INDUSTRIAL AND SYSTEMS ENGINEERING - B.S.

College of Aeronautics and Engineering
School of Engineering
www.kent.edu/engineering

PROGRAM IS PENDING APPROVAL FROM the ohio department of higher education. AFTER THAT FINAL APPROVAL, PROSPECTIVE STUDENTS MAY APPLY FOR ADMISSION.

About This Program

Design smarter systems and solve real-world challenges with a Bachelor of Science in Industrial and Systems Engineering. Customize your path and graduate ready for high-impact careers where efficiency, safety and innovation matter most. 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*

Industrial production managers

- 1.9% slower than the average
- 241,900 number of jobs
- $121,440 potential earnings

Architectural and engineering managers

- 3.8% about as fast as the average
- 212,500 number of jobs
- $167,740 potential earnings

Industrial engineers

- 11.0% much faster than the average
- 351,100 number of jobs
- $101,140 potential earnings

Engineering teachers, postsecondary

- 8.1% much faster than the average
- 50,300 number of jobs
- $106,120 potential earnings

* 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

PROGRAM IS PENDING APPROVAL FROM the ohio department of higher education. AFTER THAT FINAL APPROVAL, PROSPECTIVE STUDENTS MAY APPLY FOR ADMISSION.

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 Industrial and Systems Engineering major is selective. Applicants should understand that this is a math-intensive program, and the roadmap assumes students start with MATH 12002 their first semester. Students admitted to the program are expected to demonstrate prerequisite knowledge on a math placement assessment (the ALEKS math assessment) or via other means (e.g., AP, IB, CLEP, A levels) prior to registering for their first semester. Students who do not place into MATH 12002 will likely take longer than eight semesters to complete the program.

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 has earned a minimum C grade in all math courses listed on the high school transcript (e.g., trigonometry, algebra, geometry)

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

Current Students: Students accepted into other Kent State programs may request to change their major to Industrial and Systems Engineering once they meet the following criteria:

- Minimum 12 credit hours of Kent State coursework
- Minimum 3.000 overall Kent State GPA
- Minimum B grade in MATH 11022 or minimum C grade in MATH 12002
- Minimum C grade in PHY 23101

Transfer Students: Admission into this major requires:

- Minimum 12 credit hours of college-level coursework
- Minimum 3.000 overall GPA
- Minimum B grade in MATH 11022 or minimum C grade in MATH 12002 (or their equivalents)
- Minimum C grade in PHY 23101

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 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	COMPUTER AIDED DESIGN I	2
ENGR 13587	COMPUTER AIDED DESIGN I LABORATORY	1
ENGR 20000	PROFESSIONAL DEVELOPMENT IN ENGINEERING	1
ENGR 20002	MATERIALS AND PROCESSES	3
ENGR 33656	QUALITY ENGINEERING	3
ENGR 35765	QUALITY AND RELIABILITY ENGINEERING	3
ENGR 36620	PROJECT MANAGEMENT IN ENGINEERING	3
ENGR 42410	ENGINEERING OPTIMIZATION	3
ENGR 43080	INDUSTRIAL AND ENVIRONMENTAL SAFETY	3
ENGR 45650	OPERATIONS RESEARCH	3
ENGR 47200	SYSTEMS ENGINEERING	3
ENGR 48099	ENGINEERING CAPSTONE I (ELR)	3
ENGR 48199	ENGINEERING CAPSTONE II (ELR) (WIC) [1]	3
Industrial Engineering or Systems Engineering Track, choose from the following:		18
Industrial Engineering Track		
ENGR 31016	MANUFACTURING TECHNOLOGY	
ENGR 42710	ADDITIVE MANUFACTURING AND 3D PRINTING	
ENGR 42711	ADDITIVE MANUFACTURING AND 3D PRINTING LABORATORY	
ENGR 43550	COMPUTER-AIDED MANUFACTURING	
Industrial Engineering Track Electives, choose from the following (9 credit hours):		
BA 44062	SUPPLY CHAIN MANAGEMENT	
BMRT 22000	GLOBAL LOGISTICS	
CIS 44046	HOW TO LEAD AND MANAGE DIGITAL TRANSFORMATION	
ENGR 31065	CAST METALS	
ENGR 33870	FACILITY DESIGN AND MATERIAL HANDLING	
ENGR 35440	ENGINEERING RISK AND DECISION ANALYSIS	
ENGR 40003	LEAN SIX SIGMA	
ENGR 42550	STATISTICAL PROCESS CONTROL	
ENGR 42610 & ENGR 42611	INDUSTRIAL ROBOTICS AND VISION SYSTEMS and INDUSTRIAL ROBOTICS AND VISION SYSTEMS LABORATORY	
ENGR 47210	SUSTAINABLE ENERGY	
Systems Engineering Track		
ENGR 27100	FUNDAMENTALS OF OPERATING SYSTEMS FOR ENGINEERING	
ENGR 45440	MODEL-BASED SYSTEMS SIMULATION	
ENGR 47550	DIGITAL SYSTEMS ENGINEERING	
ENGR 47555	DIGITAL SYSTEMS ENGINEERING LABORATORY	
Systems Engineering Track Electives, choose from the following (9 credit hours):		
BA 44051	MACHINE LEARNING	
ENGR 10005	INTRODUCTION TO CYBERSECURITY	
ENGR 36337	INFORMATION TECHNOLOGY SECURITY	
ENGT 33225	INDUSTRIAL CONTROL SYSTEMS	
Additional Requirements (courses do not count in major GPA)		
ECON 22060	PRINCIPLES OF MICROECONOMICS (KSS)	3
EMAT 33310	HUMAN-COMPUTER INTERACTION	3
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
MATH 20011	DECISION-MAKING UNDER UNCERTAINTY	3
MATH 21001	LINEAR ALGEBRA	3
or MATH 21002	APPLIED LINEAR ALGEBRA	
MATH 30011	BASIC PROBABILITY AND STATISTICS	3
MATH 32044	ORDINARY DIFFERENTIAL EQUATIONS	3
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
UC 10001	FLASHES 101	1
American Civic Literacy Requirement [2]		3
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each) [2]		6-9
Kent Core Social Sciences (must be from two disciplines) (cannot be ECON) [2]		0-3
Kent Core Additional		6
General Elective (total credit hours depends on earning 120 credit hours, including 39 upper-division credit hours)		2
Minimum Total Credit Hours:		**120**

[1] A minimum C grade must be earned to fulfill the writing-intensive requirement.

[2] If students complete the American Civic Literacy requirement by taking HIST 12061, the course will apply to the Kent Core Humanities category. If they complete it with POL 10101, the course will apply to the Kent Core Social Sciences category.

Graduation Requirements

Minimum Major GPA	Minimum Overall GPA
2.500	2.000

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
ENGR 11001	INTRODUCTION TO ENGINEERING	2
ENGR 11002	INTRODUCTION TO ENGINEERING LABORATORY	1
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
UC 10001	FLASHES 101	1
Kent Core Requirement		3
Kent Core Requirement		3
	Credit Hours	**15**
Semester Two		
ENGR 13586	COMPUTER AIDED DESIGN I	2
ENGR 13587	COMPUTER AIDED DESIGN I LABORATORY	1
MATH 12003	ANALYTIC GEOMETRY AND CALCULUS II	5
PHY 23101	GENERAL UNIVERSITY PHYSICS I (KBS) (KLAB)	5

Kent Core Requirement		3
	Credit Hours	**16**
Semester Three		
ENGR 20000	PROFESSIONAL DEVELOPMENT IN ENGINEERING	1
ENGR 20002	MATERIALS AND PROCESSES	3
MATH 20011	DECISION-MAKING UNDER UNCERTAINTY	3
PHY 23102	GENERAL UNIVERSITY PHYSICS II (KBS) (KLAB)	5
American Civic Literacy Requirement		3
Kent Core Requirement		3
	Credit Hours	**18**
Semester Four		
ECON 22060	PRINCIPLES OF MICROECONOMICS (KSS)	3
EMAT 33310	HUMAN-COMPUTER INTERACTION	3
ENGR 43080	INDUSTRIAL AND ENVIRONMENTAL SAFETY	3
MATH 30011	BASIC PROBABILITY AND STATISTICS	3
Kent Core Requirement		3
	Credit Hours	**15**
Semester Five		
ENGR 33656	QUALITY ENGINEERING	3
ENGR 36620	PROJECT MANAGEMENT IN ENGINEERING	3
MATH 21001 or MATH 21002	LINEAR ALGEBRA or APPLIED LINEAR ALGEBRA	3
Kent Core Requirement		3
Kent Core Requirement		3
	Credit Hours	**15**
Semester Six		
ENGR 35765	QUALITY AND RELIABILITY ENGINEERING	3
ENGR 42410	ENGINEERING OPTIMIZATION	3
ENGR 47200	SYSTEMS ENGINEERING	3
MATH 32044	ORDINARY DIFFERENTIAL EQUATIONS	3
Industrial or Systems Engineering Track Elective		3
	Credit Hours	**15**
Semester Seven		
ENGR 27100 or ENGR 31016	FUNDAMENTALS OF OPERATING SYSTEMS FOR ENGINEERING or MANUFACTURING TECHNOLOGY	3
ENGR 43550 or ENGR 45440	COMPUTER-AIDED MANUFACTURING or MODEL-BASED SYSTEMS SIMULATION	3
ENGR 45650	OPERATIONS RESEARCH	3
ENGR 48099	ENGINEERING CAPSTONE I (ELR)	3
General Elective		2
	Credit Hours	**14**
Semester Eight		
ENGR 42710 or ENGR 47550	ADDITIVE MANUFACTURING AND 3D PRINTING or DIGITAL SYSTEMS ENGINEERING	2
ENGR 42711 or ENGR 47555	ADDITIVE MANUFACTURING AND 3D PRINTING LABORATORY or DIGITAL SYSTEMS ENGINEERING LABORATORY	1
ENGR 48199	ENGINEERING CAPSTONE II (ELR) (WIC)	3
Industrial or Systems Engineering Track Electives		6
	Credit Hours	**12**
	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.	
American Civic Literacy	3 credit hours
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. Apply systems thinking and engineering analysis to identify, formulate and solve complex engineering problems across industrial and service environments.
2. Design, implement and optimize processes and systems that meet specified needs with consideration of public health; safety; welfare; and global, cultural, social, environmental and economic factors.
3. Leverage modern tools, digital engineering and data analytics to support decision making, risk assessment and process control.
4. Communicate effectively with technical and non-technical stakeholders, including written reports, oral presentations and visual models.
5. Function effectively with teams, demonstrating leadership, collaboration and project management skills.
6. Recognize ethical and professional responsibilities, understanding the impact of engineering solutions in global, economic, environmental and societal contexts.

7. Engage in lifelong learning through adaptability, continuous improvement and application of emerging engineering methods and technologies.

Full Description

The Bachelor of Science degree in Industrial and Systems Engineering prepares students to design, analyze and improve complex systems that integrate people, technology and processes. Students complete a strong foundation in mathematics, science and engineering, followed by coursework in operations research, quality, risk analysis, decision making and digital engineering.

During their senior year, students select either the Industrial Engineering track, focusing on process control, quality and risk, or the Systems Engineering track, emphasizing model-based systems engineering, decision analysis and digital transformation. Graduates are prepared for careers in manufacturing, healthcare, logistics, aerospace and other industries in which efficiency, safety and innovation are essential. The program is designed to align with ABET accreditation standards for both industrial and systems engineering.