

ENGINEERING

Program Director:

Dr. David Foster, Ph.D.
Room 2-703 AB, 810-762-7958
dfoster@kettering.edu

Program Overview

The Bachelor of Science in Engineering program prepares students for careers in multidisciplinary engineering. The program includes a core set of engineering courses, which provides students with a foundation in Computer, Electrical, Industrial, and Mechanical Engineering principles. Students will then select one of the following application areas:

- Engineering Management
- Manufacturing Systems
- Mechatronics Systems
- Robotic Systems

The Bachelor of Science in Engineering program is new and not currently accredited by the Engineering Accreditation Commission of ABET. The program becomes eligible for ABET accreditation when the first students graduate from the program.

Program Educational Objectives

With their Kettering education as a foundation, within a few years of graduation, graduates will attain:

- A reputation for working effectively and ethically in diverse professional environments.
- Leadership in their profession while actively pursuing lifelong learning and contributing to progress within their field.
- The ability to practice responsible decision making and apply best practices to their professional endeavors.

BS/MASTERS PATHWAY

Undergraduate students also have an opportunity to get their bachelor's and master's degrees in five years with the BS/MASTERS Pathway.

Engineering Program Curriculum Requirements

| Code | Title | Credit Hours |
|--|--|--------------|
| First Year Experience | | |
| CILE-101 | First Year Foundations | 1 |
| General Education | | |
| COMM-101 | Rhetoric & Writing | 4 |
| ECON-201 | Economic Principles | 4 |
| LA-201 | Sophomore Seminar: Exploring the Human Condition | 4 |
| LA-489 | Sr. Seminar: Leadership, Ethics | 4 |
| Advanced Humanities Electives ¹ | | 8 |
| Advanced Social Science Electives ¹ | | 8 |
| Total Credit Hours | | 33 |

¹ Humanities and Social Science advanced electives must be selected from approved 300 and 400 level courses.

| Code | Title | Credit Hours |
|---|--|-------------------------------|
| Mathematics and Basic Science | | |
| MATH-101 or MATH-101X | Calculus I | 4 |
| MATH-102 or MATH-102X | Calculus II | 4 |
| MATH-203 or MATH-203X | Multivariate Calculus | 4 |
| MATH-258 | Probability and Statistics | 4 |
| CHEM-135 or CHEM-137 | Principles of Chemistry General Chemistry I | 3 |
| CHEM-136 | Principles of Chemistry Lab | 1 |
| PHYS-114 | Newtonian Mechanics | 3 |
| PHYS-115 | Newtonian Mechanics Laboratory | 1 |
| PHYS-224 | Electricity and Magnetism | 3 |
| PHYS-225 | Electricity and Magnetism Laboratory | 1 |
| Math/Science Elective | | 4 |
| | | <i>Credit Hours Subtotal:</i> |
| | | 32 |
| Engineering Fundamentals Core | | |
| IME-100 | Interdisciplinary Design and Manufacturing | 4 |
| ECE-100 | Principles of Electrical and Computer Engineering | 4 |
| IME-200 | Introduction to Industrial Engineering | 4 |
| IME-351 | Engineering Economics | 4 |
| ECE-101 or CS-101 | MATLAB and C Programming Computing & Algorithms I | 4 |
| EE-210 | Circuits I | 3 |
| EE-211 | Circuits I Lab | 1 |
| MECH-210 | Statics | 4 |
| MECH-310 | Dynamics | 4 |
| | | <i>Credit Hours Subtotal:</i> |
| | | 32 |
| Concentration - See Below | | 52 |
| | | <i>Credit Hours Subtotal:</i> |
| | | 52 |
| Free Electives | | 8 |
| | | <i>Credit Hours Subtotal:</i> |
| | | 8 |
| Culminating Undergraduate Experience | | |
| CILE-400 & CILE-401 | Undergraduate Thesis Initiation and Undergraduate Thesis Completion ¹ | 4 |
| | | <i>Credit Hours Subtotal:</i> |
| | | 4 |
| Total Credit Hours | | 128 |

(Minimum) Total Credits Required for Program: 161

¹ Students are automatically registered for CILE-400 in a co-op term when they reach Junior II status.

Manufacturing Systems Concentration

| Code | Title | Credit Hours |
|--------------------------------|---|--------------|
| IME-300 | Manufacturing Processes | 4 |
| MATH-204 | Differential Equations & Laplace Transforms | 4 |
| MATH-305 | Numerical Methods and Matrices | 4 |
| MECH-211 | Circuits and Mechatronics | 4 |
| MECH-212 | Mechanics of Materials | 4 |
| MECH-300 | Computer Aided Engineering | 4 |
| MECH-307 | Materials Engineering | 4 |
| Select Two of the Following: | | 8 |
| IME-403 | Computer Numerical Control Machining | |
| IME-408 | Industrial Robotics | |
| IME-412 | Applied Control Systems Design | |
| Select Three of the Following: | | 12 |
| CE-472 | VR Systems: Modeling & Control | |
| CE-484 | Internet of Things (IoT) | |
| CS-355 | Introduction to Cybersecurity | |
| IME-361 | Lean Work Design | |
| IME-422 | Simulation | |
| IME-465 | Human-Computer Interaction and Interface Design | |
| IME-471 | Quality Control | |
| IME-473 | Design of Experiments | |
| IME-476 | Lean Six Sigma | |
| MECH-312 | Mechanical Component Design I | |
| MECH-482 | Mechanics and Design Simulation of Fiber-Reinforced Composite Materials | |
| ENGR-490 | Senior Multidisciplinary Engineering Design Project | 4 |
| Total Credit Hours | | 52 |

Mechatronic Systems Concentration

| Code | Title | Credit Hours |
|------------------------------|---|--------------|
| MATH-204 | Differential Equations & Laplace Transforms | 4 |
| MATH-305 | Numerical Methods and Matrices | 4 |
| EE-320 & EE-321 | Electronics I and Electronics I Laboratory | 4 |
| EE-338 | Discrete-Time Signals and Systems | 4 |
| CE-210 | Intro to Digital Systems Design | 4 |
| CE-320 | Intro to Microcomputers | 4 |
| MECH-211 | Circuits and Mechatronics | 4 |
| MECH-311 | Mechatronics Systems Design | 4 |
| MECH-330 & MECH-331 | Dynamic Systems with Vibrations and Dynamic Sys w Vibrations Lab | 4 |
| MECH-430 & MECH-431 | Dynamic Systems with Controls and Dynamic Systems with Controls Lab | 4 |
| Select Two of the Following: | | 8 |
| CE-442 | Mobile Robotics | |

| | | |
|---------------------------|---|-----------|
| CE-452 | Artificial Intelligence for Autonomous Driving | |
| CE-454 | Computer Vision for Autonomous Driving | |
| CE-472 | VR Systems: Modeling & Control | |
| CE-484 | Internet of Things (IoT) | |
| EE-336 | Continuous-Time Signals and Systems | |
| EE-421 | Energy Storage Systems with EV Applications | |
| EE-434 | Digital Signal Processing | |
| IME-408 | Industrial Robotics | |
| IME-412 | Applied Control Systems Design | |
| ENGR-490 | Senior Multidisciplinary Engineering Design Project | 4 |
| Total Credit Hours | | 52 |

Robotic Systems Concentration

| Code | Title | Credit Hours |
|------------------------------|---|--------------|
| MATH-204 | Differential Equations & Laplace Transforms | 4 |
| MATH-305 | Numerical Methods and Matrices | 4 |
| EE-320 & EE-321 | Electronics I and Electronics I Laboratory | 4 |
| EE-338 | Discrete-Time Signals and Systems | 4 |
| CE-210 | Intro to Digital Systems Design | 4 |
| CE-320 | Intro to Microcomputers | 4 |
| CE-420 | Microcomputer Systems | 4 |
| CE-426 | Real-Time Embedded Systems | 4 |
| CE-442 | Mobile Robotics | 4 |
| IME-408 | Industrial Robotics | 4 |
| Select Two of the Following: | | 8 |
| CE-452 | Artificial Intelligence for Autonomous Driving | |
| CE-454 | Computer Vision for Autonomous Driving | |
| CE-472 | VR Systems: Modeling & Control | |
| CE-484 | Internet of Things (IoT) | |
| EE-421 | Energy Storage Systems with EV Applications | |
| EE-434 | Digital Signal Processing | |
| EE-336 | Continuous-Time Signals and Systems | |
| IME-412 | Applied Control Systems Design | |
| IME-465 | Human-Computer Interaction and Interface Design | |
| ENGR-490 | Senior Multidisciplinary Engineering Design Project | 4 |
| Total Credit Hours | | 52 |

Engineering Management Concentration

| Code | Title | Credit Hours |
|----------|--|--------------|
| MATH-350 | Financial Mathematics | 4 |
| IME-321 | Operations Research - Deterministic Models | 4 |

| | | |
|-------------------------------|--|-----------|
| IME-332 | Engineering Statistics | 4 |
| IME-452 | Production System Design | 4 |
| IME-453 | Supply Chain Design | 4 |
| IME-564 | Ethics and Practice of Engineering | 4 |
| Select one of the following | | 4 |
| IME-471 | Quality Control | |
| IME-476 | Lean Six Sigma | |
| Select Five of the following: | | 20 |
| BUSN-303 | New Venture Creation: Entrepreneurship | |
| BUSN-304 | Innovation Development | |
| BUSN-331 | Financial Management | |
| BUSN-402 | Business Law | |
| MGMT-205 | Organizational Behavior | |
| MGMT-419 | Project Management | |
| MGMT-424 | Data Visualization | |
| MGMT-465 | Strategic Management | |
| MGMT-479 | Leadership | |
| ENGR-490 | Senior Multidisciplinary Engineering Design Project | 4 |
| Total Credit Hours | | 52 |

| Course | Title | Credit Hours |
|--------|-------|--------------|
|--------|-------|--------------|

Freshman**Freshman I**

| | | |
|-----------------------|--|---|
| CILE-101 | First Year Foundations | 1 |
| COMM-101 | Rhetoric & Writing | 4 |
| CHEM-135 | Principles of Chemistry | 3 |
| CHEM-136 | Principles of Chemistry Lab | 1 |
| MATH-101 | Calculus I | 4 |
| IME-100 or ECE-100 | Interdisciplinary Design and Manufacturing or Principles of Electrical and Computer Engineering | 4 |

| | |
|---------------------|-----------|
| Credit Hours | 17 |
|---------------------|-----------|

Freshman II

| | | |
|-----------------------|--|---|
| LA-201 | Sophomore Seminar: Exploring the Human Condition | 4 |
| MATH-102 | Calculus II | 4 |
| PHYS-114 | Newtonian Mechanics | 3 |
| PHYS-115 | Newtonian Mechanics Laboratory | 1 |
| IME-100 or ECE-100 | Interdisciplinary Design and Manufacturing or Principles of Electrical and Computer Engineering | 4 |

| | |
|---------------------|-----------|
| Credit Hours | 16 |
|---------------------|-----------|

Sophomore**Sophomore I**

| | | |
|----------|---------------------------|---|
| ECON-201 | Economic Principles | 4 |
| ECE-101 | MATLAB and C Programming | 4 |
| MATH-203 | Multivariate Calculus | 4 |
| PHYS-224 | Electricity and Magnetism | 3 |

| | | |
|---------------------|--------------------------------------|-----------|
| PHYS-225 | Electricity and Magnetism Laboratory | 1 |
| Credit Hours | | 16 |

Sophomore II

| | | |
|--------------------------|--|-----------|
| EE-210 | Circuits I | 3 |
| EE-211 | Circuits I Lab | 1 |
| IME-200 | Introduction to Industrial Engineering | 4 |
| MECH-210 | Statics | 4 |
| CONCENTRATION COURSE ONE | | 4 |
| Credit Hours | | 16 |

Junior**Junior I**

| | | |
|--|----------------------------|-----------|
| MATH-258 | Probability and Statistics | 4 |
| MECH-310 | Dynamics | 4 |
| CONCENTRATION COURSE TWO | | 4 |
| CONCENTRATION COURSE THREE | | 4 |
| Advanced Humanities or Social Science Elective | | 4 |
| Credit Hours | | 20 |

Junior II

| | | |
|--|-----------------------|-----------|
| IME-351 | Engineering Economics | 4 |
| CONCENTRATION COURSE FOUR | | 4 |
| CONCENTRATION COURSE FIVE | | 4 |
| CONCENTRATION COURSE SIX | | 4 |
| Advanced Humanities or Social Science Elective | | 4 |
| Credit Hours | | 20 |

Senior**Senior I**

| | | |
|--|--|-----------|
| CONCENTRATION COURSE SEVEN | | 4 |
| CONCENTRATION COURSE EIGHT | | 4 |
| CONCENTRATION COURSE NINE | | 4 |
| Free Elective | | 4 |
| Advanced Humanities or Social Science Elective | | 4 |
| Credit Hours | | 20 |

Senior II

| | | |
|-----------------------------|---------------------------------|---|
| CONCENTRATION COURSE TEN | | 4 |
| CONCENTRATION COURSE ELEVEN | | 4 |
| Math/Science Elective | | 4 |
| LA-489 | Sr. Seminar: Leadership, Ethics | 4 |

| | |
|---------------------|-----------|
| Credit Hours | 16 |
|---------------------|-----------|

Senior III

| | | |
|--|--|---|
| CONCENTRATION COURSE TWELVE | | 4 |
| Advanced Humanities or Social Science Elective | | 4 |
| Free Elective | | 4 |
| ENGR-490 | Senior Multidisciplinary Engineering Design Project | 4 |

| | |
|---------------------|-----------|
| Credit Hours | 16 |
|---------------------|-----------|

Any Term

| | | |
|------------------------|--|----------|
| CILE-400 & CILE-401 | Undergraduate Thesis Initiation and Undergraduate Thesis Completion | 4 |
| Credit Hours | | 4 |

| | |
|---------------------------|------------|
| Total Credit Hours | 161 |
|---------------------------|------------|