MECHATRONICS ENGINEERING - B.S.

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

About This Program

Excited by the future of robotics, automation and intelligent systems? The Mechatronics Engineering program fuses mechanical, electrical and computer engineering to prepare students to design the smart machines powering advanced manufacturing, autonomous vehicles and next generation technologies. 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*

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

Electro-mechanical and mechatronics technologists and technicians

- 3.0% about as fast as the average
- 14,600 number of jobs
- $59,800 potential earnings

Industrial engineers

- 10.1% much faster than the average
- 295,800 number of jobs
- $88,950 potential earnings

Mechanical engineers

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

Additional Careers

- Automation engineer
- Automation technician
- Autonomous systems engineer
- Controls engineer
- Controls systems engineer
- Digital twin engineer
- Electromechanical engineer
- Embedded systems engineer
- Engineering and design roles
- Field robotics engineer
- Human-robot interaction (HRI) specialist
- Mechatronics product developer
- Quality control inspector
- Robotics applications engineer
- Robotics engineer
- Robotics systems integrator
- Robotics test engineer
- Systems integration engineer

Accreditation

The Bachelor of Science degree in Mechatronics Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org, under the General Criteria.

* 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 Mechatronics 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 Mechatronics 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 Mechatronics Engineering Technology prior to their freshman year.

Current Students: 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 3.000 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 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.

International Students: All international students must provide proof of proficiency of the English language (unless they meet specific exceptions) through the submission of an English language proficiency test score or by completing English language classes at Kent State's English as a Second Language Center before entering their program. For more information, visit the admissions website for international students.

Program Requirements

Major Requirements

Code	Title	Credit Hours
Major Requirements (courses count in major GPA)		
ENGR 11001	INTRODUCTION TO ENGINEERING	2
ENGR 11002	INTRODUCTION TO ENGINEERING LABORATORY	1
ENGR 13586 & ENGR 13587	COMPUTER AIDED DESIGN I and COMPUTER AIDED DESIGN I LABORATORY	3
or MERT 12001	COMPUTER-AIDED DESIGN	
ENGR 15302	MATLAB SKILLS FOR ENGINEERS	1
ENGR 20000	PROFESSIONAL DEVELOPMENT IN ENGINEERING	1
ENGR 20002	MATERIALS AND PROCESSES	3
or MERT 12004	MANUFACTURING PROCESSES	
ENGR 25200	STATICS (min C grade)	3
ENGR 25400	DYNAMICS (min C grade)	3
ENGR 33031	PROGRAMMABLE LOGIC CONTROLLERS	3
ENGR 33041	CONTROL SYSTEMS	3
ENGR 33222	DIGITAL DESIGN FOR COMPUTER ENGINEERING	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 42363	MATERIALS SELECTION IN DESIGN AND APPLICATIONS	3
ENGR 43030	MECHATRONICS	3
ENGR 43099	MECHATRONICS CAPSTONE (ELR) (WIC) [1,2]	3-6
or ENGR 48099 & ENGR 48199	ENGINEERING CAPSTONE I (ELR) and ENGINEERING CAPSTONE II (ELR) (WIC)	
ENGR 43220	ELECTRICAL MACHINERY	3
ENGR 43580	COMPUTER-AIDED MACHINE DESIGN	3
ENGR 47200	SYSTEMS ENGINEERING	3
Programming Elective, choose from the following:		3-4
CS 13001	COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	
CS 13011 & CS 13012	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING	
ENGR 26220 & ENGR 26222	PROGRAMMING FOR ENGINEERS and PROGRAMMING FOR ENGINEERS LABORATORY	
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) (min C grade)	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II (min C grade)	5
MATH 21001	LINEAR ALGEBRA (min C grade)	3
MATH 22005	ANALYTIC GEOMETRY AND CALCULUS III (min C grade)	4
MATH 32044	ORDINARY DIFFERENTIAL EQUATIONS (min C grade)	3
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB) (min C grade) [3]	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB) (min C grade) [3]	5
UC 10001	FLASHES 101	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
General Electives (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours)		4
Minimum Total Credit Hours:		**120**

1. A minimum C grade must be earned to fulfill the writing-intensive requirement.
2. Students wishing to take the full-year capstone option (ENGR 48099 and ENGR 48199) must take the sequence during consecutive semesters. ENGR 48099 is only offered during the fall semester and ENGR 48199 is only offered during the spring semester.
3. PHY 23101 and PHY 23102 are required for this program. No credit will be given to students who take other physics courses. Students who change their major to Mechatronics Engineering from another program should understand that choosing to take a different physics sequence may result in up to 10 additional credit hours of required work.

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 program. Students will work with their advisor to develop a sequence based on their academic goals and history. Courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

	Semester One		**Credits**
	COMM 15000	INTRODUCTION TO HUMAN COMMUNICATION (KADL)	3
	ENGR 20002 or MERT 12004	MATERIALS AND PROCESSES or MANUFACTURING PROCESSES	3
!	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10001	FLASHES 101	1
	Programming Elective		3-4
		Credit Hours	**15**
	Semester Two		
	ENGR 11001	INTRODUCTION TO ENGINEERING	2
	ENGR 11002	INTRODUCTION TO ENGINEERING LABORATORY	1
!	MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
!	MATH 21001	LINEAR ALGEBRA	3
!	PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
		Credit Hours	**16**
	Semester Three		
!	ENGR 25200	STATICS	3
!	ENGR 35500	SIGNALS AND CIRCUITS	3
!	ENGR 35501	SIGNALS AND CIRCUITS LABORATORY	1
	MATH 22005	ANALYTIC GEOMETRY AND CALCULUS III	4
!	PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
		Credit Hours	**16**
	Semester Four		
	ENGR 13586 & ENGR 13587 or MERT 12001	COMPUTER AIDED DESIGN I and COMPUTER AIDED DESIGN I LABORATORY or COMPUTER-AIDED DESIGN	3
	ENGR 15302	MATLAB SKILLS FOR ENGINEERS	1
!	ENGR 25400	DYNAMICS	3
!	MATH 32044	ORDINARY DIFFERENTIAL EQUATIONS	3
	Kent Core Requirement		3
	General Elective		1
		Credit Hours	**14**
	Semester Five		
	ENGR 20000	PROFESSIONAL DEVELOPMENT IN ENGINEERING	1
	ENGR 33222	DIGITAL DESIGN FOR COMPUTER ENGINEERING	3
!	ENGR 42111	STRENGTH OF MATERIALS FOR ENGINEERS	3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	**13**
	Semester Six		
	ENGR 33031	PROGRAMMABLE LOGIC CONTROLLERS	3
	ENGR 33041	CONTROL SYSTEMS	3
	ENGR 33440	ELECTRONIC DEVICES	3
	ENGR 33442	ELECTRONIC DEVICES LABORATORY	1
	ENGR 42363	MATERIALS SELECTION IN DESIGN AND APPLICATIONS	3
	Kent Core Requirement		3
		Credit Hours	**16**
	Semester Seven		
	ENGR 43030	MECHATRONICS	3
	ENGR 43580	COMPUTER-AIDED MACHINE DESIGN	3
	ENGR 48099	ENGINEERING CAPSTONE I (ELR)	3
	or General Elective		
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	**15**
	Semester Eight		
	ENGR 43099 or ENGR 48199	MECHATRONICS CAPSTONE (ELR) (WIC) or ENGINEERING CAPSTONE II (ELR) (WIC)	3
	ENGR 43220	ELECTRICAL MACHINERY	3
	ENGR 47200	SYSTEMS ENGINEERING	3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	**15**
		Minimum Total Credit Hours:	**120**

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
Total Credit Hours:	**36-37**

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 mechatronics, automation, systems and other engineering fields in a robust 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 Mechatronics Engineering successfully prepares graduates with knowledge across engineering disciplines for professional careers in mechatronics, controls, robotics, automation and other engineering fields that provide solutions to technical challenges and address societal needs. The program integrates mechanical, electrical, computer and controls engineering to understand automated machinery, specifically, how to design it and 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 aids for the elderly and disabled.

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

Students may apply early to the M.S. degree in Mechatronics 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.