Specialization	3
	Kent Core Requirement	3
<b>Credit Hours</b>		<b>15</b>
<b>Semester Eight</b>		
!	ENGR 45901 INTRODUCTION TO FINITE ELEMENT METHOD AND APPLICATIONS	3
!	ENGR 48001 ORBITAL MECHANICS	3
!	ENGR 48199 ENGINEERING CAPSTONE II (ELR) (WIC)	3
	Kent Core Requirement	3
	Kent Core Requirement	3

Kent Core Requirement	1
<b>Credit Hours</b>	<b>16</b>
<b>Minimum Total Credit Hours:</b>	<b>124</b>

## University Requirements

All students in a bachelor's degree program at Kent State University must complete the following university requirements for graduation.

**NOTE:** University requirements may be fulfilled in this program by specific course requirements. Please see Program Requirements for details.

Flashes 101 (UC 10001)	1 credit hour
Course is not required for students with 30+ transfer credits (excluding College Credit Plus) or age 21+ at time of admission.	
Diversity Domestic/Global (DIVD/DIVG)	2 courses
Students must successfully complete one domestic and one global course, of which one must be from the Kent Core.	
Experiential Learning Requirement (ELR)	varies
Students must successfully complete one course or approved experience.	
Kent Core (see table below)	36-37 credit hours
Writing-Intensive Course (WIC)	1 course
Students must earn a minimum C grade in the course.	
Upper-Division Requirement	39 credit hours
Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate.	
Total Credit Hour Requirement	120 credit hours

## Kent Core Requirements

Kent Core Composition (KCMP)	6
Kent Core Mathematics and Critical Reasoning (KMCR)	3
Kent Core Humanities and Fine Arts (KHUM/KFA) (min one course each)	9
Kent Core Social Sciences (KSS) (must be from two disciplines)	6
Kent Core Basic Sciences (KBS/KLAB) (must include one laboratory)	6-7
Kent Core Additional (KADL)	6
<b>Total Credit Hours:</b>	<b>36-37</b>

## Program Learning Outcomes

Graduates of this program will be able to:

1. Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
2. 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.
3. Communicate effectively with a range of audiences.
4. 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.
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.

6. Develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

The educational objectives of the program are the following:

1. Drive positive change in the community by engaging in careers in the field of aerospace engineering and beyond in a manner that promotes excellence and integrity.
2. Practice forward-thinking through continued education by way of graduate education, professional development and other continued self-motivated learning.
3. Successfully navigate the ever-changing trajectory of the world, practicing compassion as you strive to meet your personal career goals.

## Full Description

The Bachelor of Science degree in Aerospace Engineering successfully prepares the aerospace engineers of the future to work in multidisciplinary teams to design products and perform research in innovative ways that affect positive change on a regional, national and global scale. The program focuses on the application of engineering principles to the design, manufacturing and functionality of aerospace vehicles such as aircraft, missiles and spacecraft. Students gain in-depth knowledge of aerodynamics, engineering materials and processes, structures, propulsion, flight mechanics and control, while being exposed to orbital mechanics, space structures and rocket propulsion.

Applicants to this program should understand that this is a math-intensive program.

Students may apply early to the M.S. degree in Aerospace Engineering and double count 9 credit hours of graduate courses toward both degree programs. See the Combined Bachelor's/Master's Degree Program policy in the University Catalog for more information.