

# MECHATRONICS ENGINEERING - B.S.

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

## Examples of Possible Careers\*

### Electrical engineers

- 4.6% about as fast as the average
- 193,100 number of jobs
- \$100,830 potential earnings

### Electronics engineers, except computer

- 1.4% slower than the average
- 134,900 number of jobs
- \$107,540 potential earnings

### Mechanical engineers

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

## Contact Information

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

## Fully Offered

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

### \*Note

Source of occupation titles and labor data is 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.

## Description

The Bachelor of Science degree in Mechatronics Engineering integrates mechanical, electrical, computer and controls engineering to understand automated machinery, specifically, how to design it and how to make it work. Mechatronics engineering revolves around the design, construction and operation of automated systems, robots and intelligent products, which result from the integration of software and hardware.

Using automated systems is becoming more popular for operating equipment or machinery on manufacturing lines, boilers and aircraft to reduce labor costs, increase precision and accuracy and provide quality and safety for workers. Mechatronic devices can be found in agriculture,

hospitals, buildings, homes, automobiles, manufacturing plants, the toy and entertainment industry and in aids for the elderly and disabled.

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

Information on the program's education objectives and student enrollment and graduation data can be found on the college website.

## 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 Mechatronics Engineering major is selective.

**Freshman Students:** Admission into the Mechatronics Engineering major requires:

- A minimum 3.0 high school GPA;
- A minimum 24 ACT composite score (minimum 24 ACT sub-scores in both English and mathematics) or a minimum 1160 SAT composite score (mathematics, critical reasoning and writing);
- Clear demonstration of an ability to be placed directly into MATH 12002 (or its equivalent); this will occur if the student is already taking (or has taken) a Calculus or Pre-Calculus course, with a minimum grade of B.

Students who do not meet these requirements will be admitted to the Mechatronics Engineering Technology major, provided that they meet those major requirements. Students accepted into the Mechatronics Engineering Technology major may request a change in major to Mechatronics 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 Mechatronics Engineering after their freshman year if they meet the following criteria:

- Minimum 3.200 overall Kent State GPA
- Minimum B grade in both MATH 12002 and PHY 23101.

### English Language Proficiency Requirements for International Students:

All international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning a minimum 525 TOEFL score (71 on the Internet-based version), minimum 75 MELAB score, minimum 6.0 IELTS score, minimum 48 PTE score or minimum 100 DET score; or by completing the ESL level 112 Intensive Program. For more information on international admission, visit the Office of Global Education's admission website.

**Transfer Students:** Admission into the Mechatronics Engineering major requires a minimum 12 credit hours in college-level coursework with a minimum 3.200 overall GPA and a minimum B grade in both MATH 12002 and PHY 23101 (or their equivalents). Transfer students who have completed less 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 and an ACT or SAT score.

## 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

- 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
- Communicate effectively with a range of audiences
- 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
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
- Develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
- Acquire and apply new knowledge as needed, using appropriate learning strategies

## 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.

Destination Kent State: First Year Experience	1
Course is not required for students with 25 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
Writing-Intensive Course (WIC)	1 course
Students must earn a minimum C grade in the course.	
Upper-Division Requirement	39
Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate.	
Total Credit Hour Requirement	120

## Kent Core Requirements

Kent Core Composition (KCOMP)	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 Requirements

### Major Requirements

Code	Title	Credit Hours
<b>Major Requirements (courses count in major GPA)</b>		
ENGR 11000	INTRODUCTION TO ENGINEERING	3
ENGR 13585	COMPUTER AIDED ENGINEERING GRAPHICS	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 23585	ADVANCED COMPUTER AIDED DESIGN	3
ENGR 25200	STATICS	3
ENGR 25400	DYNAMICS	3
ENGR 26200	PROGRAMMING FOR ENGINEERS I	3
ENGR 33031	PROGRAMMABLE LOGIC CONTROLLERS	3
ENGR 33033	HYDRAULICS/PNEUMATICS	3
ENGR 33040	CONTROL SYSTEMS	3
ENGR 33222	DIGITAL DESIGN FOR COMPUTER ENGINEERING	3
ENGR 33364	METALLURGY AND MATERIALS SCIENCE	3
ENGR 33440	ELECTRONIC DEVICES	3
ENGR 33442	ELECTRONIC DEVICES LABORATORY	1
ENGR 35500	SIGNALS AND CIRCUITS	3
ENGR 35501	SIGNALS AND CIRCUITS LABORATORY	1
ENGR 42111	STRENGTH OF MATERIALS FOR ENGINEERS	3
ENGR 43030	MECHATRONICS	3
ENGR 43099	MECHATRONICS CAPSTONE (ELR)	3
ENGR 43220	ELECTRICAL MACHINERY	3
ENGR 43580	COMPUTER-AIDED MACHINE DESIGN	3
ENGR 47200	SYSTEMS ENGINEERING	3

### Additional Requirements (courses do not count in major GPA)

COMM 15000	INTRODUCTION TO HUMAN COMMUNICATION (KADL)	3
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR) <sup>2</sup>	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
MATH 32051	MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I	4
MATH 32052	MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II	4
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1

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)	6
Kent Core Additional	3

**Minimum Total Credit Hours:** 122

<sup>1</sup> A minimum C grade must be earned to fulfill the writing-intensive requirement.

<sup>2</sup> Applicants to this program 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 fail to obtain the minimum score required to place into MATH 12002 are at risk of delaying graduation.

## Graduation Requirements

Minimum Major GPA	Minimum Overall GPA
2.250	2.000

## 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.

<b>Semester One</b>		<b>Credits</b>
	ENGR 20002 MATERIALS AND PROCESSES	3
!	MATH 12002 ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10097 DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement	3
	Kent Core Requirement	3
<b>Credit Hours</b>		<b>15</b>
<b>Semester Two</b>		
	ENGR 11000 INTRODUCTION TO ENGINEERING	3
	ENGR 15300 INTRODUCTION TO ENGINEERING ANALYSIS USING MATLAB®	2
	ENGR 15301 INTRODUCTION TO ENGINEERING ANALYSIS USING MATLAB® LAB	1
!	MATH 12003 ANALYTIC GEOMETRY AND CALCULUS II	5
!	PHY 23101 GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
<b>Credit Hours</b>		<b>16</b>
<b>Semester Three</b>		
	ENGR 13585 COMPUTER AIDED ENGINEERING GRAPHICS	3
	ENGR 20000 PROFESSIONAL DEVELOPMENT IN ENGINEERING	1
!	ENGR 25200 STATICS	3
!	MATH 32051 MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I	4
!	PHY 23102 GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
<b>Credit Hours</b>		<b>16</b>
<b>Semester Four</b>		
	ENGR 23585 ADVANCED COMPUTER AIDED DESIGN	3
!	ENGR 25400 DYNAMICS	3
	ENGR 26200 PROGRAMMING FOR ENGINEERS I	3
!	MATH 32052 MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II	4
	Kent Core Requirement	3
<b>Credit Hours</b>		<b>16</b>
<b>Semester Five</b>		
	COMM 15000 INTRODUCTION TO HUMAN COMMUNICATION (KADL)	3
!	ENGR 35500 SIGNALS AND CIRCUITS	3
!	ENGR 35501 SIGNALS AND CIRCUITS LABORATORY	1
!	ENGR 42111 STRENGTH OF MATERIALS FOR ENGINEERS	3
	Kent Core Requirement	3
	Kent Core Requirement	3
<b>Credit Hours</b>		<b>16</b>
<b>Semester Six</b>		
	ENGR 33031 PROGRAMMABLE LOGIC CONTROLLERS	3
	ENGR 33040 CONTROL SYSTEMS	3
	ENGR 33364 METALLURGY AND MATERIALS SCIENCE	3
	ENGR 33440 ELECTRONIC DEVICES	3
	ENGR 33442 ELECTRONIC DEVICES LABORATORY	1
<b>Credit Hours</b>		<b>13</b>
<b>Semester Seven</b>		
	ENGR 33033 HYDRAULICS/PNEUMATICS	3

ENGR 33222	DIGITAL DESIGN FOR COMPUTER ENGINEERING	3
ENGR 43030	MECHATRONICS	3
	Kent Core Requirement	3
	Kent Core Requirement	3
<b>Credit Hours</b>		<b>15</b>
<b>Semester Eight</b>		
ENGR 43099	MECHATRONICS CAPSTONE (ELR)	3
ENGR 43220	ELECTRICAL MACHINERY	3
ENGR 43580	COMPUTER-AIDED MACHINE DESIGN	3
ENGR 47200	SYSTEMS ENGINEERING	3
	Kent Core Requirement	3
<b>Credit Hours</b>		<b>15</b>
<b>Minimum Total Credit Hours:</b>		<b>122</b>