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UNDERGRADUATE CATALOG

At Kettering University, students major in experience through its unique and innovative cooperative education model. Students split their time between 11-week academic terms and 12-week co-op terms. This allows students to immediately apply what they learn in the classroom and labs at their co-op employment position and apply what they've learned at their co-op to the classroom and labs.

All aspects of learning are investigated and integrated to create an ongoing and all-encompassing educational journey. Each semester, whether in the classroom or at their co-op, students gain the valuable experience needed to graduate and earn employment in their desired field. They will graduate with 2.5 years of job experience in addition to their academic degree.

The Kettering track record speaks for itself. Alumni have gone on to became founders, CEOs, CFOs, CIOs, and vice presidents of companies such as: Merrill Lynch, General Motors, Walmart, Gap, FedEx, Indy Motor Speedway, Detroit Labs, Hurley Medical Center, Biomet Inc., Gibson Guitars, The Walt Disney Company, Salesforce, and The Weather Company, just to name a few.

These alumni came to Kettering at different times and pursued different degrees, but one thing they have in common is that they were prepared to be leaders, entrepreneurs, and intrapreneurs. Their success was #KetteringBuilt.

Click here for more information about admission requirements and deadlines.

About the Catalog

The online Kettering University catalog (Undergraduate, Graduate, Kettering University Online) reflects current academic policies, procedures, degree offerings, course descriptions, and other pertinent information. This digital version of the catalog is the official catalog of the University. The printed catalog is no longer the official catalog of the University, and in the case of any difference between the printed catalog and the online catalog, University officials will be guided by the online catalog.

The catalog should not be considered a binding contract between Kettering University and students, and the University reserves the right to make changes in curricula, degree requirements, course offerings, or academic policies at any time.

2021-2022 Academic Calendar

This calendar also exists as a downloadable .pdf file on Kettering University's Academic Calendars Webpage. **Kettering University Online does not use this calendar.**

Summer 2021

Date	Event
July 8	A-section Convocation
July 8-11	New Student Orientation
July 12	Classes Begin
July 16 (Noon)	Last Day to add or drop courses for the term
August 8	Last Day for Course Withdrawal for Partial Refund
August 23 (Noon)	Undergraduate Student Midterm Grades Due
August 29	Last Day for Undergraduate Course Withdrawal - No Refund
September 3-6	Labor Day Break (no classes)
September 19	Last Day for Graduate Course Withdrawal - No Refund
September 21	Last Day of Classes (follow Friday schedule)
September 22	Reading Day (no classes)
September 23-25	Final Exam Period
September 25	Term Ends
September 27-October 1	Grading, Assessment & Professional Development for Faculty
October 1 (Noon)	Final Grades Due From Instructors. Final grade processing for the term will be completed within 2-3 business days.

Fall 2021

Date	Event
September 30	B-section Convocation
September 30-October 3	New Student Orientation
October 4	Classes Begin
October 8 (Noon)	Last Day to Add or Drop Courses
October 31	Last Day for Course Withdrawal for Partial Refund
November 15 (Noon)	Undergraduate Student Midterm Grades Due
November 21	Last Day for Undergraduate Course Withdrawal - No Refund
November 25-26	No classes
December 12	Last Day for Graduate Course Withdrawal - No Refund
December 13-14	Last Day of Classes (follow Thursday/Friday schedule)
December 15	Reading Day (no classes)
December 16-18	Final Exam Period
December 18	Term Ends
December 20-24	Grading, Assessment & Professional Development for Faculty
January 4, 2022 (Noon)	Final Grades Due From Instructors. Final grade processing for the term will be completed within 2-3 business days.

Winter 2022

Date	Event
January 10	Classes Begin
January 14 (Noon)	Last Day to Add or Drop Courses
January 17	Dr. Martin Luther King Jr. Day - University Closed
February 6	Last Day for Course Withdrawal for Partial Refund
February 21 (Noon)	Undergraduate Student Midterm Grades Due
February 27	Last Day for Undergraduate Course Withdrawal - No Refund
March 4	No classes
March 20	Last Day for Graduate Course Withdrawal - No Refund
March 22	Last Day of Classes (follow Friday schedule)
March 23	Reading Day (no classes)
March 24-26	Final Exam Period

March 26	Term Ends
March 28-April 1	Grading, Assessment & Professional Development for Faculty
April 1 (Noon)	Final Grades Due From Instructors. Final grade processing for the term will be completed within 2-3 business days.

Spring 2022

Date	Event
April 4	Classes Begin
April 8 (Noon)	Last Day to Add or Drop Courses
May 1	Last Day for Course Withdrawal for Partial Refund
May 16 (Noon)	Undergraduate Student Midterm Grades Due
May 22	Last Day for Undergraduate Course Withdrawal - No Refund
May 30	Memorial Day - No Classes
June 12	Last Day for Graduate Course Withdrawal - No Refund
June 13	Last day of classes
June 14	Reading Day (no classes)
June 15-17	Final Exam Period
June 17	Term Ends
June 18	Commencement
June 20-24	Grading, Assessment & Professional Development for Faculty
June 24 (Noon)	Final Grades Are Due From Instructors. Final grade processing for the term will be completed within 2-3 business days.

Academic Programs

Baccalaureate Degree Programs

***New students will not be accepted into these programs effective October 5, 2021.**

1. Bachelor of Science in Applied Biology (p. 27)*
2. Bachelor of Science in Applied Mathematics (p. 29)*
   Concentrations:
   - Actuarial Science
   - Applied Statistics
   - Applied and Computational Mathematics
   - Mathematical Biology
3. Bachelor of Science in Applied Physics (p. 33)*
   Minors:
   - Acoustics
   - Applied Optics
   - Materials Science
   - Medical Physics
4. Bachelor of Science in Biochemistry (p. 36)*
5. Bachelor of Science in Chemical Engineering (p. 7)
6. Bachelor of Science in Chemistry (p. 38)*
7. Bachelor of Science in Computer Engineering (p. 10)
8. Bachelor of Science in Computer Science (p. 41)
   Concentrations:
   - Computer Gaming
   - Cybersecurity
9. Bachelor of Science in Electrical Engineering (p. 12)
10. Bachelor of Science in Engineering (p. 14)
    Concentrations:
    - Manufacturing Systems
    - Mechatronics Systems
    - Robotic Systems
    - Engineering Management
11. Bachelor of Science in Engineering Physics (p. 43)
    Minors:
    - Acoustics
    - Applied Optics
    - Materials Science
    - Medical Physics
12. Bachelor of Science in Industrial Engineering (p. 17)
13. Bachelor of Science in Management (p. 47)
    Concentrations:
    - Innovation and Entrepreneurship
    - Sustainable Solutions for Enterprise
    - Supply Chain and Logistics Management
    - Business Analytics
    - Technology
14. Bachelor of Science in Mechanical Engineering (p. 20)
    Concentrations:
    - Alternative Energy
    - Automotive Engineering Design
    - Bio-engineering Applications
    - Machine Design & Advanced Materials

Course of Study

1. Pre-Med (p. 46)

Minors (*These minors cannot be added after October 5, 2021)

1. Acoustics (p. 50)
2. Applied and Computational Mathematics (p. 50)
3. Business (p. 51)
4. Computer Engineering (p. 51)
5. Computer Gaming (p. 51)
6. Computer Science (p. 51)
7. Cybersecurity (p. 52)
8. Economics (p. 52)
9. Electrical Engineering (p. 52)
10. History (p. 52)*
11. Innovation and Entrepreneurship (p. 52)
12. International Studies (p. 53)*
13. Literature (p. 53)*
14. Physics (p. 53)
15. Pre-Law (p. 54)*
16. Statistics (p. 54)

College of Engineering

Craig J. Hoff, Ph.D., P.E.

Dean of the College of Engineering
3-105 AB, 810-762-9856
coe@kettering.edu

The College of Engineering is home to the Departments of Chemical Engineering, Electrical and Computer Engineering, Industrial and Manufacturing Engineering and Mechanical Engineering. Programs offered through the college focus on a variety of subject areas including embedded computer systems, signal process, control systems, robotics, manufacturing and human processes, safety, bioengineering, automotive design, alternative energy and much more.

Academic Programs

Chemical Engineering (p. 7)

Kettering offers one of only six ABET accredited chemical engineering programs in Michigan and it is definitely one of the best. Our faculty are not only outstanding, externally recognized researchers, they are also dedicated to teaching and offer a curriculum that is cutting edge, hands-on and relevant to solving real word problems in a variety of industries. Kettering Chemical Engineering students have a variety of co-op options in the automotive industry, the energy industry and the chemical industry and they can also apply to do sponsored research on campus for their co-op term, working on graduate level research alongside faculty mentors.

Computer Engineering (p. 10)

Computers are embedded in an incredible range of modern products: cell phones, cameras, games, appliances, cars, airplanes, spacecraft, medical and military equipment—and that means just about every industry needs computer engineers. And there's no better place to learn how to lead the pack than Kettering. Small classes, professors who love to teach, state-of-the art labs, co-op and experiential learning opportunities that starts in your first year—these are a few of the reasons to choose Kettering for computer engineering

Electrical Engineering (p. 12)

Electrical engineers pioneer novel solutions, design faster systems, and maximize reliability and safety. And there's no better place to begin your EE career than Kettering. Small classes, state-of-the-art labs, co-op and experiential learning opportunities —these are a few of the reasons to choose Kettering for electrical engineering.

Engineering

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 or Robotic Systems.

Industrial Engineering (p. 17)

Virtually every organization: banks, the military, theme parks, airlines, restaurants, retail companies, manufacturers, software companies, even hospitals, need industrial engineers to find new ways to improve quality, save money, and increase productivity. And there's no better place to launch your career as an expert in innovation than Kettering. Small classes, state-of-the-art labs, co-op and experiential learning opportunities—it's no surprise that U.S. News & World Report has ranked us at the top for fourteen straight years.

Mechanical Engineering (p. 20)

Organizations everywhere need innovative MEs who can design smarter, faster, more fuel-efficient, and more cost-effective machines. And there's no better place to start your career as an ME than Kettering. Small classes, state-of-the-art labs, co-op and experiential learning opportunities that start in your first year—it's no surprise that U.S. News & World Report consistently ranks us as one of the nation's top programs.

Minors

Computer Engineering (p. 51)
Electrical Engineering (p. 52)

Dual Majors

The department heads of the programs have agreed upon a curriculum that satisfies all requirements for the following dual majors . Dual major contracts are available in either of the listed department offices. Programs not listed require approval of the appropriate department head(s).

- Computer Engineering & Computer Science
- Electrical Engineering & Computer Science
- Electrical Engineering & Computer Engineering
- Industrial Engineering & Business Administration
- Mechanical Engineering & Electrical Engineering
- Mechanical Engineering & Applied Physics
- Mechanical Engineering & Industrial Engineering

Chemical Engineering

Home Department: Chemical Engineering

Department Head (Acting):

Susan Farhat, Ph.D.

Program Overview

Chemical engineers apply the principles of chemistry, math, and physics to the design and operation of large-scale chemical manufacturing processes. They translate processes developed in the lab into practical applications for the production of products such as plastics, medicines, detergents, and fuels; design plants to maximize productivity and minimize costs; and evaluate operations for performance and product quality.

Chemical Engineers work in very diverse industries including petrochemicals, biotechnology, pharmaceuticals, alternative energy, food, health, automotive, aerospace, and the environment. Chemical Engineers have a broad knowledge of engineering science and environmental regulations, and as a consequence are apt at managing projects of significant proportions. Chemical Engineers have an integrated approach towards systems and understand the complete process and its critical components. Chemical engineers affect or control the production of almost every article manufactured on an industrial scale.

Kettering University's Bachelor of Science in Chemical Engineering is a strong interdisciplinary program which draws on the strengths of our exceptional faculty, curricula, laboratories, and unique co-op component.

The Chemical Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

Program Educational Objectives

The Chemical Engineering program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in chemical engineering or a related field. In particular, all graduates of the Chemical Engineering program will:

- Be employed or pursuing an advanced degree in the field of chemical engineering or other related disciplines.
- Be productive members of interdisciplinary teams.
- Assume leadership positions in their industry, their continuing education, or in their communities, as their careers develop.
- Continue their professional development and engage in the life-long learning necessary for a sustainable career.

Chemical 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Basic Sciences		
Select one of the following:		4
CHEM-137 & CHEM-136	General Chemistry I and Principles of Chemistry Lab	
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	
CHEM-237 & CHEM-238	General Chemistry II and General Chemistry II Lab	4
CHEM-345 & CHEM-346	Organic Chemistry I and Organic Chemistry I Lab	6
CHEM-347	Organic Chemistry II	4
Advanced Chemistry Elective & Lab [3]		7
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
	Credit Hours Subtotal:	*33*
Mathematics		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
MATH-204	Differential Equations & Laplace Transforms	4
MATH-258	Probability and Statistics	4
	Credit Hours Subtotal:	*20*
Engineering Topics		
CHME-100	Introduction to Chemical Engineering	4
CHME-200	Mass & Energy Balance	4
CHME-210	Chemical Engineering Thermodynamics	4
CHME-225	Computing in Chemical Engineering	2
CHME-310	Fluid Dynamics and Heat Transfer	4
CHME-325	Fluid Dynamics and Heat Transfer Lab	2
CHME-330	Mass Transfer and Separations	4
CHME-350	Reaction Engineering	4
CHME-360	Applications of Chemical Engineering	4
CHME-425	Separations, Reactions, and Prototyping Lab	3
CHME-430	Process Controls	4
CHME-440	Senior Chemical Engineering Design I	4
CHME-480	Chemical Engineering Capstone	4
Chemical Engineering Elective		4
EE-212	Applied Electrical Circuits	3
MECH-231L	Signals for Mechanical Systems Lab	1
	Credit Hours Subtotal:	*55*
Electives		
Technical Electives [4]		8
Free Electives		8
	Credit Hours Subtotal:	*16*
Undergraduate Thesis		
CILE-400	Culminating Undergraduate Experience: Thesis [5]	4

(Minimum) Total Credits Required for Program: 161[2]

[2] The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Chemical Engineering majors must meet the general educational requirements and their program's requirements for a minor or concentration.

[3] Advanced Chemistry Elective/Lab must be numbered 300 or higher and cannot be Organic Chemistry I or Organic Chemistry II, since these are are already required courses.

[4] A minimum of eight hours of technical electives are required for the Chemical Engineering Degree. A technical elective may be any course numbered 300-599 in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. Other courses may be used but require approval by the Department Head of Natural Sciences.

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

Representative Program [1,2]

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-137 or CHEM-135	General Chemistry I or Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
CHME-100	Introduction to Chemical Engineering	4
COMM-101	Rhetoric & Writing	4
MATH-101	Calculus I	4
	Credit Hours	17
Freshman II		
CHEM-237	General Chemistry II	3
CHEM-238	General Chemistry II Lab	1
ECON-201	Economic Principles	4
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
	Credit Hours	16
Sophomore I		
CHEM-345	Organic Chemistry I	4
CHEM-346	Organic Chemistry I Lab	2
CHME-200	Mass & Energy Balance	4
MATH-203	Multivariate Calculus	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
	Credit Hours	18
Sophomore II		
CHEM-347	Organic Chemistry II	4
MATH-204	Differential Equations & Laplace Transforms	4
CHME-210	Chemical Engineering Thermodynamics	4
LS-201	Sophomore Seminar: Exploring the Human Condition	4
CHME-225	Computing in Chemical Engineering	2
	Credit Hours	18
Junior I		
CHME-310	Fluid Dynamics and Heat Transfer	4
CHME-325	Fluid Dynamics and Heat Transfer Lab	2
Advanced Humanities or Advanced Social Science Elective		4
Advanced Chemistry Elective & Lab		7
	Credit Hours	17
Junior II		
CHME-330	Mass Transfer and Separations	4
CHME-350	Reaction Engineering	4
CHME-360	Applications of Chemical Engineering	4
Advanced Humanities or Advanced Social Science Elective		4
	Credit Hours	16
Senior I		
Advanced Chemical Engineering Elective		4
CHME-430	Process Controls	4
EE-212	Applied Electrical Circuits	3
MECH-231L	Signals for Mechanical Systems Lab	1
Technical Elective		4
Adv. COMM, HUMN, or SSCI Elective		4
	Credit Hours	20
Senior II		
CHME-425	Separations, Reactions, and Prototyping Lab	3
CHME-440	Senior Chemical Engineering Design I	4
MATH-258	Probability and Statistics	4
Adv. COMM, HUMN, or SSCI Elective		4
Free Elective		4
	Credit Hours	19
Senior III		
CHME-480	Chemical Engineering Capstone	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Technical Elective		4
Free Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161[1]

[1] The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Chemical Engineering majors must meet the general educational requirements and their program's requirements for a minor or concentration.

[2] Humanities and Social Science electives must be selected from approved 300 or 400 level courses, including one Humanities course and one Social Science course.

[3] Advanced Chemistry Elective/Lab must be numbered 300 or higher and cannot be Organic Chemistry I or Organic Chemistry II, since these are are already required courses.

[4] A minimum of 8 hours of technical electives are required for the Chemical Engineering Degree. A technical elective may be any course numbered 300-599 in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. Other courses may be used but require approval by the Department Head of Chemistry/Biochemistry.

Computer Engineering

Home Department: Electrical and Computer Engineering

Department Head:

Mark G. Thompson, Ph.D.
Room 2-703 AB, 810-762-7900
ece@kettering.edu

Program Overview

Computer engineering is a branch of engineering concerned with the design, development, and application of computer systems. The Bachelor of Science in Computer Engineering (CE) program at Kettering University focuses on embedded-computer systems, in which a computer chip, module, or circuit board is built into a larger product or system. Examples of products containing embedded computers include "smart" phones, MP3 players, GPS navigation systems, hybrid and electric vehicle drive systems, unmanned vehicles, medical diagnostic devices, and manufacturing systems. Embedded systems applications span a wide range of industry sectors including consumer electronics, internet technology, computer hardware, automotive systems, and automated manufacturing. Computer engineers today can find employment in all these industries, and many more.

The Computer Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

Program Educational Objectives

The Computer Engineering Program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in computer engineering or a related field. In particular, graduates of the Computer Engineering Program will:

- Be employed or pursuing an advanced degree in the field of computer engineering or other related disciplines.
- Be productive members of interdisciplinary teams.
- Assume leadership positions in their industry, their continuing education, or in their communities, as their careers develop.
- Continue their professional development and engage in the life-long learning necessary for a sustainable career.

The Computer Engineering program is designed to meet its objectives through its curriculum, experiential learning including cooperative education, and co-curricular activities sponsored by the department and the university.

The curriculum includes a strong sequence of mathematics and basic science courses that provides the solid foundation in these areas that is common to all engineering programs at Kettering University. Engineering design and basic engineering concepts from a variety of disciplines are introduced in the freshman year in IME-100. Basic and practical computer programming and problem solving are introduced, also in the freshman year, in ECE-101.

The "core" curriculum covers hardware design, software development in both assembly and higher-level languages, computer networking, and embedded computer applications through a combination of computer engineering, electrical engineering, and computer science courses. Every course in the core curriculum includes a strong laboratory experience, a hallmark of the program that both enhances students' learning and hones their abilities to apply technology effectively in the workplace. A flexible selection of electives allow students to deepen their knowledge in specific areas or applications of computer engineering, or to broaden their background through dual majors or minors, or simply well chosen combinations of courses that meet their individual educational goals.

The culminating experience in the curriculum takes place in CE-490, which gives students experience working in a team environment to complete a large engineering project that builds on the knowledge and skills they have gained in their coursework.

The curriculum is supported by modern lab facilities for digital systems, embedded systems, computer networks, virtual reality systems, logic systems, mobile robotics, mobile application development, circuits, and electronics.

Computer 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Mathematics and Basic Science		
CS-211	Discrete Mathematics	4
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
or MATH-102H	Calculus II - Honors	

MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
or MATH-203H	Multivariate Calculus - Honors	
MATH-204	Differential Equations & Laplace Transforms	4
or MATH-204H	Differential Equations and Laplace Transforms - Honors	
MATH-258	Probability and Statistics	4
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
Math/Science Electives		8
	Credit Hours Subtotal:	*40*
Engineering Topics		
CE-210	Digital Systems I	4
CE-320	Microcomputers I	4
CE-420	Microcomputers II	4
CE-422	Computer Architecture and Organization	4
CE-426	Real-Time Embedded Systems	4
CE-480	Computer Networks	4
CE-490	Senior CE Design Project	4
ECE-101	MATLAB and C Programming	4
EE-210 & EE-211	Circuits I and Circuits I Lab	4
EE-320 & EE-321	Electronics I and Electronics I Laboratory	4
IME-100	Interdisciplinary Design and Manufacturing	4
Computer Engineering Electives		8
Electrical Engineering Elective		4
Engineering Elective		4
	Credit Hours Subtotal:	*60*
Computer Science		
CS-101	Computing & Algorithms I	4
CS-102	Computing & Algorithms II	4
Computer Science Elective		4
	Credit Hours Subtotal:	*12*
Electives		
Free Electives		8
Technical Elective		4
	Credit Hours Subtotal:	*12*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis [2]	4
	Credit Hours Subtotal:	*4*
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161

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

Electives

Computer Engineering Electives

A computer engineering elective may be any course with a CE prefix.

Computer Science Electives

A computer science elective may be any course with a CS prefix.

Electrical Engineering Elective

The electrical engineering elective may be any course with an EE prefix, *except* EE-212.

Engineering Elective

The engineering elective may be any course with a CE, CHME, EE, EP, IME, or MECH, prefix, *except* EE-212 and EP-235.

Free Elective

COMM-435 and MATH-100 are **not** accepted for free elective credit.

Math/Science Electives

A math/science elective may be any course with a BIOL, CHEM, EP, MATH or PHYS prefix, *except* MATH-100 and EP-235.

Technical Elective

The technical elective may be any course with an BIOL, CE, CHEM, CHME, CS, EE, EP, IME, MATH, MECH, or PHYS prefix, except EE-212, EP-235, and MATH-100.

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
COMM-101	Rhetoric & Writing	4
IME-100	Interdisciplinary Design and Manufacturing	4
MATH-101	Calculus I	4
Math/Science Elective		4
	Credit Hours	17
Freshman II		
ECE-101	MATLAB and C Programming	4
ECON-201	Economic Principles	4
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
	Credit Hours	16
Sophomore I		
CE-210	Digital Systems I	4
LS-201	Sophomore Seminar: Exploring the Human Condition	4
MATH-203	Multivariate Calculus	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
	Credit Hours	16
Sophomore II		
CE-320	Microcomputers I	4

EE-210	Circuits I	3
EE-211	Circuits I Lab	1
MATH-204	Differential Equations & Laplace Transforms	4
Advanced Communications Elective		4
	Credit Hours	16
Junior I		
CE-420	Microcomputers II	4
CS-101	Computing & Algorithms I	4
EE-320	Electronics I	3
EE-321	Electronics I Laboratory	1
MATH-258	Probability and Statistics	4
Advanced Humanities Elective		4
	Credit Hours	20
Junior II		
CE-422	Computer Architecture and Organization	4
CE-426	Real-Time Embedded Systems	4
CS-102	Computing & Algorithms II	4
CS-211	Discrete Mathematics	4
Advanced Social Science Elective		4
	Credit Hours	20
Senior I		
CE-480	Computer Networks	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Computer Science Elective		4
Electrical Engineering Elective		4
Math/Science Elective		4
	Credit Hours	20
Senior II		
CE-490	Senior CE Design Project	4
Computer Engineering Elective		4
Engineering Elective		4
Free Elective		4
	Credit Hours	16
Senior III		
Advanced COMM, Humanities or Social Science Elective		4
Computer Engineering Elective		4
Free Elective		4
Technical Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161

Electrical Engineering

Home Department: Electrical and Computer Engineering

Department Head:

Mark Thompson, Ph.D.
Room 2-703 AB, 810-762-7900
ece@kettering.edu

Program Overview

Electrical Engineering is a broad engineering discipline that integrates mathematical and scientific principles of electricity and magnetism to analyze electrical phenomena and to design electrical systems. The Electrical Engineering program prepares students for a wide range of careers involving design and implementation of electrical systems.

The Electrical Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

Program Educational Objectives

The Electrical Engineering Program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in electrical engineering or a related field. In particular, graduates of the Electrical Engineering Program will:

- Be employed or pursuing an advanced degree in the field of electrical engineering or other related disciplines.
- Be productive members of interdisciplinary teams.
- Assume leadership positions in their industry, their continuing education, or in their communities, as their careers develop.
- Continue their professional development and engage in the life-long learning necessary for a sustainable career.

The Electrical Engineering program is designed to meet its objectives through its curriculum, experiential learning including cooperative education, and co-curricular activities sponsored by the department and the university.

The curriculum includes a strong sequence of mathematics and basic science courses that provides the solid foundation in these areas that is common to all engineering programs at Kettering University. Engineering design and basic engineering concepts from a variety of disciplines are introduced in the freshman year in IME-100. Basic and practical computer programming and problem solving is introduced, also in the freshman year, in ECE-101.

The “core” curriculum include fundamental courses in electrical circuits, electronics, electrical signals and systems, electromagnetic fields and waves, digital systems, and embedded computer systems. Fully half of the courses in the core curriculum include a strong laboratory experience, which both enhances students’ learning and hones their abilities to apply technology effectively in the workplace. A flexible selection of electives allow students to deepen their knowledge in specific areas or applications of electrical engineering, or to broaden their background through dual majors or minors, or simply well chosen combinations of courses that meet their individual educational goals.

The culminating experience in the curriculum takes place in EE-490, which gives students experience working in a team environment to complete a large engineering project that builds on the knowledge and skills they have gained in their coursework.

The curriculum is supported by modern lab facilities for analog and digital circuits and electronics, electrical machines, power electronics, control systems, high-voltage studies, virtual reality systems, and embedded computer systems.

Electrical 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Mathematics and Basic Science		
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	4
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
MATH-204	Differential Equations & Laplace Transforms	4
MATH-258	Probability and Statistics	4
MATH-307	Matrix Algebra	4
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
Math/Science Elective		4
	Credit Hours Subtotal:	*40*
Engineering Topics		
CE-210	Digital Systems I	4
CE-320	Microcomputers I	4
ECE-101	MATLAB and C Programming	4
EE-210 & EE-211	Circuits I and Circuits I Lab	4
EE-240	Electromagnetic Fields and Applications	4
EE-310	Circuits II	4
EE-320 & EE-321	Electronics I and Electronics I Laboratory	4
EE-336	Continuous-Time Signals and Systems	4
EE-338	Discrete-Time Signals and Systems	4
EE-432	Feedback Control Systems	4
EE-490	Senior Electrical Engineering Design Project	4
IME-100	Interdisciplinary Design and Manufacturing	4
Electrical Engineering Electives		12
Electrical or Computer Engineering Elective		4
	Credit Hours Subtotal:	*64*
Electives		
Free Electives		8
Technical Electives		12
	Credit Hours Subtotal:	*20*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis [2]	4
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161

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

Electives

Electrical Engineering Electives

An electrical engineering elective may be any course with an EE prefix, *except* EE-212. At least 8 credits of electrical engineering electives must be at the 400 level or above.

Electrical or Computer Engineering Electives

The electrical or computer engineering elective may be an electrical engineering elective or any course with a CE prefix.

Free Elective

COMM-435 and MATH-100 are NOT accepted for free elective credit.

Math/Science Elective

The math/science elective may be CS-211, or any course with a BIOL, CHEM, EP, MATH, PHYS prefix, *except* MATH-100 and EP-235.

Technical Electives

A technical elective may be any course with an BIOL, CE, CHEM, CHME, CS, EE, EP, IME, MATH, MECH or PHYS prefix, *except* EE-212, EP-235, and MATH-100.

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-135	Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
COMM-101	Rhetoric & Writing	4
IME-100	Interdisciplinary Design and Manufacturing	4
MATH-101	Calculus I	4
	Credit Hours	17
Freshman II		
ECE-101	MATLAB and C Programming	4
ECON-201	Economic Principles	4
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
	Credit Hours	16
Sophomore I		
CE-210	Digital Systems I	4
LS-201	Sophomore Seminar: Exploring the Human Condition	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
EE-240	Electromagnetic Fields and Applications	4
MATH-204	Differential Equations & Laplace Transforms	4
Advanced Communications Elective		4
	Credit Hours	16
Junior I		
EE-310	Circuits II	4
EE-320	Electronics I	3
EE-321	Electronics I Laboratory	1
EE-336	Continuous-Time Signals and Systems	4
MATH-307	Matrix Algebra	4
Advanced Social Science Elective		4
	Credit Hours	20
Junior II		
CE-320	Microcomputers I	4
EE-338	Discrete-Time Signals and Systems	4
MATH-258	Probability and Statistics	4
Advanced Humanities Elective		4
Electrical Engineering Elective		4
	Credit Hours	20
Senior I		
EE-432	Feedback Control Systems	4
Advanced Communications, Humanities, or Social Science Elective		4
Electrical or Computer Engineering Elective		4
Math/Science Elective		4
Technical Elective		4
	Credit Hours	20
Senior II		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Electrical Engineering Elective		4
Free Elective		4
Technical Elective		4
	Credit Hours	16
Senior III		
EE-490	Senior Electrical Engineering Design Project	4
Free Elective		4
Upper Level Electrical Engineering Elective		4
Technical Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161

Engineering

Home Department: Industrial and Manufacturing Engineering

Department Head:

Scott E. Grasman, Ph.D.
Room 1-700A, AB, 810-762-7948
ime@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 in 2025 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.

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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Mathematics and Basics Science		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
MATH-258	Probability and Statistics	4
CHEM-135	Principles of Chemistry	3
or CHEM-137	General Chemistry I	
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 [1]		4
	Credit Hours Subtotal:	*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	MATLAB and C Programming	4
or CS-101	Computing & Algorithms I	
EE-210	Circuits I	3
EE-211	Circuits I Lab	1
MECH-210	Statics	4
MECH-310	Dynamics	4
	Credit Hours Subtotal:	*32*
Concentration - See Below		**52**
	Credit Hours Subtotal:	*52*
Free Electives		**8**
	Credit Hours Subtotal:	*8*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours Subtotal:	*4*
Total Credit Hours		128

Manufacturing Systems Concentration

Code	Title	Credit Hours
MATH-204	Differential Equations & Laplace Transforms	4
MATH-305	Numerical Methods and Matrices	4
MECH-100	Engineering Graphical Communication	4
MECH-212	Mechanics of Materials	4
MECH-300	Computer Aided Engineering	4
MECH-307	Materials Engineering	4
MECH-311	Introduction to Mechanical System Design	4
IME-300	Manufacturing Processes	4
Select Two of the Following:		8
IME-403	Computer Numerical Control Machining	
IME-408	Industrial Robotics	
IME-412	Applied Control Systems Design	
Select One of the Following:		4
CILE-490	Multidisciplinary Capstone	
IME-409	Computer Integrated Manufacturing	
MECH-472	CAD/CAM/CAE & Additive Manufacturing Capstone Design	
Select Two of the Following:		8
CE-472	VR Systems: Modeling & Control	
CE-484	Internet of Things (IoT)	
CS-455	Computer and Network Security	
IME-361	Lean Work Design	
IME-422	Simulation	

IME-465	Human-Computer Interaction and Interface Design	
IME-471	Quality Assurance	
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	
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	Digital Systems I	4
CE-320	Microcomputers I	4
CE-426	Real-Time Embedded Systems	4
MECH-311	Introduction to Mechanical System 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 One of the following		4
CILE-490	Multidisciplinary Capstone	
IME-409	Computer Integrated Manufacturing	
Select Two of the Following:		8
CE-442	Introduction to Mobile Robotics	
CE-452	Artificial Intelligence for Autonomous Driving	
CE-454	Computer Vision for Autonomous Driving	
CE-472	VR Systems: Modeling & Control	
EE-421	Energy Storage Sys w/ EV App	
EE-434	Digital Signal Processing	
EE-336	Continuous-Time Signals and Systems	
IME-408	Industrial Robotics	
IME-412	Applied Control Systems Design	
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	Digital Systems I	4
CE-320	Microcomputers I	4
CE-426	Real-Time Embedded Systems	4
CE-442	Introduction to Mobile Robotics	4
IME-408	Industrial Robotics	4
MECH-311	Introduction to Mechanical System Design	4
Select One of the following		4
CILE-490	Multidisciplinary Capstone	
IME-409	Computer Integrated Manufacturing	
Select Two of the Following:		8
CE-420	Microcomputers II	
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 Sys w/ EV App	
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	
Total Credit Hours		52

Engineering Management Concentration

Code	Title	Credit Hours
MATH-350	Financial Mathematics	4
IME-321	Operations Research I - Deterministic Models	4
IME-332	Engineering Statistics I - Statistical Inference and Regression	4
IME-452	Production System Design	4
IME-453	Tools for Managing the Supply Chain	4
Select one of the following		4
IME-471	Quality Assurance	
IME-476	Lean Six Sigma	
IME-564	Ethics and Practice of Engineering	4
Select One of the following		4
CILE-490	Multidisciplinary Capstone	
IME-454	Senior Design Project	
Select Five of the following:		20
BUSN-303	New Venture Creation: Entrepreneurship	
BUSN-304	Intrapreneurship and 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	
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		
LS-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
MATH-203	Multivariate Calculus	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
MECH-210	Statics	4
	Credit Hours	16
Sophomore II		
EE-210	Circuits I	3
EE-211	Circuits I Lab	1
IME-200	Introduction to Industrial Engineering	4
MECH-310	Dynamics	4
CONCENTRATION COURSE ONE		4
	Credit Hours	16
Junior		
Junior I		
ECE-101	MATLAB and C Programming	4
IME-351	Engineering Economics	4
MECH-311	Introduction to Mechanical System Design (Advanced Communications Elective)	4
CONCENTRATION COURSE TWO		4
Advanced Communications Elective		4
	Credit Hours	20
Junior II		
MATH-258	Probability and Statistics	4
CONCENTRATION COURSE THREE		4
CONCENTRATION COURSE FOUR		4
CONCENTRATION COURSE FIVE		4
Advanced Humanities Elective		4
	Credit Hours	20
Senior		
Senior I		
CONCENTRATION COURSE SIX		4
CONCENTRATION COURSE SEVEN		4
CONCENTRATION COURSE EIGHT		4
Free Elective		4
Advanced SSCI/COMM/HUMN Elective		4
	Credit Hours	20
Senior II		
CONCENTRATION COURSE NINE		4
CONCENTRATION COURSE TEN		4
CONCENTRATION COURSE ELEVEN		4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
	Credit Hours	16
Senior III		
CONCENTRATION COURSE TWELVE		
Advanced SSCI Elective		4
Math/Science Elective		4
Free Elective		4
	Credit Hours	12
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	157

Industrial Engineering

Home Department: Industrial and Manufacturing Engineering

Department Head:

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Room 1-700A, AB, 810-762-7948
ime@kettering.edu

Program Overview

The Department of Industrial & Manufacturing Engineering offers a Bachelor of Science in Industrial Engineering (IE). The department emphasizes development of the student's ability to analyze operational requirements and to design processes that systematically integrate customer needs, technology, and economic and social factors for industrial, service, and governmental organizations.

Industrial Engineering is a discipline known for its breadth of scope and application. The preparation received in industrial engineering is valuable to virtually all industrial, commercial and governmental entities that are engaged in manufacture of a product or provision of a service. Graduates

typically are responsible for the design of integrated systems at one of two levels.

The first level may be described as the “human activity systems” level and is concerned with design of the physical workplace at which human activity occurs. The second level, the “management control system” level, is concerned with planning, measuring and controlling the activities of the organization for optimal utilization of its resources. The use of computers and the development of the associated software are integral parts of both levels of systems design. Industrial Engineers are concerned with systematic design and integration of people, raw materials, facilities, information, and energy to produce safe and quality products and/or services at an affordable cost to the consumer.

The Industrial Engineering curriculum develops the engineering theory and the practical background and people skills necessary to design optimal productive work and management control systems for an organization. The Industrial Engineering curriculum is designed to provide the student with a sound theoretical background while being oriented toward applied problem solving. Classroom instruction is backed by hands-on application in well-equipped laboratory facilities including Applied Control Systems, Work Design, Human Factors (Ergonomics), Manufacturing Materials and Processes, Methods Analysis, and Simulation Modeling.

The Industrial Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

Program Educational Objectives

Within a few years of graduation, Bachelor of Science in Industrial Engineering graduates will have attained:

- The ability to apply current principles of Industrial Engineering to solve complex, real-world problems and overcome challenges facing themselves, their organizations, and the community.
- Exemplary teamwork and leadership skills, growing professionally and increasing their level of responsibility and authority.
- The ability and motivation to expand their knowledge and technological skillset throughout their lives and careers.

Dual Majors

Coordinated programs are available to earn both a Bachelor of Science in Industrial Engineering and a Bachelor of Science in other fields such as Applied Math, Management, Chemical Engineering, Computer Science, and Mechanical Engineering. Generally, completing such a program requires one or two additional academic terms at Kettering University. It is the student's responsibility to determine that all requirements are satisfied for both programs. The student must be advised by both programs each term.

Minors

Many academic departments offer minors (p. 50). For a list of minors see Academic Programs, Minors.

Industrial 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Mathematics and Basic Sciences		
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	4
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
Select one of the following:		4
MATH-204	Differential Equations & Laplace Transforms	
MATH-307	Matrix Algebra	
MATH-258	Probability and Statistics	4
IME-332	Engineering Statistics I - Statistical Inference and Regression	4
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
Science or Math Electives [1]		4
	Credit Hours Subtotal:	*40*
Engineering Topics		
IME-100	Interdisciplinary Design and Manufacturing	4
IME-200	Introduction to Industrial Engineering	4

IME-211	Algorithms and Computer Programming (or CS-101 or ECE-101)	4
IME-321	Operations Research I - Deterministic Models	4
IME-351	Engineering Economics	4
IME-361	Lean Work Design	4
IME-422	Simulation	4
IME-452	Production System Design	4
IME-453	Tools for Managing the Supply Chain	4
IME-454	Senior Design Project	4
MECH-100	Engineering Graphical Communication	4
MECH-210	Statics	4
	Credit Hours Subtotal:	*48*
IE Program Electives		
Select one of the following Human Factors requirements:		4
IME-462	Ergonomics	
IME-463	Safety and Human Factors	
IME-465	Human-Computer Interaction and Interface Design	
Select one of the following Manufacturing requirements:		4
IME-300	Manufacturing Processes	
IME-403	Computer Numerical Control Machining	
IME-408	Industrial Robotics	
IME-412	Applied Control Systems Design	
Select one of the following Quality & Statistics requirements:		4
IME-471	Quality Assurance	
IME-472	Introduction to Reliability and Maintainability	
IME-473	Design of Experiments	
IME-476	Lean Six Sigma	
IME Electives		8
	Credit Hours Subtotal:	*20*
Electives		
Technical Electives [2]		8
Free Electives		8
	Credit Hours Subtotal:	*16*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours Subtotal:	*4*
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161

1 The Science or Math Elective may be any course with a MATH, CHEM, PHYS or BIOL prefix except MATH-100. Students taking CHEM-135 may not take CHEM-137 as a Science Elective.

2 Technical electives include any CE, CHME, CS, ECE, EE, IME, or MECH course not already used to satisfy degree requirements. One must be 200-level or higher and one must be 300-level or higher.

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

Representative Program

Course	Title	Credit Hours
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	Interdisciplinary Design and Manufacturing	4
	Credit Hours	17
Freshman II		
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
MECH-100	Engineering Graphical Communication	4
IME-200	Introduction to Industrial Engineering	4
	Credit Hours	16
Sophomore I		
ECON-201	Economic Principles	4
MATH-203	Multivariate Calculus	4
MATH-258	Probability and Statistics	4
IME-211	Algorithms and Computer Programming	4
	Credit Hours	16
Sophomore II		
LS-201	Sophomore Seminar: Exploring the Human Condition	4
MATH-204 or MATH-307	Differential Equations & Laplace Transforms or Matrix Algebra	4
IME-351	Engineering Economics	4
IME-361	Lean Work Design	4
	Credit Hours	16
Junior I		
CILE-400	Culminating Undergraduate Experience: Thesis	4
Advanced Communications Elective		4
PHYS-224	Electricity and Magnetism (Advanced Communications Elective)	3
PHYS-225	Electricity and Magnetism Laboratory	1
MECH-210	Statics	4
IME-321	Operations Research I - Deterministic Models	4
IME-332	Engineering Statistics I - Statistical Inference and Regression (Advanced Communications Elective)	4
	Credit Hours	24
Junior II		
Advanced Humanities Elective		4
Technical Elective		4
IE Program Elective (Ergonomics, Manufacturing, or Quality & Statistics)		4

IME-452	Production System Design	4
	Credit Hours	16
Senior I		
Math or Science Elective		4
Technical Elective		4
IME-422	Simulation	4
IME-453	Tools for Managing the Supply Chain	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
	Credit Hours	20
Senior II		
Advanced SSCI/COMM/HUMN Elective		4
IE Program Elective (Ergonomics, Manufacturing, or Quality & Statistics)		4
IE Program Elective (Ergonomics, Manufacturing, or Quality & Statistics)		4
IME Elective		4
Free Elective		4
	Credit Hours	20
Senior III		
Advanced SSCI Elective		4
IME Elective		4
Free Elective		4
IME-454	Senior Design Project	4
	Credit Hours	16
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161

Mechanical Engineering

Home Department: Mechanical Engineering

Department Head:

Bassem Ramadan, Ph.D
Room 2-103 MC, 810-762-7992
me@kettering.edu (twalton@kettering.edu)

Program Overview

The Bachelor of Science in Mechanical Engineering (ME) prepares students for a broad range of careers associated with the design and implementation of mechanical systems involving the conversion, transmission, and utilization of energy. Mechanical engineering courses that provide breadth in the discipline include design, dynamics, engineering materials, thermodynamics, fluid mechanics, heat transfer, vibrations, systems analysis, and associated laboratories. Large and well-equipped laboratories in experimental mechanics, heat transfer, fluid mechanics, engines, vibrations, hydraulics, instrumentation, and automotive emissions support the mechanical engineering program.

Mechanical Engineering students may elect to customize their degree by taking a set of elective courses in a specific area; either by pursuing a Specialty within the Mechanical Engineering program or by pursuing a Minor (p. 50) with non-Mechanical Engineering programs. For more details see Mechanical Engineering Program Specialties or Minors.

Mechanical Engineering students may elect to customize their degree by taking a set of elective courses in a specific area; either by pursuing a Specialty within the ME program or by pursuing a Minor with non-ME programs. For more details see “Mechanical Engineering Program Specialties” or “Minors”.

The Mechanical Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

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.

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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Mathematics and Basic Science		
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	4
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
Select one of the following:		4
MATH-102	Calculus II	
MATH-102X	Calculus II	
MATH-102H	Calculus II - Honors	
MATH-203	Multivariate Calculus	4
or MATH-203H	Multivariate Calculus - Honors	

MATH-204	Differential Equations & Laplace Transforms	4
or MATH-204H	Differential Equations and Laplace Transforms - Honors	
MATH-305	Numerical Methods and Matrices	4
MATH-258	Probability and Statistics	4
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
Math/Science Elective [1]		4
	Credit Hours Subtotal:	*40*
Engineering Topics		
EE-212 & MECH-231L	Applied Electrical Circuits and Signals for Mechanical Systems Lab [2]	4
IME-100	Interdisciplinary Design and Manufacturing	4
MECH-100	Engineering Graphical Communication	4
MECH-210	Statics	4
MECH-212	Mechanics of Materials	4
MECH-300	Computer Aided Engineering	4
MECH-307	Materials Engineering	4
MECH-310	Dynamics	4
MECH-311	Introduction to Mechanical System Design	4
MECH-312	Mechanical Component Design I	4
MECH-320	Thermodynamics	4
MECH-322	Fluid Mechanics	4
MECH-330 & MECH-331	Dynamic Systems with Vibrations and Dynamic Sys w Vibrations Lab	4
MECH-420	Heat Transfer	4
MECH-422	Energy Systems Laboratory	4
MECH-430 & MECH-431	Dynamic Systems with Controls and Dynamic Systems with Controls Lab	4
	Credit Hours Subtotal:	*64*
Electives		
Two Free Electives [3]		8
Two Mechanical Engineering Electives [4]		8
Mechanical Engineering Senior Design Project		4
	Credit Hours Subtotal:	*20*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis [5]	4
Total Credit Hours		128

(Minimum) Total Credits Required for the Program: 161

1 Math/Science elective is described as: Any level BIOL, CHEM, MATH or PHYS that is not used to complete core degree requirements.

2 Students pursuing an Electrical Engineering minor take EE-210/EE-211 in lieu of MECH-231L/EE-212.

3 Free electives are described as: Any Kettering University course except any course that consists of an elementary nature when advanced topics have been mastered, and any course that consists of topics, which are very similar to topics which have been mastered.

4 ME electives are described as: Any 300-599 level BIOL, CE, CHEM, CHME, CS, ECE, EE, EP, IME, ISYS, MATH (except pre-calc and college math), MECH, or PHYS that is not used to complete core degree requirements. In addition, BUSN-303, BUSN-304 and MGMT-419 also qualify as M.E. Electives.

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

Mechanical Engineering Program Specialties

Students majoring in Mechanical Engineering may select a specialty consisting of 20 credit hours of courses focused in a particular area. Specialties may include both required and elective courses. First Six Semesters are common to all Mechanical Engineering Students. Senior I through Senior III representative programs are given for each specialty.

A Mechanical Engineering specialty provides students a depth of study in preparation for a career within an industrial sector and/or as a foundation for graduate study. However, the student's degree is Mechanical Engineering and the selected specialty does not prevent students from working within any industry. The primary advantage is to provide a "jump start" over mechanical engineering graduates from other schools with traditional degree programs. Courses are subject to cancellation due to low enrollment.

Alternative Energy Specialty

Code	Title	Credit Hours
MECH-421	Energy and Environmental System Design	4
MECH-426	Fuel Cell Science and Engineering	4
MECH-427	Energy and the Environment	4
MECH-428	Bio and Renewable Energy	4
MECH-445	Hybrid Electric Vehicle Propulsion	4
	Credit Hours Subtotal:	*20*

Automotive Engineering Design Specialty

Code	Title	Credit Hours
MECH-448	Vehicle Design Project	4
Select four of the following:		16
MECH-416	Introduction to Finite Element Analysis with Structural Applications	
MECH-426	Fuel Cell Science and Engineering	
MECH-440	Introduction to Internal Combustion Engines	
MECH-441	Advanced Automotive Power Systems	
MECH-442	Chassis Systems	
MECH-444	Introduction to Automotive Powertrains	
MECH-445	Hybrid Electric Vehicle Propulsion	
MECH-446	Vehicle Systems Dynamics	
MECH-450	Automotive Bioengineering: Occupant Protection and Safety	

MECH-451	Vehicular Crash Dynamics and Accident Reconstruction	
	Credit Hours Subtotal:	*20*
Other courses with the approval of the automotive faculty		

Bioengineering Application Specialty

Code	Title	Credit Hours
Required Courses		
MECH-350	Introduction to Bioengineering Applications	4
MECH-454	Bioengineering Applications Project	4
Electives		
Select three of the following:		12
BIOL-141 & BIOL-142	General Biology and General Biology Lab	
BIOL-241 & BIOL-242	Human Biology and Human Biology Lab	
BIOL-341	Anatomy and Physiology	
MECH-450	Automotive Bioengineering: Occupant Protection and Safety	
MECH-451	Vehicular Crash Dynamics and Accident Reconstruction	
PHYS-354	Medical Physics Principles	
	Credit Hours Subtotal:	*20*

Machine Design & Advanced Materials Specialty

Code	Title	Credit Hours
MECH-416	Introduction to Finite Element Analysis with Structural Applications	4
MECH-482	Mechanics and Design Simulation of Fiber-Reinforced Composite Materials	4
Two MDAM Specialty Related Electives		8
Select one of the following		4
MECH-413	Mechanical Systems Design Project	
MECH-414	Experimental Mechanics	
MECH-472	CAD/CAM/CAE & Additive Manufacturing Capstone Design	
	Credit Hours Subtotal:	*20*

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-135	Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
COMM-101	Rhetoric & Writing	4
MATH-101	Calculus I	4
MECH-100	Engineering Graphical Communication [1]	4
	Credit Hours	17
Freshman II		
IME-100	Interdisciplinary Design and Manufacturing [1]	4
LS-201	Sophomore Seminar: Exploring the Human Condition	4
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
	Credit Hours	16
Sophomore I		
ECON-201	Economic Principles	4
MATH-203	Multivariate Calculus	4
MECH-210	Statics	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
	Credit Hours	16
Sophomore II		
EE-212	Applied Electrical Circuits	3
MECH-231L	Signals for Mechanical Systems Lab	1
MATH-204	Differential Equations & Laplace Transforms	4
MECH-212	Mechanics of Materials	4
Math/Science Elective [3]		4
	Credit Hours	16
Junior I		
MATH-305	Numerical Methods and Matrices	4
MECH-307	Materials Engineering	4
MECH-311	Introduction to Mechanical System Design	4
MECH-312	Mechanical Component Design I	4
Advanced Communicatons Elective		4
	Credit Hours	20
Junior II		
MATH-258	Probability and Statistics	4
MECH-300	Computer Aided Engineering [2]	4
MECH-310	Dynamics	4
MECH-320	Thermodynamics	4
Advanced Humanities Elective		4
	Credit Hours	20
Senior I		
MECH-322	Fluid Mechanics	4
MECH-330 & MECH-331	Dynamic Systems with Vibrations and Dynamic Sys w Vibrations Lab	4
Advanced Communications, Humanities, or Social Science Elective		4
Free Elective		4
ME Elective [3]		4
	Credit Hours	20
Senior II		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
MECH-420	Heat Transfer	4
MECH-430 & MECH-431	Dynamic Systems with Controls and Dynamic Systems with Controls Lab	4

ME Elective [3]		4
	Credit Hours	16
Senior III		
MECH-422	Energy Systems Laboratory	4
Advanced Social Science Elective		4
Free Elective		4
ME Senior Design Project [4]		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis [5]	4
	Credit Hours	4
	Total Credit Hours	161

1 Approximately one-half of the students take MECH-100 Freshman I and IME-100 Freshman II, the other one-half take IME-100 Freshman I and MECH-100 Freshman II.

2 Approximately one-half of students take MECH-300 Junior II and MECH-311 Junior I, the other one-half take MECH-311 Junior II and MECH-300 Senior I.

3 Elective courses may vary in lecture and/or laboratory credits and terms from those shown. Math/Science electives are any level MATH, BIOL, CHEM, or PHYS course that is not used to complete core degree requirements.

4 ME Senior Design Projects may vary in lecture and/or laboratory credits and terms from those shown.

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

Bachelor of Science in Mechanical Engineering Curriculum by Specialty

Alternative Energy Specialty

Freshman I through Junior II Representative Program Credit Total: **105**

Course	Title	Credit Hours
Senior I		
MECH-322	Fluid Mechanics	4
MECH-330 & MECH-331	Dynamic Systems with Vibrations and Dynamic Sys w Vibrations Lab	4
MECH-420	Heat Transfer	4
Advanced Humanities or Social Science Elective		4
	Credit Hours	16
Senior II		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
MECH-430 & MECH-431	Dynamic Systems with Controls and Dynamic Systems with Controls Lab	4
MECH-427	Energy and the Environment	4
MECH-428	Bio and Renewable Energy	4
MECH-445	Hybrid Electric Vehicle Propulsion	4
	Credit Hours	20
Senior III		
MECH-422	Energy Systems Laboratory	4
MECH-421	Energy and Environmental System Design	4
MECH-426	Fuel Cell Science and Engineering	4
Advanced Social Science Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis [1]	4
	Credit Hours	4
	Total Credit Hours	56

(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.

Automotive Engineering Design Specialty

Freshman I through Junior II Rep. Program Credit Total: **105**

Course	Title	Credit Hours
Senior I		
MECH-322	Fluid Mechanics	4
MECH-330 & MECH-331	Dynamic Systems with Vibrations and Dynamic Sys w Vibrations Lab	4
Advanced Humanities or Advanced Social Science Elective		4
Automotive Specialty Electives [1,2]		8
	Credit Hours	20
Senior II		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
MECH-420	Heat Transfer	4
MECH-430 & MECH-431	Dynamic Systems with Controls and Dynamic Systems with Controls Lab	4
Automotive Specialty Elective		4
	Credit Hours	16
Senior III		
MECH-422	Energy Systems Laboratory	4
MECH-448	Vehicle Design Project	4
Advanced Humanities or Social Science Elective		4
Automotive Specialty Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis [3]	4
	Credit Hours	4
	Total Credit Hours	56

(Minimum) Total Credits Required for Program: 161

1 Elective courses may vary in lecture and/or laboratory credits and terms from those shown.

2 Students select a Specialty Related Elective or Specialty Related ME Elective with approval of their ME Specialty Advisor.

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

Bioengineering Application Specialty

Freshman I through Junior I Representative Program Credit Total: **85**

Course	Title	Credit Hours
Junior II		
MECH-300	Computer Aided Engineering	4
MECH-310	Dynamics	4
MECH-320	Thermodynamics	4
MECH-350	Introduction to Bioengineering Applications	4
Advanced Communications Elective		4
	Credit Hours	20
Senior I		
MATH-258	Probability and Statistics	4
MECH-322	Fluid Mechanics	4
MECH-330 & MECH-331	Dynamic Systems with Vibrations and Dynamic Sys w Vibrations Lab	4
Advanced Humanities or Advanced Social Science Elective		4
Bioengineering Specialty Related Elective [1,2]		4
	Credit Hours	20
Senior II		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
MECH-420	Heat Transfer	4
MECH-430 & MECH-431	Dynamic Systems with Controls and Dynamic Systems with Controls Lab	4
Bioengineering Specialty Related Elective [1,2]		4
	Credit Hours	16
Senior III		
MECH-422	Energy Systems Laboratory	4
MECH-454	Bioengineering Applications Project	4
Advanced Humanities or Social Science Elective		4
Bioengineering Specialty Related Elective [1,2]		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis [3]	4
	Credit Hours	4
	Total Credit Hours	76

(Minimum) Total Credits Required for Program: 161

1 Elective courses may vary in lecture and/or laboratory credits and terms from those shown.

2 Students select a Specialty Related Elective or Specialty Related ME Elective with approval of their ME Specialty Advisor.

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

Machine Design & Advanced Materials Specialty

Freshman I through Junior II Representative Program Credit Total: **105**

Course	Title	Credit Hours
Senior I		
MECH-322	Fluid Mechanics	4
MECH-330 & MECH-331	Dynamic Systems with Vibrations and Dynamic Sys w Vibrations Lab	4
MECH-416	Introduction to Finite Element Analysis with Structural Applications	4
MECH-482	Mechanics and Design Simulation of Fiber-Reinforced Composite Materials	4
Advanced Humanities or Advanced Social Science Elective		4
	Credit Hours	20
Senior II		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
MECH-420	Heat Transfer	4
MECH-430 & MECH-431	Dynamic Systems with Controls and Dynamic Systems with Controls Lab	4
Machine Design Specialty Elective [1,2]		4
	Credit Hours	16
Senior III		
MECH-422	Energy Systems Laboratory	4
MECH-413 or MECH-414 or MECH-472	Mechanical Systems Design Project or Experimental Mechanics or CAD/CAM/CAE & Additive Manufacturing Capstone Design	4
Advanced Humanities or Social Science Elective		4
Machine Design Specialty Elective [1,2]		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis [3]	4
	Credit Hours	4
	Total Credit Hours	56

(Minimum) Total Credits Required for Program: 161

1 Elective courses may vary in lecture and/or laboratory credits and terms from those shown.

2 Students select a Specialty Related Elective or Specialty Related ME Elective with approval of their ME Specialty Advisor.

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

College of Sciences and Liberal Arts

Kathryn Svinarich, Ph.D.

Dean of the College of Sciences and Liberal Arts
csla@kettering.edu

The College of Sciences and Liberal Arts is home to the Departments of Computer Science, Liberal Studies, Mathematics, and Natural Sciences. Courses offered in the College of Sciences & Liberal Arts include traditional courses in math, science, communications, humanities, and the social sciences but also a variety of interdisciplinary and special topics courses that combine aspects of several disciplines together in a single course or cluster of courses.

***New students will not be accepted into these programs after October 5, 2021.**

Applied Biology (p. 27)*

The Applied Biology program at Kettering equips students with the practical knowledge and skills necessary for success in any biology-based industry and institution. Our rigorous curriculum has at its core a challenging laboratory component with a strong focus on molecular and cellular biology, emphasizing undergraduate research and the techniques and problem solving abilities needed in the biomedical, pharmaceutical, and biotechnology industries. Many of our students decide to pursue graduate education and a Kettering Applied Biology degree is a fantastic preparation for medical, veterinary, dental or physician's assistant school.

Applied Mathematics (p. 29)*

Mathematics is the universal language of STEM and business. The Kettering Applied Math degree provides, at its core, the skills and knowledge that students need to use math to create real change. We offer concentrations in Applied and Computational Math, which combines mathematics with electrical, industrial or mechanical engineering, or physics or computer science; Applied Statistics, which includes probability and modeling, mathematical biology, which brings math, biology and chemistry together, and our Actuarial Science program, which is ranked second in the country by the prestigious Safeco Insurance rankings (and offers one of the best salary profiles of any STEM degree). Kettering math majors have access to the best facilities and the outstanding faculty who are recognized for their excellence in research and teaching. If you love numbers and want to know how to turn that love into a career, Kettering is your school.

Applied Physics (p. 33)*

Kettering offers the only ABET accredited Applied Physics program in the country! We prepare physicists who have a deep understanding of physics theory as well as the skills and creative thinking needed to solve real world problems. Access to state of the art labs including a new NSF sponsored high performance computing cluster and the chance to work with research faculty who are active in the areas of acoustics, medical physics, biophysics and optics offer opportunities for excellent students to participate in on campus research for their co-op terms or to use their knowledge in a variety of external co-ops around the country, including NASA.

Biochemistry (p. 36)*

The Kettering Biochemistry program starts with a solid foundation in chemistry and then adds additional courses in biochemistry and biology, resulting in a solid preparation for the biomedical, pharmaceutical and biotechnology industry. Our faculty have rigorous research programs that involve undergraduates as early as their freshman year! Outstanding students have the opportunity to compete for funded on campus research co-op positions and our students also take on challenging co-op positions in external industries around the country. Many of Kettering's Biochemistry graduates have gone on to top graduate programs and because biochemistry combines the rigors of both chemistry and biology, it provides an excellent preparation for medical school and other health science graduate programs.

Chemistry (p. 38)*

Chemistry has been called the Central Science, bridging the disciplines of biology and physics. At Kettering, the chemistry program offers a strong core in the five sub-disciplines of chemistry: organic, analytical, physical, inorganic and biochemistry, but it doesn't stop there. Chemistry students have the opportunity to take courses and labs in advanced chemistry and physics. By the time they graduate, they will have a broad and thorough understanding of many theoretical and experimental areas. The rigorous chemistry curriculum has at its core a challenging laboratory component with a strong focus on experimental design, emphasizing undergraduate research and the techniques and problem solving abilities needed in the chemical and biotechnology industries. Our faculty have rigorous research programs that involve undergraduates as early as their freshman year. Outstanding students have the opportunity to compete for funded on campus research co-op positions and our students also take on challenging co-op positions in external industries around the country. Earning a degree in chemistry provides opportunities for a career in a wide variety of fields including research and development, manufacturing, quality control, sales and marketing, environmental protection, public health, law and policy, and education.

Computer Science (p. 41)

Computer Science is one of the fastest growing majors in the world. Computer scientists are needed in every imaginable industry, from the automotive industry, programming autonomous vehicles to the cybersecurity industry, protecting the world's most sensitive data. Kettering faculty know that our students have to be exposed to state of the art technologies in their curriculum and our faculty bring their expertise in virtual reality, gaming, mobile networks and data science right into the classroom. Kettering students have co-op opportunities in top industries, like the automotive and health system sectors as well as government security, and they also have the chance to work directly with faculty on current cutting edge research.

Engineering Physics (p. 43)

Kettering's Engineering Physics degree truly represents the best of STEM, combining the theory of physics with the practice of engineering. As one of only a very few Engineering Physics programs in the region, we can confidently state that we are at the forefront. Our students have access to state of the art equipment, such as the new high performance computing cluster, and have the opportunity to compete for research co-ops working with our world class, externally funded faculty. The ABET accredited curriculum allows our students to explore the nexus between theoretical physics and applied engineering, uniquely preparing them for success in nearly any STEM related career.

Liberal Studies (p. 26)

As scientists and engineers, Kettering graduates will use their technical talent to solve complex human problems. The Kettering Department of Liberal Studies offers a curriculum that nurtures a multidisciplinary approach to understanding those human problems from a variety of

perspectives. The department is home to the humanities, social sciences, and communication. It offer minors in Economics, History, International Studies, Literature and Pre-Law as well as study in interdisciplinary areas such as social justice and community engagement. The unique Liberal Studies curriculum features seminars at both the sophomore level (Understanding the Human Condition) and the senior level (Leadership, Ethics and Contemporary Issues). Together, these courses offer students a structured approach to developing the intellectual skills of critical thinking, analysis, written and oral communication, and creativity that are crucial to a complete Kettering education.

Minors

- Acoustics (p. 50)
- Applied and Computational Mathematics (p. 50)
- Computer Gaming (p. 51)
- Computer Science (p. 51)
- Cybersecurity (p. 52)
- Economics (p. 52)
- History (p. 52)
- Literature (p. 53)
- Physics (p. 53)
- Pre-Law (p. 54)
- Statistics (p. 54)

Liberal Studies

Home Department: Liberal Studies

Department Head:

Babak Elahi, Ph.D.

Room 4-502 AB, 810-762-9699
liberalstudies@kettering.edu

General Education

As a part of their general education, all Kettering University undergraduate students are required to take the following courses:

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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Courses eligible for 300-400 level humanities, communications, and social science elective credit include:

Code	Title	Credit Hours
Communications Elective Courses		
COMM-311	Rhetorical Principles of Persuasion	4
COMM-313	Rhetorical Principles of Public Speaking	4
COMM-391	Communications Special Topics	4
COMM-401	Communicating about Data	4
Humanities Elective Courses		
HUMN-391	Special Topics in Humanities	4
LIT-304	American Literature and Philosophy	4
LIT-307	Poetry: Substance and Structure	4
LIT-309	The Literature of Multicultural America	4
LIT-310	African American Literature	4
LIT-311	Literatures of the African Diaspora	4
LIT-372	Masterpieces of Literature	4
LIT-391	Literature Special Topics	4
PHIL-378	Moral and Ethical Philosophy	4

PHIL-391	Philosophy Special Topics	4
Social Science Elective Courses		
ECON-342	Intermediate Microeconomics: Managerial Economics	4
ECON-344	Intermediate Macroeconomics: Economic Growth and Fluctuation	4
ECON-348	History of Economic Thought	4
ECON-352	International Economics	4
ECON-354	Money and Banking	4
ECON-391	Economics Special Topics	4
HIST-306	International Relations	4
HIST-308	America and the World	4
HIST-319	The Rise of the Global Community	4
HIST-320	Modern Middle East	4
HIST-322	Africa in the World Economy	4
HIST-329	Science, Technology, and the Modern World	4
HIST-391	History Special Topics	4
SOC-331	Globalization in India and China: Comparative and Cross-Cultural Perspectives	4
SOC-333	Global Social Movements	4
SOC-337	Religion in Society	4
SOC-341	Law, Politics, and Society	4
SOC-391	Sociology Special Topics	4
SSCI-310	The Flint Water Crisis	4
SSCI-314	Technology and Sustainable Development	4
SSCI-391	Social Science Special Topics	4

Students wishing to study a topic within the humanities and social sciences not offered as a regular course may request that a liberal studies faculty member provide an independent study course. This independent study course may not serve as a substitute for any of the courses in the general education component, including the 300-level electives and senior seminar. Written approval must be given by the instructor and Liberal Studies department head.

Besides the general education requirements, students are also able to broaden their education by choosing to use their free electives for courses beyond their majors.

Applied Biology (Please see NOTE below)

NOTE: New students will not be accepted into this program after October 5, 2021. Students currently in the program or accepted into the program before Oct. 5, 2021 are unaffected by this change.

Home Department: Natural Sciences

Daniel O. Ludwigsen, Ph.D.

Room 2-323A, 810-762-7488

naturalsciences@kettering.edu

Program Overview

The Bachelor of Science in Applied Biology program at Kettering provides students with a strong foundation in the principles and applications of biology. Students in the Applied Biology program take courses in various areas of biology including general biology, human biology, microbiology, molecular biology, cellular biology, ecology, and genetics. Additional advanced courses are required and can be chosen by the student to create a concentration of study in the biological area. All Applied Biology students will have several terms of paid cooperative work experience so that concepts learned in the classroom can be applied to real world problems. Students in this program will also work closely with faculty members on a capstone research project as part of their undergraduate education and training.

An applied biology degree provides an excellent foundation for careers in biotechnology, medicine, pharmacology, environmental fields, technical management, education, business, and law.

Program Educational Objectives

The Applied Biology program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in a biological or related field. In particular, all graduates of the Applied Biology program will:

- Be employed or pursuing an advanced degree in the field of biology or other related disciplines.
- Be productive members of interdisciplinary teams.
- Assume leadership positions in their industry, their continuing education, or in their communities, as their careers develop.
- Continue their professional development and engage in life-long learning necessary for a sustainable career.

Applied Biology Program Curriculum Requirements

Code	Title	Credit Hours
First Year Experience		
CILE-101	First Year Foundations	1
General Education		
COMM-101	Rhetoric & Writing	4
Social Science Elective (200 or higher)		4
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Biology Core		
BIOL-141 & BIOL-142	General Biology and General Biology Lab	4
BIOL-241 & BIOL-242	Human Biology and Human Biology Lab	4
BIOL-311	Ecology	4
BIOL-321	Biological Techniques I	4
BIOL-331	Biological Techniques II	4
BIOL-351	Genetics	4
BIOL-361 & BIOL-362	Microbiology and Microbiology Lab	7
BIOL-381 & BIOL-382	Molecular Biology and Molecular Biology Lab	7
BIOL-441 & BIOL-442	Cellular Biology and Cellular Biology Lab	7
Advanced Biology Elective and Lab		7
Advanced Biology Elective		3
BIOL-494	Research Methods	4
Chemistry Core		
CHEM-137 & CHEM-136	General Chemistry I and Principles of Chemistry Lab	4
CHEM-237 & CHEM-238	General Chemistry II and General Chemistry II Lab	4
CHEM-345 & CHEM-346	Organic Chemistry I and Organic Chemistry I Lab [2]	6
CHEM-347	Organic Chemistry II [2]	4
CHEM-351 & CHEM-352	Biochemistry I and Biochemistry Lab	7
	Credit Hours Subtotal:	*84*
Mathematics		
MATH-101 or MATH-101X	Calculus I Calculus I	4
Select one of the following:		4
MATH-102	Calculus II	
MATH-102X	Calculus II	
MATH-102H	Calculus II - Honors	
MATH-258	Probability and Statistics	4
Physics		
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
	Credit Hours Subtotal:	*16*
Electives		
Technical Electives [3]		12
Free Electives		12
	Credit Hours Subtotal:	*24*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis [4]	4
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161[5]

[2] Alternatively an extended (X) section of this lecture course may be taken. Extended versions of courses offer additional hours with the instructor.

[3] A technical elective may be any 300 or 400 level courses in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. Some 200 level classes can also count as technical electives but must be approved by the department head.

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

[5] The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Applied Biology majors must meet the general educational requirements and their program's requirements for a minor or concentration.

Applied Biology Major Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-137 or CHEM-135	General Chemistry I or Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
MATH-101 or MATH-101X	Calculus I or Calculus I	4
COMM-101	Rhetoric & Writing	4
BIOL-141	General Biology	3
BIOL-142	General Biology Lab	1
	Credit Hours	17
Freshman II		
CHEM-237	General Chemistry II	3
CHEM-238	General Chemistry II Lab	1
MATH-102 or MATH-102X	Calculus II or Calculus II	4
Social Science Elective (200 or higher)		4
BIOL-241	Human Biology	3
BIOL-242	Human Biology Lab	1
	Credit Hours	16
Sophomore I		
BIOL-311	Ecology	4
BIOL-321	Biological Techniques I	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
LS-201	Sophomore Seminar: Exploring the Human Condition	4
	Credit Hours	16
Sophomore II		
BIOL-331	Biological Techniques II	4
BIOL-351	Genetics	4
MATH-258	Probability and Statistics	4

Adv. COMM, HUMN, or SSCI Elective		4
	Credit Hours	16
Junior I		
CHEM-345	Organic Chemistry I	4
CHEM-346	Organic Chemistry I Lab	2
BIOL-361	Microbiology	4
BIOL-362	Microbiology Lab	3
Adv. COMM, HUMN, or SSCI Elective		4
	Credit Hours	17
Junior II		
CHEM-347	Organic Chemistry II	4
BIOL-381	Molecular Biology	4
BIOL-382	Molecular Biology Lab	3
Free Elective		4
Technical Elective		4
	Credit Hours	19
Senior I		
CHEM-351	Biochemistry I	4
CHEM-352	Biochemistry Lab	3
BIOL-441	Cellular Biology	4
BIOL-442	Cellular Biology Lab	3
Adv. COMM, HUMN, or SSCI Elective		4
	Credit Hours	18
Senior II		
Advanced Biology Elective and Lab		7
Adv. COMM, HUMN, or SSCI Elective		4
Technical Elective		4
Free Elective		4
	Credit Hours	19
Senior III		
BIOL-494	Research Methods	4
Advanced Biology Elective		3
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Technical Elective		4
Free Elective		4
	Credit Hours	19
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161[4]

1 Humanities, Social Science, and Communications advanced electives must be selected from approved 300 and 400 level courses, including one Humanities course and one Social Science Course. Additionally, two of the three advanced electives must be writing intensive.

2 Alternatively an extended (X) section of this lecture course may be taken. Extended versions of courses offer additional hours with the instructor.

3 A technical elective may be any 300 or 400 level courses in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. MATH-204 and PHYS-224/PHYS-225 can also count as a technical elective. All other courses must be approved by the department head.

4 The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Applied Biology majors must meet the general educational requirements and their program's requirements for a minor or concentration.

Applied Mathematics (Please see NOTE below)

NOTE: New students will not be accepted into this program after October 5, 2021. Students currently in the program or accepted into the program before Oct. 5, 2021 are unaffected by this change.

Home Department: Mathematics

Department Head:

Leszek Gawarecki, Ph.D.
Room 2-100A AB, 810-762-9557
math@kettering.edu

Program Overview

Mathematics is the universal language of engineering, science, and management. Students majoring in Applied Mathematics at Kettering University select a concentration in Actuarial Science, Applied and Computational Mathematics, Applied Statistics or Mathematical Biology. The degree is very flexible in serving the interests of business and industry, preparing the student for a wide variety of careers. The degree also provides a sound preparation for graduate study. Kettering graduates in Applied Mathematics appreciate their broad-based education because it enables them to work easily with engineers, managers, and scientists. They can contribute to team approaches to problem solving.

Students with concentrations in Actuarial Science will study mathematical and statistical methods of certain actuarial models and the application of those models to insurance and other financial risks. Courses include the early stage of the actuarial exams (P, FM, LTAM, and SRM) as well as all three VEE credits. The actuarial science concentration provides excellent preparation for the student interested in starting a career in the actuarial profession. It earned the designation of Advanced Curriculum and is a leading undergraduate level actuarial program by the standards of the Society of Actuaries. Actuaries are professionals who use mathematics, statistics and financial theory to analyze financial consequences of risk.

Students with concentrations in Applied and Computational Mathematics will study classical and modern mathematical topics related to scientific and engineering disciplines. Courses are included that emphasize the modeling of physical systems from theoretical and practical perspectives as well as practical scientific computations. The student will also

complete an application sequence of engineering, science, or computer science courses related to the special interests of the student.

Students with concentrations in Applied Statistics will study modern statistical methods related to the acquisition, organization, analysis, and interpretation of data. Courses are included that emphasize theory and application of probability, statistics, and mathematical modeling.

Students with concentrations in Mathematical Biology will study mathematical and statistical methods related to the modeling of complex biological systems. Theoretical and numerical methods of solution will be applied to ordinary and partial differential equations and systems of equations arising in General and Human Biology, Anatomy and Physiology, and Ecology.

The curriculum for Applied Mathematics includes core mathematics courses that are common to all concentrations. These courses make up about one quarter of the total credits in the program. Considerable emphasis is placed on additional core courses in science, management and humanities.

Applied Mathematics students interact regularly with engineering and science departments through core and other required courses appropriate to the concentrations in applied and computational mathematics, applied statistics and mathematical biology. A substantial number of electives provides flexibility for greater breadth or depth of study in mathematics or its applications.

In addition to the major in Applied Mathematics, there are available minors in Applied and Computational Mathematics and Applied Statistics. Because of the strong mathematical content of Kettering's other degree programs, it is possible for many students to complete one of these minors with a modest amount of additional course work.

Program Educational Objectives

The Mathematics Program Faculty have established the following Program Educational Objectives:

- Provide its students with a broad, fundamental understanding of foundational, mathematical and computational concepts.
- Provide the skills to use mathematics in modeling and solving problems of mathematics, science, engineering, commerce and industry.
- Provide productive employees to science, engineering, commerce, and industry and ensure the relevance of the Applied Mathematics program through interaction with employers.

Applied Mathematics 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Computer Programming		
Select one of the following:		4
CS-101	Computing & Algorithms I	
ECE-101	MATLAB and C Programming	
IME-211	Algorithms and Computer Programming	
	Credit Hours Subtotal:	*4*
Basic Science		
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	4
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
	Credit Hours Subtotal:	*12*
Mathematics		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
MATH-204	Differential Equations & Laplace Transforms	4
MATH-305	Numerical Methods and Matrices	4
MATH-307	Matrix Algebra	4
MATH-308	Abstract Algebra	4
MATH-313	Boundary Value Problems	4
MATH-321	Real Analysis I	4
MATH-327	Probability & Stochastic Modeling	4
MATH-412	Complex Variables	4
MATH-416	Vector Analysis	4
	Credit Hours Subtotal:	*48*
Concentration		
Select one of the following concentrations:		28-36
(Courses for each concentration are listed in the Plan of Study Tab)		
Actuarial Science		
Applied and Computational Mathematics		
Applied Statistics		
Mathematical Biology		

	Credit Hours Subtotal:	*28-36*
Electives		
Science Electives		8
Free Electives		16-24
	Credit Hours Subtotal:	*24-32*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis [2]	4

(Minimum) Total Credits Required for Program: 161

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

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-135	Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
COMM-101	Rhetoric & Writing	4
MATH-101	Calculus I	4
Select one of the following:		4
CS-101	Computing & Algorithms I	
IME-211	Algorithms and Computer Programming	
ECE-101	MATLAB and C Programming	
	Credit Hours	17
Freshman II		
ECON-201	Economic Principles	4
MATH-102	Calculus II	4
MATH-307	Matrix Algebra	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
	Credit Hours	16
Sophomore I		
MATH-203	Multivariate Calculus	4
MATH-308	Abstract Algebra	4
LS-201	Sophomore Seminar: Exploring the Human Condition	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
	Credit Hours	16
Sophomore II		
MATH-204	Differential Equations & Laplace Transforms	4
MATH-327	Probability & Stochastic Modeling	4
Science Elective		4
Free Elective		4
	Credit Hours	16
	Total Credit Hours	65

Actuarial Science Concentration

Course	Title	Credit Hours
Junior I		
MATH-258	Probability and Statistics	4
MATH-313	Boundary Value Problems	4
MATH-350	Financial Mathematics	4
BUSN-221	Financial Accounting	4
Advanced Communications Elective		4
	Credit Hours	20
Junior II		
MATH-305	Numerical Methods and Matrices	4
MATH-321	Real Analysis I	4
ECON-342	Intermediate Microeconomics: Managerial Economics	4
Advanced Humanities Elective		4
Free Elective		4
	Credit Hours	20
Senior I		
MATH-427	Statistical Inference & Modeling	4
MATH-360	Life Contingencies I	4
MATH-416	Vector Analysis	4
Science Elective		4
Advanced Social Science Elective		4
	Credit Hours	20
Senior II		
MATH-361	Life Contingencies II	4
MATH-412	Complex Variables	4
ECON-344	Intermediate Macroeconomics: Economic Growth and Fluctuation	4
Free Elective		4
	Credit Hours	16
Senior III		
MATH-450	Statistics for Risk Modeling	4
BUSN-331	Financial Management	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Comm, Humanities or Social Science Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	96

(Minimum) Total Credits Required for Program: 161

Applied and Computational Mathematics Concentration

Course	Title	Credit Hours
Junior I		
MATH-305	Numerical Methods and Matrices	4
MATH-313	Boundary Value Problems	4

Advanced Communications Elective		4
Free Elective		4
	Credit Hours	16
Junior II		
MATH-328	Methods of Applied Mathematics	4
MATH-418	Intermediate Differential Equations	4
Advanced Humanities		4
Free Elective		4
	Credit Hours	16
Senior I		
MATH-416	Vector Analysis	4
Engineering Applications/CS Sequence		4
Advanced Social Science Elective		4
Free Electives		8
	Credit Hours	20
Senior II		
MATH-321	Real Analysis I	4
MATH-423	Partial Differential Equations	4
Engineering Applications/CS Sequence		4
Science Elective		4
Free Elective		4
	Credit Hours	20
Senior III		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
MATH-412	Complex Variables	4
Engineering Applications/CS Sequence		8
Advanced Comm, Humanities or Social Science Elective		4
	Credit Hours	20
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	96

(Minimum) Total Credits Required for Program: 161

The student will develop an engineering applications or computer science sequence with the assistance of an academic advisor. The following are examples of a possible CS-sequence, EE-sequence, IME-sequence, MECH-sequence, and PHYS sequence.

Code	Title	Credit Hours
CS-Sequence		
CS-102	Computing & Algorithms II	4
CS-203	Computing & Algorithms III	4
CS-312	Theory of Computation	4
CS-415	Cryptography	4
EE-Sequence		
EE-210	Circuits I	3
EE-240	Electromagnetic Fields and Applications	4
EE-340	Electromagnetic Wave Propagation	4
EE-348	Electromagnetic Compatibility	4
IME-Sequence		
IME-351	Engineering Economics	4
IME-321	Operations Research I - Deterministic Models	4
IME-423	Operations Research II - Stochastic Models	4
IME-453	Tools for Managing the Supply Chain	4
MECH-Sequence		
MECH-210	Statics	4
MECH-212	Mechanics of Materials	4
MECH-310	Dynamics	4
MECH-320	Thermodynamics	4
PHYS-Sequence		
PHYS-302	Vibration, Sound and Light	4
PHYS-362	Modern Physics and Lab	4
PHYS-412	Theoretical Mechanics	4
PHYS-462	Quantum Mechanics	4

Applied Statistics Concentration

Course	Title	Credit Hours
Junior I		
MATH-258	Probability and Statistics	4
MATH-313	Boundary Value Problems	4
MATH-412	Complex Variables	4
Advanced Communications Elective		4
	Credit Hours	16
Junior II		
MATH-305	Numerical Methods and Matrices	4
MATH-450	Statistics for Risk Modeling	4
Industrial/MATH Elective [1]		4
Free Elective		4
Advanced Humanities Elective		4
	Credit Hours	20
Senior I		
MATH-350	Financial Mathematics	4
MATH-416	Vector Analysis	4
MATH-427	Statistical Inference & Modeling	4
Free Elective		4
Advanced Social Science Elective		4
	Credit Hours	20
Senior II		
IME-471	Quality Assurance	4
IME-473	Design of Experiments	4
MATH-321	Real Analysis I	4
Free Elective		4
Science Elective		4
	Credit Hours	20
Senior III		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Industrial/Math Elective [1]		4

Advanced Comm, Humanities or Advanced Social Science Elective		4
Free Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	96

(Minimum) Total Credits Required for Program: 161

[1] The student should select at least two IME/MATH electives from the following courses: IME-321, IME-422, IME-423, and MATH-428.

Mathematical Biology Concentration

Course	Title	Credit Hours
Junior I		
MATH-313	Boundary Value Problems	4
Advanced Chemistry Elective		4
Advanced Communications Elective		4
Advanced Humanities Elective		4
	Credit Hours	16
Junior II		
MATH-328	Methods of Applied Mathematics	4
MATH-418	Intermediate Differential Equations	4
BIOL-241	Human Biology	3
BIOL-242	Human Biology Lab	1
Advanced Social Science Elective		4
Free Elective		4
	Credit Hours	20
Senior I		
MATH-258	Probability and Statistics	4
MATH-416	Vector Analysis	4
BIOL-341	Anatomy and Physiology	4
Science Elective		4
Advanced Comm, Humanities or Advanced Social Science Elective		4
	Credit Hours	20
Senior II		
MATH-321	Real Analysis I	4
MATH-330	Biostatistics	4
BIOL-381	Molecular Biology	4
BIOL-382	Molecular Biology Lab	3
Free Elective		4
	Credit Hours	19
Senior III		
BIOL-351	Genetics	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
MATH-412	Complex Variables	4
Free Electives		8
	Credit Hours	20
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	99

(Minimum) Total Credits Required for Program: 161

Applied Physics (Please see NOTE below)

Please Note: New students will not be accepted into this program after October 5, 2021. Current students are unaffected by this change.

Home Department: Natural Sciences

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naturalsciences@kettering.edu

Program Overview

Physics is the most fundamental science and underlies the understanding of nearly all areas of science, technology, and engineering. Physics is concerned with the study of energy, space, time, matter, the interaction between material objects and the laws that govern these interactions at various scales from sub nano-scale to light-years scale. Physicists study mechanics, sound, heat, light, electric and magnetic fields, gravitation, relativity, atomic and nuclear physics, solid state physics, wave-like properties of particles and particle-like properties of radiation. Applied physics is not a specific branch of physics but the application of all branches of physics to the broad realm of practical problems in scientific and industrial applications, applied science, and advanced industry. Applied Physics (AP) is the interface between physics, applied sciences and technology; linking the theory, laboratory, and practice. At Kettering University, Applied Physics involves applications of optics, acoustics, and materials in fields such as nanotechnology, telecommunications, medical physics and devices, or advanced and electronic materials. The Applied Physics degree is a flexible degree designed to interface physics with applied sciences and engineering disciplines.

The degree in Applied Physics at Kettering University provides excellent preparation for work in industry or in government agencies. The program also serves as a solid foundation for students desiring to go on to graduate school in physics or any number of fields in pure and applied science. The curriculum in Applied Physics provides a solid education in mathematics, applied sciences and physics with emphasis on the four areas of Applied Optics, Acoustics, Materials Science and nanotechnology and Medical Physics.

- Applied Physics (AP) students at Kettering University take the same core physics courses as physics students at other universities. Furthermore, our Physics students are required to take a sequence of courses in optics, acoustics, and materials science.
- Applied Physics (AP) students at Kettering University will graduate from the most distinctive physics program in the nation, incorporating the Co-op and Experiential Learning model that

provides students with a rich co-op experience while they are undergraduates. This is unique compared to any other Applied Physics program.
- The Applied Physics (AP) program includes a thorough background in mathematics, science, computer programming, social sciences, humanities, and communication.
- Applied Physics (AP) students complete a sequence of courses in an area of applied science, mathematics or advanced technology or even business (p. 51), pre-law (p. 54), or pre-med (p. 46).
- Applied Physics students must write a senior thesis.
- The Applied Physics program at Kettering University is the first and only ABET accredited applied physics program in the world.

For more information about the Applied Physics program, including pictures and descriptions of our laboratory faculty, facilities, concentrations and minors, please visit our Web site, or send an email to physics@kettering.edu.

Program Educational Objectives

Applied Physics graduates will:

- Excel in technical careers and thrive in graduate studies using scientific principles and application of physical sciences.
- Work effectively in bringing multi-disciplinary ideas to diverse professional environments.
- Improve their workplaces and communities, and the society through professional and personal activities.

Dual Majors

One of the advantages of being an Applied Physics major is that because physics leads to or has overlaps with nearly every science and engineering discipline, it is makes it very easy to pursue a dual major. A dual major creates greater flexibility in terms of future career or graduate studies.

When an undergraduate student simultaneously completes two sets of major requirements, he or she earns a dual major. Students must complete a minimum of 161 credit hours to earn the Bachelor of Science degree AND complete all course requirements for both majors. Dual majors will require additional credits beyond the 161 minimum. If capstone courses are required in both majors both must be completed. Only one thesis is required. Approval and academic advising from both academic departments is required.

For further information please contact physics@kettering.edu.

Specialization within the Physics Program

Applied and Engineering Physics students may obtain a minor in acoustics, applied optics, medical physics, or materials science, but they are not eligible for a minor in physics. See the catalog description of minors for more information, or please send an email to physics@kettering.edu.

Track of Studies and International Programs

Applied Physics students may utilize the flexibility built in the physics curriculum to use their elective courses toward a collection of courses in a specific area of engineering or a cohesive collection of science and mathematics courses. This in particular could be useful in designing a track of study that may facilitate student participation in an existing study abroad program. This flexibility in the Physics curriculum may also be useful in better planning and preparing for future graduate studies and career. For further information about this please send an email to physics@kettering.edu.

Applied Physics 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Chemistry		
Select one of the following:		4
CHEM-137 & CHEM-136	General Chemistry I and Principles of Chemistry Lab	
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	
CHEM-237 & CHEM-238	General Chemistry II and General Chemistry II Lab	4
	Credit Hours Subtotal:	*8*
Computer Science		
CS-101	Computing & Algorithms I	4
	Credit Hours Subtotal:	*4*
Engineering		
Select one of the following:		4
EE-210 & EE-211	Circuits I and Circuits I Lab	
EE-212 & MECH-231L	Applied Electrical Circuits and Signals for Mechanical Systems Lab	
EE-240	Electromagnetic Fields and Applications	4
EP-235	Computers in Physics	4

EP-342	Introduction to Materials Science and Engineering	4
EP-485	Acoustic Testing and Modeling	4
	Credit Hours Subtotal:	*20*
Mathematics		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
Select one of the following:		4
MATH-102	Calculus II	
MATH-102X	Calculus II	
MATH-102H	Calculus II - Honors	
MATH-203	Multivariate Calculus	4
or MATH-203H	Multivariate Calculus - Honors	
MATH-204	Differential Equations & Laplace Transforms	4
or MATH-204H	Differential Equations and Laplace Transforms - Honors	
MATH-258	Probability and Statistics	4
or MATH-327	Probability & Stochastic Modeling	
MATH-307	Matrix Algebra	4
MATH-313	Boundary Value Problems	4
	Credit Hours Subtotal:	*28*
Physics		
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
PHYS-302	Vibration, Sound and Light	4
PHYS-362	Modern Physics and Lab	4
PHYS-412	Theoretical Mechanics	4
PHYS-452	Thermodynamics and Statistical Physics	4
PHYS-462	Quantum Mechanics	4
PHYS-477	Optics and Lab	4
Advanced Physics Elective (Choose Two) [2]		8
	Credit Hours Subtotal:	*40*
Electives		
Free electives		8
Technical Electives [3]		16
	Credit Hours Subtotal:	*24*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis [4]	4
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161

[2] Any PHYS or EP course that is not a core physics requirement listed above

[3] Any 300 or 400 level Science, Math, Engineering, or Business courses approved by the academic advisor to form a sequence of courses in a specific technical field of study. Some Computer Science courses that are 100 or 200 level could be approved as a technical elective by the Physics Department Head.

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

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-137 or CHEM-135	General Chemistry I or Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
COMM-101	Rhetoric & Writing	4
CS-101	Computing & Algorithms I	4
MATH-101	Calculus I	4
	Credit Hours	17
Freshman II		
CHEM-237	General Chemistry II	3
CHEM-238	General Chemistry II Lab	1
ECON-201	Economic Principles	4
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
	Credit Hours	16
Sophomore I		
MATH-203	Multivariate Calculus	4
MATH-307	Matrix Algebra	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
LS-201	Sophomore Seminar: Exploring the Human Condition	4
	Credit Hours	16
Sophomore II		
EP-235	Computers in Physics	4
MATH-204	Differential Equations & Laplace Transforms	4
PHYS-362	Modern Physics and Lab	4
Select one of the following:		4
EE-210 & EE-211	Circuits I and Circuits I Lab	
EE-212 & MECH-231L	Applied Electrical Circuits and Signals for Mechanical Systems Lab	
	Credit Hours	16
Junior I		
MATH-313	Boundary Value Problems	4
PHYS-302	Vibration, Sound and Light	4
Advanced Physics Elective [2]		4
Advanced Communications Elective		4
	Credit Hours	16
Junior II		
EP-342	Introduction to Materials Science and Engineering	4

MATH-258 or MATH-327	Probability and Statistics or Probability & Stochastic Modeling	4
Technical Elective [1]		4
Advanced Physics Elective [2]		4
Advanced Humanities Elective		4
	Credit Hours	20
Senior I		
EE-240	Electromagnetic Fields and Applications	4
PHYS-412	Theoretical Mechanics	4
PHYS-477	Optics and Lab	4
Technical Elective [1]		4
Advanced Social Science Elective		4
	Credit Hours	20
Senior II		
EP-485	Acoustic Testing and Modeling	4
PHYS-452	Thermodynamics and Statistical Physics	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Technical Elective [1]		4
Free Elective		4
	Credit Hours	20
Senior III		
PHYS-462	Quantum Mechanics	4
Free Elective		4
Technical Elective [1]		4
Advanced Humanities, Social Science, or Communications Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161

1 Technical Electives are any 300 or 400 level Science, Math, Engineering, or Business courses approved by the academic advisor to form a sequence of courses in a specific technical field of study. Some Computer Science courses that are 100 or 200 level could be approved as a technical elective by the Physics Department Head.

2 Advanced Physics Electives includes any PHYS or EP course, which is not a core physics requirement as listed above.

Biochemistry (Please see NOTE below)

Please Note: New students will not be accepted into this program after October 5, 2021. Current students are unaffected by this change.

Home Department: Natural Sciences

Daniel O. Ludwigsen, Ph.D.
Room 2-323A, 810-762-7488
naturalsciences@kettering.edu

Program Overview

The Bachelor of Science in Biochemistry program at Kettering provides students with a strong foundation in the principles of biologically-oriented chemistry and introduces students to a broad range of topics that comprise the large and dynamic field of biochemistry. Students in the biochemistry program take courses and laboratories in all of the major chemical sub-disciplines including organic chemistry, inorganic chemistry, physical chemistry and analytical chemistry. Additional special emphasis in the biological area will be achieved by taking courses and laboratories in biology and biochemistry. All Biochemistry students will have several terms of cooperative work experience so that concepts learned in the classroom can be applied to real world problems. Students in this program will also work closely with faculty members on research projects as part of their undergraduate education and training.

A Biochemistry degree provides an excellent foundation for careers in biotechnology, medicine, pharmacology, environmental fields, technical management, education, business, and law.

Program Educational Objectives

The Biochemistry program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in a biochemical or related field. In particular, all graduates of the Biochemistry program will:

- Have a broad, thorough, and quantitative understanding of theoretical and experimental chemistry or biochemistry.
- Function effectively and ethically within an organization and society as professionals in chemistry, biochemistry, or related fields.
- Have the skills to effectively communicate their understanding of chemistry or biochemistry to the general public as well as the professional community.
- Have the knowledge and skills in Chemistry and/or Biochemistry to be successful in pursuing an advanced degree.

Biochemistry 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Biochemistry Core		
Select one of the following:		4
CHEM-137 & CHEM-136	General Chemistry I and Principles of Chemistry Lab	
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	
CHEM-237 & CHEM-238	General Chemistry II and General Chemistry II Lab	4
CHEM-345 & CHEM-346	Organic Chemistry I and Organic Chemistry I Lab [2]	6
CHEM-347 & CHEM-348	Organic Chemistry II and Organic Chemistry II Lab [2]	6
CHEM-351 & CHEM-352	Biochemistry I and Biochemistry Lab	7
CHEM-361 & CHEM-362	Physical Chemistry I and Physical Chemistry I Lab	7
CHEM-373 & CHEM-374	Analytical Chemistry and Analytical Chemistry Lab	7
CHEM-437 & CHEM-438	Inorganic Chemistry and Inorganic Chemistry Lab	7
CHEM-451 & CHEM-452	Biochemistry II and Biochemistry II Lab	7
CHEM-491	CHEM Special Topics	2
CHEM-494	Research Methods	4
	Credit Hours Subtotal:	*61*
Biology Core		
BIOL-141 & BIOL-142	General Biology and General Biology Lab	4
BIOL-241 & BIOL-242	Human Biology and Human Biology Lab	4
BIOL-351	Genetics	4
BIOL-381 & BIOL-382	Molecular Biology and Molecular Biology Lab	7
Mathematics		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
Select one of the following:		4
MATH-102	Calculus II	
MATH-102X	Calculus II	
MATH-102H	Calculus II - Honors	
MATH-203	Multivariate Calculus	4
or MATH-203H	Multivariate Calculus - Honors	
MATH-258	Probability and Statistics	4
Physics		
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
	Credit Hours Subtotal:	*43*
Electives		
Technical Electives [3]		12
Free Electives		8
	Credit Hours Subtotal:	*20*
Undergraduate Thesis		
CILE-400	Culminating Undergraduate Experience: Thesis [4]	4
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161[5]

[2] Alternatively an extended (X) section of this lecture course may be taken. Extended versions of courses offer additional hours with the instructor.

[3] A technical elective may be any 300 or 400 level courses in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. MATH-204 and PHYS-224/PHYS-225 can also count as a technical elective. All other courses must be approved by the department head.

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

[5] The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Applied Biology majors must meet the general educational requirements and their program's requirements for a minor or concentration.

Biochemistry Major Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-137 or CHEM-135	General Chemistry I or Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
MATH-101	Calculus I	4
COMM-101	Rhetoric & Writing	4
BIOL-141	General Biology	3
BIOL-142	General Biology Lab	1
	Credit Hours	17
Freshman II		
CHEM-237	General Chemistry II	3

CHEM-238	General Chemistry II Lab	1
MATH-102	Calculus II	4
ECON-201	Economic Principles	4
BIOL-241	Human Biology	3
BIOL-242	Human Biology Lab	1
	Credit Hours	16
Sophomore I		
CHEM-345	Organic Chemistry I	4
CHEM-346	Organic Chemistry I Lab	2
MATH-203	Multivariate Calculus	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
LS-201	Sophomore Seminar: Exploring the Human Condition [1]	4
	Credit Hours	18
Sophomore II		
CHEM-347	Organic Chemistry II	4
CHEM-348	Organic Chemistry II Lab	2
MATH-258	Probability and Statistics	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
Adv. COMM, HUMN, or SSCI Elective		4
	Credit Hours	18
Junior I		
CHEM-351	Biochemistry I	4
CHEM-352	Biochemistry Lab	3
CHEM-437	Inorganic Chemistry	4
CHEM-438	Inorganic Chemistry Lab	3
Adv. COMM, HUMN, or SSCI Elective		4
	Credit Hours	18
Junior II		
BIOL-351	Genetics	4
CHEM-451	Biochemistry II	4
CHEM-452	Biochemistry II Lab	3
Advanced Chemistry Elective		2
Technical Elective		4
	Credit Hours	17
Senior I		
CHEM-361	Physical Chemistry I	4
CHEM-362	Physical Chemistry I Lab	3
Technical Elective		4
Free Elective		4
Adv. COMM, HUMN, or SSCI Elective		4
	Credit Hours	19
Senior II		
CHEM-373	Analytical Chemistry	4
CHEM-374	Analytical Chemistry Lab	3
BIOL-381	Molecular Biology	4
BIOL-382	Molecular Biology Lab	3
Technical Elective		4
	Credit Hours	18
Senior III		
CHEM-494	Research Methods	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Adv. COMM, HUMN, or SSCI Elective		4
Free Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161 [4]

1. Humanities, Social Science, and Communications advanced electives must be selected from approved 300 and 400 level courses, including one Humanities course and one Social Science Course. Additionally, two of the three advanced electives must be writing intensive.
2. Alternatively an extended (X) section of this lecture course may be taken. Extended versions of courses offer additional hours with the instructor.
3. A technical elective may be any 300 or 400 level courses in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. MATH-204 and PHYS-224/PHYS-225 can also count as a technical elective. All other courses must be approved by the department head.
4. The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Applied Biology majors must meet the general educational requirements and their program's requirements for a minor or concentration.

Chemistry (Please see NOTE below)

Please Note: New students will not be accepted into this program after October 5, 2021. Current students are unaffected by this change.

Home Department: Natural Sciences

Daniel O. Ludwigsen, Ph.D.
Room 2-323A, 810-762-7488
naturalsciences@kettering.edu

Program Overview

The Bachelor of Science in Chemistry at Kettering provides students with a strong and rigorous foundation in chemistry, while introducing students to a broad range of chemical topics. Students in the chemistry program take courses and laboratories in all of the major chemical sub-disciplines including organic chemistry, inorganic chemistry, physical chemistry, analytical chemistry and biochemistry. During their senior year, chemistry majors take advanced chemistry courses in specialized areas. All Chemistry students will have several terms of cooperative work experience so that concepts learned in the classroom can be applied to real world problems. Students in this program will also work closely with faculty members on research projects as part of their undergraduate

education and training. This allows them to gain a deeper insight into the sub-area(s) in chemistry of their choice.

A chemistry degree provides an excellent foundation for careers in traditional chemistry areas as well as many in non-traditional areas such as medicine, technical management, education, technical writing, sales, business, and law.

Program Educational Objectives

The Chemistry Program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in a chemical or related field. In particular, all graduates of the Chemistry Program will:

- Have a broad, thorough, and quantitative understanding of theoretical and experimental chemistry or biochemistry.
- Function effectively and ethically within an organization and society as professionals in chemistry, biochemistry, or related fields.
- Have the skills to effectively communicate their understanding of chemistry or biochemistry to the general public as well as the professional community.
- Have the knowledge and skills in Chemistry and/or Biochemistry to be successful in pursuing an advanced degree.

Chemistry 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Mathematics		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
Select one of the following:		4
MATH-102	Calculus II	
MATH-102X	Calculus II	
MATH-102H	Calculus II - Honors	
MATH-203	Multivariate Calculus	4
or MATH-203H	Multivariate Calculus - Honors	
MATH-204	Differential Equations & Laplace Transforms	4
or MATH-204H	Differential Equations and Laplace Transforms - Honors	
MATH-258	Probability and Statistics	4
Physics		
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
PHYS-362	Modern Physics and Lab	4
	Credit Hours Subtotal:	*32*
Chemistry Core		
Select one of the following:		4
CHEM-137 & CHEM-136	General Chemistry I and Principles of Chemistry Lab	
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	
CHEM-237 & CHEM-238	General Chemistry II and General Chemistry II Lab	4
CHEM-345 & CHEM-346	Organic Chemistry I and Organic Chemistry I Lab [2]	6
CHEM-347 & CHEM-348	Organic Chemistry II and Organic Chemistry II Lab [2]	6
CHEM-351 & CHEM-352	Biochemistry I and Biochemistry Lab	7
CHEM-361 & CHEM-362	Physical Chemistry I and Physical Chemistry I Lab	7
CHEM-363 & CHEM-364	Physical Chemistry II and Physical Chemistry II Lab	7
CHEM-373 & CHEM-374	Analytical Chemistry and Analytical Chemistry Lab	7
CHEM-437 & CHEM-438	Inorganic Chemistry and Inorganic Chemistry Lab	7
Advanced Chemistry Electives/Labs		9
CHEM-494	Research Methods	4
	Credit Hours Subtotal:	*68*
Electives		
Technical Electives [3]		12
Free Electives		12
	Credit Hours Subtotal:	*24*
Undergraduate Thesis		
CILE-400	Culminating Undergraduate Experience: Thesis [4]	4
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161 [5]

[2] Alternatively an extended (X) section of this lecture course may be taken. Extended versions of courses offer additional hours with the instructor.

[3] A technical elective may be any 300 or 400 level courses in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. MATH-204 and PHYS-224/PHYS-225 can also count as a technical elective. All other courses must be approved by the department head.

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

[5] The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Applied Biology majors must meet the general educational requirements and their program's requirements for a minor or concentration.

Chemistry Major Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-137 or CHEM-135	General Chemistry I or Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
MATH-101	Calculus I	4
COMM-101	Rhetoric & Writing	4
ECON-201	Economic Principles	4
	Credit Hours	17
Freshman II		
CHEM-237	General Chemistry II	3
CHEM-238	General Chemistry II Lab	1
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
Free Elective		4
	Credit Hours	16
Sophomore I		
CHEM-345	Organic Chemistry I *	4
CHEM-346	Organic Chemistry I Lab	2
MATH-203	Multivariate Calculus	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
LS-201	Sophomore Seminar: Exploring the Human Condition	4
	Credit Hours	18
Sophomore II		
CHEM-347	Organic Chemistry II *	4
CHEM-348	Organic Chemistry II Lab	2
MATH-204	Differential Equations & Laplace Transforms	4
Adv. COMM, HUMN, or SSCI Elective		4
Technical Elective		4
	Credit Hours	18
Junior I		
CHEM-351	Biochemistry I	4
CHEM-352	Biochemistry Lab	3
CHEM-361	Physical Chemistry I	4
CHEM-362	Physical Chemistry I Lab	3
MATH-258	Probability and Statistics	4
	Credit Hours	18
Junior II		
CHEM-373	Analytical Chemistry	4
CHEM-374	Analytical Chemistry Lab	3
CHEM-363	Physical Chemistry II	4
CHEM-364	Physical Chemistry II Lab	3
PHYS-362	Modern Physics and Lab	4
	Credit Hours	18
Senior I		
CHEM-437	Inorganic Chemistry	4
CHEM-438	Inorganic Chemistry Lab	3
Advanced Chemistry Elective and Lab		7
Advanced Humanities or Advanced Social Science Elective [1]		4
	Credit Hours	18
Senior II		
Advanced Chemistry Elective		2
Advanced Humanities, Advanced Social Science, or Advanced Communications Elective [1]		4
Technical Electives		8
Free Elective		4
	Credit Hours	18
Senior III		
CHEM-494	Research Methods	4
Adv. COMM, HUMN, or SSCI Elective		4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Free Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161[4]

[1] Humanities, Social Science, and Communications advanced electives must be selected from approved 300 and 400 level courses, including one Humanities course and one Social Science Course. Additionally, two of the three advanced electives must be writing intensive.

[2] Alternatively an extended (X) section of this lecture course may be taken. Extended versions of courses offer additional hours with the instructor.

[3] A technical elective may be any 300 or 400 level courses in BIOL, CE, CHEM, CHME, CS, EE, IME, ISYS, MATH, MECH, or PHYS that is not used to complete core degree requirements. MATH-204 and PHYS-224/PHYS-225 can also count as a technical elective. All other courses must be approved by the department head.

[4] The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Applied Biology majors must meet the general educational requirements and their program's requirements for a minor or concentration.

Computer Science

Home Department: Computer Science

Department Head:

Michael Farmer, Ph.D.
Room 2-300 AB, 810-762-7963
computerscience@kettering.edu (jgeske@kettering.edu)

Program Overview

Computer Science touches virtually every aspect of human endeavor. Its impact on society is seen in the proliferation of computers, information systems, game systems, web browsers, search engines, computerization and automation of automobiles, and all the wonderful application programs that have been developed to make computers more productive and easier to use. An important aspect of the field deals with how to make programming easier, software more reliable, and the processing and retrieval of information more accessible, but fundamentally, computer science is a science of abstraction - creating the correct models for real-world problems that can be represented and manipulated inside a computer.

Computer scientists are experts on the subject of computation and information representation, both in terms of the theory of the fundamental capabilities and limitations of computation, as well as how computation can be practically realized and applied. A computer scientist understands how to design and analyze algorithms that apply computation effectively, and how to represent, store, and retrieve information efficiently, and how to design software systems to solve complex problems.

The program for Computer Science majors is broad and rigorous; students are required to have a solid foundation in computer software, hardware, and theory. Yet, the program is structured in a way that supports in-depth study of areas in and outside the computing field. Technical and free electives give students the opportunity to take advanced courses in areas of computer science such as information retrieval, computer graphics, cryptography, computer and network security, and artificial intelligence; students may elect to concentrate their studies in computer gaming, or cybersecurity; students can easily obtain minors in diverse fields such as applied mathematics, applied physics, computer engineering, and literature.

A wide variety of exciting professional and academic opportunities exist for graduates of computer science including software engineering, Internet systems and technology, security, hardware development, information systems, biotechnology, business, and consulting, as well as masters and doctoral studies in computing related fields. With the aid of a Computer Science faculty advisor, the computer science student is expected to put together a coherent program of study that supports career objectives and is true to the aims of a liberal education.

The program in Computer Science is accredited by the Computing Accreditation Commission of ABET.

Computer Science vs. Computer Engineering

Historically, the discipline of computer science draws its roots from two separate disciplines.

- Electrical Engineering: the development of devices that depend on electricity and magnetism.
- Mathematics: the study of the properties and interactions of idealized objects, such as numbers and symbols.

Computer science lies at the intersection of these two disciplines. It is the study of a particular class of electrical devices (i.e. computers) which can perform mathematical, logical operations (i.e. software).

The computer engineering (p. 10) and computer science programs have a common core of classes. Students in both programs study programming, the design of digital systems, computer architecture, and operating systems, as well as a solid foundation in mathematics, science, and general education.

The computer engineering program emphasizes the design and development of physical computer systems. In addition to a common engineering core, students in computer engineering study topics such as the analysis of electrical circuits, and electronics, with an emphasis on electrical and digital design.

The computer science program emphasizes the design and development of software systems. Students in computer science study topics such as algorithms and data structures, software engineering, compiler design, database systems, artificial intelligence, and the theoretical foundations of computation.

Both programs prepare students for work in the computer industry, though with emphasis on different areas. Students should select the program which fits their skills and interests best. Both programs offer minors (p. 50), so students may take additional courses in these areas and have it designated on their transcript.

Program Educational Objectives

1. Computer Science graduates will have sufficient depth of understanding of the fundamental areas of computer science to enable them for success in today's workplace.
2. Computer Science graduates will have sufficient breadth of understanding to enable continued professional development and lifelong learning throughout their careers.
3. Computer Science graduates will have sufficient teamwork, communication, and interpersonal skills to enable them to work with others effectively in their professional careers.
4. Computer Science graduates will be sufficiently prepared to be innovative and ethical leaders in a global society.

Computer Science 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4

Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
Liberal Studies Electives [2]		8
	Credit Hours Subtotal:	*41*
Total Credit Hours		41

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

[2] Liberal Studies Electives must be 200 level or above.

Code	Title	Credit Hours
Basic Science		
Science Electives		16
	Credit Hours Subtotal:	*16*
Computer Science		
CS-101	Computing & Algorithms I	4
CS-102	Computing & Algorithms II	4
CS-203	Computing & Algorithms III	4
CS-211	Discrete Mathematics	4
CS-231	Programming Language Paradigms	4
CS-300	The Computing Professional	4
CS-312	Theory of Computation	4
CS-351	Cloud Computing	4
CS-451	Operating Systems	4
CS-471	Software Engineering	4
Computer Science Technical Electives		16
	Credit Hours Subtotal:	*56*
Computer Engineering		
CE-210	Digital Systems I	4
CE-320	Microcomputers I	4
	Credit Hours Subtotal:	*8*
Mathematics		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
Select one of the following:		4
MATH-102	Calculus II	
MATH-102X	Calculus II	
MATH-102H	Calculus II - Honors	
Mathematics Electives		12
	Credit Hours Subtotal:	*20*
Electives		
Free Electives		16
	Credit Hours Subtotal:	*16*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis [1]	4
Total Credit Hours		120

(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.

Concentrations

The Computer Science concentrations provide students with a technical depth of study in an emerging area of interest. The student's degree remains in Computer Science, and this concentration does not prevent students from working within any government or industry position in the computer science arena. Students interested in either the Computer Gaming or Cybersecurity concentrations should contact Dr. Michael Farmer, Department Head of Computer Science.

Computer Gaming

Students majoring in Computer Science may select a concentration in Computer Gaming consisting of the following 16 credit hours of Computer Science technical electives as listed below.

Code	Title	Credit Hours
Required Courses		
CS-320	Computer Graphics	4
CS-385	Introduction to Game Design	4
CS-420	Introduction to Virtual Reality	4
CS-485	Advanced Game Development	4

Cybersecurity

Students majoring in Computer Science may select a concentration in Cybersecurity consisting of the following 16 credit hours of Computer Science technical electives as listed below.

Code	Title	Credit Hours
Required Courses		
CS-415	Cryptography	4
CS-455	Computer and Network Security	4
CS-457	Wireless and Mobile Security	4
CS-458	Computer and Network Forensics	4

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
COMM-101	Rhetoric & Writing	4
CS-101	Computing & Algorithms I	4
MATH-101	Calculus I	4
Science Elective [1]		4
	Credit Hours	17
Freshman II		
CS-102	Computing & Algorithms II	4
CS-211	Discrete Mathematics	4
MATH-102	Calculus II	4
ECON-201	Economic Principles	4
	Credit Hours	16
Sophomore I		
CS-203	Computing & Algorithms III	4

LS-201	Sophomore Seminar: Exploring the Human Condition	4
Mathematics Elective		4
Science Elective [1]		4
	Credit Hours	16
Sophomore II		
CE-210	Digital Systems I	4
CS-231	Programming Language Paradigms	4
Science Elective [1]		4
Advanced Liberal Studies Elective		4
	Credit Hours	16
Junior I		
CE-320	Microcomputers I	4
CS-300	The Computing Professional	4
CS Technical Elective [2]		4
Advanced Liberal Studies Elective		4
	Credit Hours	16
Junior II		
CS-351	Cloud Computing	4
Advanced Liberal Studies Elective		4
CS Technical Elective [2]		4
Free Elective		4
Mathematics Elective		4
	Credit Hours	20
Senior I		
CS-312	Theory of Computation	4
Advanced Liberal Studies Elective		4
CS Technical Elective [2]		4
Free Electives		8
	Credit Hours	20
Senior II		
CS-471	Software Engineering	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
CS Technical Elective [2]		4
Free Elective		4
Mathematics Elelctive		4
	Credit Hours	20
Senior III		
CS-451	Operating Systems	4
Liberal Studies Electives		8
Science Elective [1]		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161

[1] Must include two courses (8 credits) with a laboratory component.

[2] A list of approved technical electives is available from the department and listed on the department web-site.

Engineering Physics

Home Department: Natural Sciences

Department Head:

Daniel O. Ludwigsen, Ph.D.
Room 2-323A, 810-762-7488
naturalsciences@kettering.edu

Program Overview

Physics is the most fundamental science and underlies the understanding of nearly all areas of science, technology, and engineering. Physics is concerned with the study of energy, space, time, matter, the interaction between material objects and the laws that govern these interactions at various scales from sub nano-scale to light-years scale. Physicists study mechanics, sound, heat, light, electric and magnetic fields, gravitation, relativity, atomic and nuclear physics, solid state physics, wave-like properties of particles and particle-like properties of radiation. Engineering physics is not a specific branch of physics but the application of all branches of physics to the broad realm of practical problems in scientific and industrial settings, engineering design and applications, applied science, and advanced industry. Engineering Physics (EP) is the interface of physics with specific areas of advanced or emerging technology, which are not covered in depth under the traditional engineering education, such as applications of optics, acoustics, and materials in fields like nanotechnology, telecommunications, medical physics and devices, or advanced and electronic materials. The Engineering Physics degree is a flexible degree designed to interface physics with applied sciences and engineering disciplines.

The Bachelor of Science in Engineering Physics (EP) degree at Kettering University unifies physics knowledge and applications in optics, acoustics, and advanced materials with a comprehensive engineering component to prepare graduates for engineering applications in emerging technology. The well balanced curriculum in Engineering Physics provides a solid education combined with desirable skills that could lead to a career in industry and government sector as well as graduate studies in applied sciences and engineering.

- Engineering Physics (EP) students at Kettering take the same core physics courses as physics students at other universities. Furthermore, our Physics students are required to take a sequence of courses in optics, acoustics and materials.
- Engineering Physics (EP) students at Kettering University will graduate from the most distinctive physics program in the nation. The cooperative education and experiential learning model at Kettering University provides Engineering Physics students with a rich co-op experience, complete with a senior thesis (p. 73) while they are undergraduates.
- The Engineering Physics (EP) program includes a thorough background in mathematics, science, engineering fundamentals, social sciences, humanities, and communication coupled with an individually designed engineering component.
- Engineering Physics (EP) students complete an individually designed sequence of courses in engineering that culminates in an engineering

capstone design experience. Popular options include sequences such as energy systems engineering or mechanical design.
- The Engineering Physics program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

For more information about the Engineering Physics program, including pictures and descriptions of our laboratory facilities and minors, please visit our degree program website, or send an email to physics@kettering.edu.

Program Educational Objectives

Engineering Physics graduates will:

- Thrive in graduate studies, technical careers, or engineering practices using broad based scientific knowledge.
- Work effectively in diverse professional environments and multi-disciplinary projects.
- Improve their workplaces and communities, and the society through professional and personal activities.

Dual Majors

One of the advantages of being an Engineering Physics major is that because physics leads to or has overlaps with nearly every science and engineering discipline, it is makes it very easy to pursue a dual option. Pursuing a dual option will create greater flexibility in terms of future career or graduate studies.

When an undergraduate student simultaneously completes two sets of major requirements, he or she earns a dual major. Students must complete a minimum of 161 credit hours to earn the Bachelor of Science degree AND complete all course requirements for both majors. Dual majors will require additional credits beyond the 161 minimum. If capstone courses are required in both majors both must be completed. Only one thesis is required. Approval and academic advising from both academic departments is required.

For further information please contact the Physics Department Head at physics@kettering.edu.

Specialization within the Physics Program

Applied and Engineering Physics students may obtain a minor in acoustics, applied optics, medical physics, or materials science, but they are not eligible for a minor in physics. See the catalog description of minors for more information, or please contact the Physics Department Head at physics@kettering.edu.

Track of Studies and International Programs

Engineering Physics students may utilize the flexibility built in the physics curriculum to use their elective courses toward a collection of courses in a chosen area of engineering. This in particular could be useful in designing a track of study that may facilitate student participation in an existing study abroad program. This flexibility in the Physics curriculum may also be useful in better planning and preparing for future graduate studies and career. For further information about this please contact the Physics Department Head at physics@kettering.edu.

Engineering Physics 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Engineering		
EP-235	Computers in Physics	4
EP-485	Acoustic Testing and Modeling	4
EE-240	Electromagnetic Fields and Applications	4
IME-100	Interdisciplinary Design and Manufacturing	4
Select an intermediate engineering option:		8
MECH-210 & MECH-212	Statics and Mechanics of Materials	
CE-210 & CE-320	Digital Systems I and Microcomputers I	
Select one of the following:		4
EE-210 & EE-211	Circuits I and Circuits I Lab	
EE-212 & MECH-231L	Applied Electrical Circuits and Signals for Mechanical Systems Lab	
Select one of the following:		4
EP-342	Introduction to Materials Science and Engineering	
MECH-307	Materials Engineering	
Engineering Elective Sequence [2]		20
	Credit Hours Subtotal:	*52*
Chemistry		
Select one of the following:		4
CHEM-137 & CHEM-136	General Chemistry I and Principles of Chemistry Lab	

CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	
	Credit Hours Subtotal:	*4*
Mathematics		
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
Select one of the following:		4
MATH-102	Calculus II	
MATH-102X	Calculus II	
MATH-102H	Calculus II - Honors	
MATH-203	Multivariate Calculus	4
or MATH-203H	Multivariate Calculus - Honors	
MATH-204	Differential Equations & Laplace Transforms	4
or MATH-204H	Differential Equations and Laplace Transforms - Honors	
MATH-258	Probability and Statistics	4
or MATH-327	Probability & Stochastic Modeling	
MATH-305	Numerical Methods and Matrices	4
or MATH-307	Matrix Algebra	
Physics		
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
PHYS-302	Vibration, Sound and Light	4
PHYS-362	Modern Physics and Lab	4
PHYS-412	Theoretical Mechanics	4
PHYS-452	Thermodynamics and Statistical Physics	4
PHYS-462	Quantum Mechanics	4
PHYS-477	Optics and Lab	4
Advanced Physics Elective	Any PHYS or EP course that is not a core physics requirement listed above	4
	Credit Hours Subtotal:	*60*
Electives		
Free Electives		8
	Credit Hours Subtotal:	*8*
Culminating Undergraduate Experience		
CILE-400	Culminating Undergraduate Experience: Thesis [3]	4
Total Credit Hours		128

(Minimum) Total Credits Required for Program: 161

[2] The Engineering Elective Sequence provides a depth of study in a specific engineering field, and must culminate in a senior level capstone design experience. Engineering sequence courses will be designed based on individual student interests and their future career or graduate studies plans and will be approved by the academic advisor.

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

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
CHEM-137 or CHEM-135	General Chemistry I or Principles of Chemistry	3
CHEM-136	Principles of Chemistry Lab	1
COMM-101	Rhetoric & Writing	4
IME-100	Interdisciplinary Design and Manufacturing	4
MATH-101	Calculus I	4
	Credit Hours	17
Freshman II		
ECON-201	Economic Principles	4
MATH-102	Calculus II	4
MECH-210	Statics	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
	Credit Hours	16
Sophomore I		
LS-201	Sophomore Seminar: Exploring the Human Condition	4
MATH-203	Multivariate Calculus	4
MECH-212	Mechanics of Materials	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
	Credit Hours	16
Sophomore II		
EP-235	Computers in Physics	4
MATH-204	Differential Equations & Laplace Transforms	4
PHYS-362	Modern Physics and Lab	4
Advanced Communications Elective		4
	Credit Hours	16
Junior I		
Select one of the following:		4
EE-210 & EE-211	Circuits I and Circuits I Lab	
EE-212 & MECH-231L	Applied Electrical Circuits and Signals for Mechanical Systems Lab	
PHYS-302	Vibration, Sound and Light	4
Engineering Elective Sequence [1]		4
Advanced Humanities Elective		4
	Credit Hours	16
Junior II		
EE-240	Electromagnetic Fields and Applications	4
EP-342 or MECH-307	Introduction to Materials Science and Engineering or Materials Engineering	4

MATH-258 or MATH-327	Probability and Statistics or Probability & Stochastic Modeling	4
Advanced Physics Elective [2]		4
Engineering Elective Sequence [1]		4
	Credit Hours	20
Senior I		
MATH-305 or MATH-307	Numerical Methods and Matrices or Matrix Algebra	4
PHYS-412	Theoretical Mechanics	4
PHYS-477	Optics and Lab	4
Advanced Social Science Elective		4
Engineering Elective Sequence [1]		4
	Credit Hours	20
Senior II		
EP-485	Acoustic Testing and Modeling	4
PHYS-452	Thermodynamics and Statistical Physics	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Engineering Elective Sequence [1]		4
Free Elective		4
	Credit Hours	20
Senior III		
PHYS-462	Quantum Mechanics	4
Engineering Elective Capstone Design [1]		4
Advanced Humanities, Social Science, or Communications Elective		
Free Elective		4
	Credit Hours	12
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	157

(Minimum) Total Credits Required for Program: 161

1 The Engineering Elective Sequence provides a depth of study in a specific engineering field, and must culminate in a senior level capstone design experience. Engineering sequence courses will be designed based on individual student interests and their future career or graduate studies plans and will be approved by the academic advisor.

2 Advanced Physics Electives includes any PHYS or EP course, which is not a core physics requirement as listed above.

Pre-Med Education Course of Study

Home Department: Natural Sciences

Pre-Med Coordinator:

Stacy K. Seeley, Ph.D.
Room 3-103 MC 810-762-9561
chem@kettering.edu

Pre-Med Education Course of Study

Supplementing traditional degree requirements at Kettering with the Pre-Med Course of Study prepares students for a career in the health sciences. This program is ideal for students who are considering going into the fields of medicine, nursing, pharmacy, or the health sciences. Completing this course of study ensures students get a well rounded science education, preparing them for medical, professional, or graduate school.

The Pre-Med Course of Study is built around common Medical School prerequisites:

- One year of introductory chemistry: CHEM-135/CHEM-136 or CHEM-137/CHEM-136 and CHEM-237/CHEM-238.
- One year of organic chemistry: CHEM-345/CHEM-346 and CHEM-347/CHEM-348.
- One year of introductory biology: BIOL-141/BIOL-142 and BIOL-241/BIOL-242.
- One-half year of Biochemistry: CHEM-351/CHEM-352.
- One year of Physics: PHYS-114/PHYS-115 and PHYS-224/PHYS-225
- Other requirements for most medical schools, such as one year of college math and courses in liberal studies, are already included within the degree programs at Kettering.
- While most medical schools do not usually require other courses as prerequisite courses, we do also recommend taking other specific courses to help prepare students who plan on taking the Medical College Admissions Test (MCAT). These include Biochemistry II (CHEM-451), Anatomy & Physiology (BIOL-341), and a Psychology course.

Kettering's Biochemistry program already includes these specific courses required for entrance into most medical schools. Applied Biology students need to only take one additional physics course (PHYS-224/PHYS-225) to complete these typical entrance requirements. Students in any of the other degree programs can obtain the required courses by completing the Biochemistry minor, a year of Physics (p. 33), and a year of Biology (p. 27) to obtain the most common Medical School prerequisites. Students can typically utilize free or technical electives to take a portion of the credits in the Pre-Med Course of Study. For a sample curriculum for your degree program that incorporates the pre-med course of study, see your degree program department head or Dr. Stacy K. Seeley (pre-med coordinator).

The Premedical Education Course of Study will not appear on the transcript. The two Organic Chemistry and one Biochemistry courses comprise the Biochemistry Minor. As such, students completing the Premedical Education Course of Study will earn a Biochemistry Minor which will be listed on their transcript.

Students are also encouraged to participate in Kettering's Health-focused Education and Learning (K-HEAL) course cluster for additional health-focused courses throughout the curriculum. For more information, interested students should contact K-HEAL@kettering.edu.

School of Management

EXPERIENCE BUSINESS

The School of Management is home to the Department of Business. The programs offered by the School develop business leaders through ***an interdisciplinary*** management education. The School of Management offers an undergraduate degree in management and a variety of Master's programs including Master of Science in Operations Management, Master of Science in Engineering Management, Master of Science in Supply Chain Management, Master of Business Administration (MBA) and Technical Master of Business Administration (Tech MBA).

ACADEMIC PROGRAMS

UNDERGRADUATE

Bachelor of Science in Management (BSM) (p. 47)

The Bachelor of Science in Management is a unique combination of management and business-related courses with a substantial amount of technical and quantitative analysis. The objective of this program is to prepare graduates for leaderships roles in business organizations through a rigorous common core, a foundation in systems management and customized concentrations built around student interests. Integration of project-based instruction and cooperative industrial experience prepares students for the management challenges of increasingly complex business environments.

Explore concentrations in Business Analytics, Technology Leadership, Supply Chain and Logistics Management, Innovation and Entrepreneurship, and Sustainable Solutions for Enterprise.

MINORS

The School of Management also offers two minors available to students not majoring in Business: the Business Minor and the Innovation and Entrepreneurship Minor.

BUSINESS (p. 51)

The Business Minor provides students not majoring in Business with a strong base in the functional areas of business and one elective course. It also fulfills prerequisites for the Master of Business Administration (MBA), Master of Science in Engineering Management, and Master of Science in Operations Management programs offered at Kettering University. In many cases, courses in the business minor will serve prerequisite needs for MBA programs at other institutions.

INNOVATION AND ENTREPRENEURSHIP (p. 52)

The Innovation and Entrepreneurship minor is designed for students interested in starting their own business or leading the creation of new ideas in an existing business.

DUAL MAJOR PROGRAMS

The department heads of the programs have agreed upon a curriculum that satisfies all requirements for a dual major. Dual major contracts are available in either of the listed department offices. Programs not listed require approval of the appropriate department head(s).

- Industrial Engineering & Management

ACCELERATED MASTER'S PROGRAM

Undergraduate students also have an opportunity to get their bachelor's and master's degree in five years with the Accelerated Master's Program.

Management

Home Department: School of Management

Room 4-304 AB

som@kettering.edu

PROGRAM OVERVIEW

The Bachelor of Science in Management (BSM) degree is focused on developing technology-savvy business leaders of the future.

In order to accomplish our mission, the School of Management must focus on producing effective managers who are thought leaders. The BSM coupled with the cooperative education model will train students to utilize business knowledge to make sound management decisions.

The Bachelor of Science in Management curriculum is a unique combination of management and business-related courses with a substantial amount of technical and quantitative analysis. The objective of this program is to prepare graduates for leadership roles in business organizations through a rigorous common core, a foundation in systems management and customized concentrations built around student interests. Integration of project-based instruction and cooperative industrial experience prepares students for the management challenges of increasingly complex business environments.

The inclusion of a systems management perspective provides the skills necessary for students to apply their multi-disciplinary education to the solution of challenging problems in the multifaceted world of modern business. The courses are orchestrated toward the management application of knowledge, not a mere understanding of functional skills.

CONCENTRATIONS

The BSM gives students the unique opportunity to **Build Your Brand** by providing them with the management and leadership skills to make their dreams real, whether that is aspiring to a c-suite position or becoming an entrepreneur by starting their own business. As students navigate through the management program including core courses, they will choose from a wide array of electives that form a concentration denoting an area of particular focus.

TECHNOLOGY LEADERSHIP

The Technology Leadership Concentration is comprised of four approved electives that may include courses from Mechanical Engineering, Electrical and Computer Engineering, Industrial and Manufacturing Engineering, Chemistry, Biology, and Computer Science.

BUSINESS ANALYTICS

The Business Analytics Concentration is comprised of four approved electives that may include courses from Computer Science, Liberal Studies, and Business.

SUPPLY CHAIN AND LOGISTICS MANAGEMENT
The Supply Chain and Logistics Management Concentration is comprised of four approved electives that may include courses from Industrial and Manufacturing Engineering and Business.

SUSTAINABLE SOLUTIONS FOR ENTERPRISE
The Sustainable Solutions for Enterprise Concentration is comprised of four approved electives that may include courses from Social Sciences, Biology, Chemistry, and Business.

INNOVATION AND ENTREPRENEURSHIP
The Innovation and Entrepreneurship Concentration is comprised of four approved electives that may include courses from Business, Economics, and Engineering.

STUDY ABROAD

The BSM offers a range of international educational opportunities, including the option to study abroad. Management students wishing to study abroad have the opportunity to attend classes held in English at partner universities in Germany and South Korea. The program is one term in length, normally the Senior 1(SR1) term. Students interested in studying abroad need to make their decision no later than the Junior 1 (JR1) term and discuss their intentions with their academic advisor. Additional information is available from the School of Management and the Kettering University Office of International Programs.

ACCREDITATION

The BSM program is accredited by the Association of Collegiate Business Schools and Programs (ACBSP).

Management 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
LS-201	Sophomore Seminar: Exploring the Human Condition	4
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
Advanced Communications Elective [1]		4
Advanced Humanities Elective [1]		4
Advanced Social Science Elective [1]		4
Advanced Communications, Humanities or Social Science Elective [1]		4
	Credit Hours Subtotal:	*33*
Total Credit Hours		33

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

Code	Title	Credit Hours
Engineering, Mathematics and Science		
MATH-101	Calculus I	4
Basic Science Elective		4
	Credit Hours Subtotal:	*8*
Management Core		
IME-100	Interdisciplinary Design and Manufacturing	4
MGMT-101	Introduction to Applied Management	4
BUSN-103	Introduction to Marketing	4
MGMT-104	Management Concepts	4
BUSN-152	Information Systems	4
MGMT-205	Organizational Behavior	4
BUSN-221	Financial Accounting	4
BUSN-222	Managerial Accounting	4
BUSN-271	Statistics for Business	4
BUSN-312	Business Process Improvement	4
MGMT-313	Marketing Research	4
BUSN-331	Financial Management	4
MGMT-314	Financial Statement Analysis	4
MGMT-315	Operations and Supply Chain Management	4
ECON-342	Intermediate Microeconomics: Managerial Economics	4
or ECON-344	Intermediate Macroeconomics: Economic Growth and Fluctuation	
BUSN-371	Business Analytics	4
BUSN-402	Business Law	4
MGMT-419	Project Management	4
BUSN-459	International Business	4
MGMT-465	Strategic Management	4
MGMT-479	Leadership	4
MGMT-484	Business Consulting Project	4
	Credit Hours Subtotal:	*88*
Electives		
Business Electives: any business course for which the student has the prerequisites		4
Free Electives: any course for which the student has the prerequisites		8
In consultation with your advisor, select one of the following concentrations (each concentration is comprised of four electives approved by the advisor):		16
Technology Leadership (approved electives from the following list or others with approval from advisor)		
ECE-101	MATLAB and C Programming	
CE-442	Introduction to Mobile Robotics	
CE-450	App Dvelpmt for Mobile Devices	
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)	

IME-200	Introduction to Industrial Engineering
MECH-100	Engineering Graphical Communication
MECH-427	Energy and the Environment
IME-403	Computer Numerical Control Machining
IME-408	Industrial Robotics
IME-409	Computer Integrated Manufacturing
IME-463	Safety and Human Factors
IME-465	Human-Computer Interaction and Interface Design
IME-471	Quality Assurance
IME-472	Introduction to Reliability and Maintainability
IME-476	Lean Six Sigma
IME-499	Industrial Engineering Independent Study
Business Analytics (approved electives from the following list or others with approval from advisor)	
IME-211	Algorithms and Computer Programming
CS-101	Computing & Algorithms I
CS-102	Computing & Algorithms II
CS-231	Programming Language Paradigms
CS-300	The Computing Professional
CS-341	Web Software Tools
CS-351	Cloud Computing
CS-455	Computer and Network Security
CS-461	Database Systems
CS-481	Artificial Intelligence
MGMT-423	Data Analytics
MGMT-424	Data Visualization
MGMT-425	Digital Strategy and Competitive Advantage
BUSN-456	Database Management Systems
COMM-401	Communicating about Data
Supply Chain and Logistics Management (approved electives from the following list or others with approval from advisor)	
BUSN-361	Lean Operations Management
IME-321	Operations Research I - Deterministic Models
IME-351	Engineering Economics
IME-361	Lean Work Design
IME-452	Production System Design
IME-453	Tools for Managing the Supply Chain
IME-476	Lean Six Sigma
BUSN-456	Database Management Systems
Sustainable Solutions for Enterprise (eapproved electives from the following list or others with approval from advisor)	
SSCI-314	Technology and Sustainable Development
BIOL-311	Ecology
MECH-427	Energy and the Environment
MECH-428	Bio and Renewable Energy
BIOL-499	Biology Independent Study
Innovation and Entrepreneurship (approved electives from the following list or others with approval from advisor)	
BUSN-303	New Venture Creation: Entrepreneurship
BUSN-304	Intrapreneurship and Innovation Development
BUSN-321	Entrepreneurial Thinking
BUSN-429	Entrepreneurial Finance
IME-474	Design for Manufacture and Assembly
ECON-499	Economics Independent Study
Culminating Undergraduate Experience	
CILE-400	Culminating Undergraduate Experience: Thesis [1] 4
	Credit Hours Subtotal: *32*

(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.

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
COMM-101	Rhetoric & Writing	4
MGMT-101	Introduction to Applied Management	4
BUSN-103	Introduction to Marketing	4
IME-100	Interdisciplinary Design and Manufacturing	4
	Credit Hours	17
Freshman II		
MATH-101	Calculus I	4
MGMT-104	Management Concepts	4
BUSN-152	Information Systems	4
Science Elective		4
	Credit Hours	16
Sophomore I		
LS-201	Sophomore Seminar: Exploring the Human Condition	4
MGMT-205	Organizational Behavior	4
BUSN-221	Financial Accounting	4
Free Elective		4
	Credit Hours	16
Sophomore II		
ECON-201	Economic Principles	4
BUSN-222	Managerial Accounting	4
BUSN-271	Statistics for Business	4
Free Elective		4
	Credit Hours	16
Junior I		
BUSN-312	Business Process Improvement	4
MGMT-313	Marketing Research	4
BUSN-331	Financial Management	4
Business Elective		4
	Credit Hours	16

Junior II		
MGMT-314	Financial Statement Analysis	4
MGMT-315	Operations and Supply Chain Management	4
BUSN-371	Business Analytics	4
Approved Concentration Elective		4
Advanced Communications Elective		4
	Credit Hours	20
Senior I		
BUSN-402	Business Law	4
MGMT-419	Project Management	4
MGMT-479	Leadership	4
Advanced Social Science Elective		4
Approved Concentration Elective		4
	Credit Hours	20
Senior II		
ECON-342 or ECON-344	Intermediate Microeconomics: Managerial Economics or Intermediate Macroeconomics: Economic Growth and Fluctuation	4
BUSN-459	International Business	4
MGMT-465	Strategic Management	4
Approved Concentration Elective		4
Advanced Humanities Elective		4
	Credit Hours	20
Senior III		
LS-489	Senior Seminar: Leadership, Ethics, and Contemporary Issues	4
MGMT-484	Business Consulting Project	4
Advanced Communications, Humanities or Social Science Elective		4
Approved Concentration Elective		4
	Credit Hours	16
Any Term		
CILE-400	Culminating Undergraduate Experience: Thesis	4
	Credit Hours	4
	Total Credit Hours	161

(Minimum) Total Credits Required for Program: 161

Minors

A minor is an area of concentrated study, outside of the major area of study. A minor requires a minimum of four classes (16 credits) in a directed area of study. Minors may require coursework in a student's degree program beyond the minimum of 41 classes (161 credits) required for completion of the major. Minors are not required for graduation though a student may elect to pursue a minor in an area of additional interest. Minors appear on a student's transcript at student declaration, and requirements must be completed at the time of graduation.

A student wishing to declare a minor should consult the head of the department that houses the minor, or a faculty advisor in that department. The student is then responsible for submitting a request to the Registrar's Office for processing.

Minors (*These Minors cannot be added after October 5, 2021)

- Acoustics (p. 50)
- Applied and Computational Mathematics (p. 50)
- Business (p. 51)
- Computer Engineering (p. 51)
- Computer Gaming (p. 51)
- Computer Science (p. 51)
- Cybersecurity (p. 52)
- Economics (p. 52)
- Electrical Engineering (p. 52)
- History (p. 52)*
- Innovation and Entrepreneurship (p. 52)
- International Studies (p. 53)*
- Literature (p. 53)*
- Physics (p. 53)
- Pre-Law (p. 54)*
- Statistics (p. 54)

Acoustics Minor

Department of Natural Sciences

Total Required Credits: 16

Code	Title	Credit Hours
PHYS-302	Vibration, Sound and Light	4
PHYS-388	Acoustics in the Human Environment	4
EP-485	Acoustic Testing and Modeling	4
Choose one from:		4
EE-336	Continuous-Time Signals and Systems	
EE-338	Discrete-Time Signals and Systems	
MECH-330 & MECH-331	Dynamic Systems with Vibrations and Dynamic Sys w Vibrations Lab	
Total Credit Hours		16

For more information on the Acoustics Minor contact naturalsciences@kettering.edu.

Applied and Computational Mathematics Minor

Mathematics Department

Total Required Credits: 32

Code	Title	Credit Hours
MATH-101	Calculus I	4
MATH-102	Calculus II	4
MATH-203	Multivariate Calculus	4
MATH-204	Differential Equations & Laplace Transforms	4

MATH-305	Numerical Methods and Matrices	4
Select two mathematics courses from the following list:		8
MATH-258	Probability and Statistics	
MATH-308	Abstract Algebra	
MATH-313	Boundary Value Problems	
MATH-321	Real Analysis I	
MATH-327	Probability & Stochastic Modeling	
MATH-416	Vector Analysis	
MATH-418	Intermediate Differential Equations	
Any one additional mathematics course must be selected.		4
Total Credit Hours		32

For more information on the Applied and Computational Mathematics Minor contact the Mathematics Department at math@kettering.edu .

Business Minor

School of Management

The School of Management offers the Business Minor and the Innovation and Entrepreneurship Minor. In the contemporary technology driven economy, every career path requires business acumen to understand and apply the technology, terminology and techniques of today's best business practices. The Business Minor is the most popular minor at Kettering University. When combined with a major outside of business, the Business Minor creates added value by providing students with an understanding of business basics, prerequisites for further study of business, and exposure to management fundamentals. A minor in business supports success in leadership and managerial roles and prepares anyone interested in running her or his own business or a non-profit organization.

Total Required Credits: 32

Code	Title	Credit Hours
ECON-201	Economic Principles	4
Economics Elective 300 or higher		4
BUSN-103	Introduction to Marketing	4
MGMT-104	Management Concepts	4
BUSN-221	Financial Accounting	4
BUSN-331	Financial Management	4
Select one of the following:		4
MATH-258	Probability and Statistics	
MATH-327	Probability & Stochastic Modeling	
MATH-330	Biostatistics	
Select one of the following:		4
MGMT-419	Project Management	
MGMT-465	Strategic Management	
MGMT-479	Leadership	
Total Credit Hours		32

For more information on the Business Minor contact the School of Management at 810-762-9630, som@kettering.edu.

Computer Engineering Minor

Electrical and Computer Engineering Department

Total Required Credits: 36

Code	Title	Credit Hours
CE-210	Digital Systems I	4
CE-320	Microcomputers I	4
CS-101	Computing & Algorithms I	4
CS-102	Computing & Algorithms II	4
EE-210	Circuits I	3
EE-211	Circuits I Lab	1
EE-320	Electronics I	3
EE-321	Electronics I Laboratory	1
CE-412	Digital Systems II	4
or CE-422	Computer Architecture and Organization	
CE-420	Microcomputers II	4
or CE-426	Real-Time Embedded Systems	
CE-480	Computer Networks	4
or CS-451	Operating Systems	
Total Credit Hours		36

For more information on the Computer Engineering Minor contact the Electrical and Computer Engineering Department at ece@kettering.edu.

Computer Gaming Minor

Computer Science Department

Total Required Credits: 20

Code	Title	Credit Hours
CS-101	Computing & Algorithms I	4
CS-102	Computing & Algorithms II	4
CS-320	Computer Graphics	4
CS-385	Introduction to Game Design	4
CS-485	Advanced Game Development	4
Total Credit Hours		20

For more information on the Computer Gaming Minor contact the Computer Science Department at computerscience@kettering.edu.

Computer Science Minor

Computer Science Department

Total Required Credits: 24

Code	Title	Credit Hours
CS-101	Computing & Algorithms I	4
CS-102	Computing & Algorithms II	4
CS-203	Computing & Algorithms III	4
CS-211	Discrete Mathematics	4

Select two Computer Science courses numbered 300 or above	8
Total Credit Hours	24

For more information on the Computer Science Minor contact the Computer Science Department at computerscience@kettering.edu.

Cybersecurity Minor

Computer Science Department

Total Required Credits: 20

Code	Title	Credit Hours
CS-101	Computing & Algorithms I	4
CS-102	Computing & Algorithms II	4
Select three of the following:		12
CS-415	Cryptography	
CS-455	Computer and Network Security	
CS-457	Wireless and Mobile Security	
CS-458	Computer and Network Forensics	
Total Credit Hours		20

For more information on the Cybersecurity Minor contact the Computer Science Department at computerscience@kettering.edu.

Economics Minor

Liberal Studies Department

Total Required Credits: 16

Code	Title	Credit Hours
ECON-201	Economic Principles	4
ECON-342	Intermediate Microeconomics: Managerial Economics	4
ECON-344	Intermediate Macroeconomics: Economic Growth and Fluctuation	4
Select one of the following:		4
ECON-348	History of Economic Thought	
ECON-352	International Economics	
ECON-354	Money and Banking	
ECON-391	Economics Special Topics	
Total Credit Hours		16

For more information on the Economics Minor contact the Liberal Studies Department at csla@kettering.edu.

Electrical Engineering Minor

Electrical and Computer Engineering Department

Total Required Credits: 32

Code	Title	Credit Hours
ECE-101	MATLAB and C Programming	4
or CS-101	Computing & Algorithms I	
CE-210	Digital Systems I	4
EE-210	Circuits I	3
EE-211	Circuits I Lab	1
EE-310	Circuits II	4
EE-320	Electronics I	3
EE-321	Electronics I Laboratory	1
EE-336	Continuous-Time Signals and Systems	4
Select two additional courses that have an EE prefix or a CE prefix (except EE-212).		8
Total Credit Hours		32

For more information on the Electrical Engineering Minor contact the Electrical and Computer Engineering Department at ece@kettering.edu.

History Minor

Liberal Studies Department

Total Required Credits: 16

Code	Title	Credit Hours
Select four of the following:		16
HIST-306	International Relations	
HIST-308	America and the World	
HIST-319	The Rise of the Global Community	
HIST-320	Modern Middle East	
HIST-322	Africa in the World Economy	
HIST-329	Science, Technology, and the Modern World	
HIST-391	History Special Topics	
HIST-499	History Independent Study	
Total Credit Hours		16

For more information on the History Minor, contact the Liberal Studies Department at csla@kettering.edu.

Innovation and Entrepreneurship Minor

School of Management

The School of Management offers the Innovation and Entrepreneurship Minor and the Business Minor. The Innovation and Entrepreneurship Minor provides students with the background to manage the creation of new products or processes within existing organizations, as well as foundational exposure to commercialize creative and innovative ideas into new business ventures. Engineers and scientists are essentially inventors for the future and engineering/science and innovation go hand in hand.

Total Required Credits: 28

Code	Title	Credit Hours
ECON-201	Economic Principles	4
Economics Elective 300 or higher		4
BUSN-303	New Venture Creation: Entrepreneurship	4
BUSN-304	Intrapreneurship and Innovation Development	4
BUSN-321	Entrepreneurial Thinking	4
BUSN-402	Business Law	4
Select one of the following:		4
MATH-258	Probability and Statistics	
MATH-327	Probability & Stochastic Modeling	
MATH-330	Biostatistics	
Total Credit Hours		28

For more information on the Innovation and Entrepreneurship Minor contact the School of Management at som@kettering.edu.

International Studies Minor

Liberal Studies Department

Total Required Credits: 16

The International Studies Minor consists of four of the following courses; no more than two from the same discipline within the department of Liberal Studies (e.g. history) may count toward the minor. No more than one course required for one's major may count toward the minor.

Code	Title	Credit Hours
BUSN-459	International Business	4
Select four of the following:		16
ECON-352	International Economics	
HIST-306	International Relations	
HIST-308	America and the World	
HIST-320	Modern Middle East	
HIST-322	Africa in the World Economy	
HIST-391	History Special Topics (must have international focus)	
HUMN-391	Special Topics in Humanities (must have international focus)	
HUMN-499	Humanities Independent Study (must have international focus)	
LIT-309	The Literature of Multicultural America	
LIT-311	Literatures of the African Diaspora	
LIT-391	Literature Special Topics (must have international focus)	
SOC-337	Religion in Society	
SOC-391	Sociology Special Topics (must have international focus)	
SSCI-314	Technology and Sustainable Development	
SSCI-391	Social Science Special Topics (must have international focus)	
SSCI-398	Social Science Study Abroad Advanced Topics	
SSCI-499	Social Science Independent Study (must have international focus)	
Total Credit Hours		20

For more information on the International Studies Minor, contact the Liberal Studies Department at csla@kettering.edu.

Literature Minor

Liberal Studies Department

Total Required Credits: 16

Code	Title	Credit Hours
Select four of the following:		16
HUMN-391	Special Topics in Humanities (must have literature focus)	
HUMN-499	Humanities Independent Study (must have literature focus)	
LIT-304	American Literature and Philosophy	
LIT-307	Poetry: Substance and Structure	
LIT-309	The Literature of Multicultural America	
LIT-310	African American Literature	
LIT-311	Literatures of the African Diaspora	
LIT-372	Masterpieces of Literature	
LIT-391	Literature Special Topics	
Total Credit Hours		16

For more information on the Literature Minor, contact the Liberal Studies Department at csla@kettering.edu.

Physics Minor

Department of Natural Sciences

Total Required Credits: 16

Code	Title	Credit Hours
PHYS-302	Vibration, Sound and Light	4
PHYS-362	Modern Physics and Lab	4
Select two of the following:		8
PHYS-412	Theoretical Mechanics	
EP-446	Solid State Physics	
PHYS-452	Thermodynamics and Statistical Physics	
PHYS-462	Quantum Mechanics	
PHYS-464	Nuclear Physics: Principles and Applications	
Total Credit Hours		16

For more information on the Physics Minor contact naturalsciences@kettering.edu.

Pre-Law Minor

Liberal Studies Department

Total Required Credits: 16

The Liberal Studies minor in Pre-law allows students to take courses related to four learning objectives that are described below. Students select four courses representing at least three of these objectives. Select courses from at least two different disciplines across these objectives. The disciplines include history, philosophy, literature, sociology and communication. "Topics" courses (e.g. SOC-391) may also apply.

1. Achieve an understanding of international institutions and issues, of world events, and of the increasing interdependence of the nations and communities of the world.

Code	Title	Credit Hours
HIST-306	International Relations	4
HIST-308	America and the World	4
HIST-320	Modern Middle East	4
HIST-322	Africa in the World Economy	4

2. Achieve an understanding of
   a. the development of political thought and/or
   b. political and legal systems.

Code	Title	Credit Hours
LIT-304	American Literature and Philosophy	4
PHIL-378	Moral and Ethical Philosophy	4

3. Achieve an understanding of human behavior and social interaction with particular emphasis on understanding diverse cultures within and beyond the U.S

Code	Title	Credit Hours
LIT-309	The Literature of Multicultural America	4
LIT-310	African American Literature	4
LIT-311	Literatures of the African Diaspora	4
SOC-337	Religion in Society	4
SSCI-314	Technology and Sustainable Development	4
SSCI-398	Social Science Study Abroad Advanced Topics	4

4. Achieve an understanding of effective and ineffective practices in human communication

Code	Title	Credit Hours
COMM-311	Rhetorical Principles of Persuasion	4
COMM-313	Rhetorical Principles of Public Speaking	4

For more information on the Pre-Law Minor, contact the Liberal Studies Department at csla@kettering.edu.

Statistics Minor

Mathematics Department

Total Required Credits: 32

Code	Title	Credit Hours
MATH-101	Calculus I	4
MATH-102	Calculus II	4
MATH-203	Multivariate Calculus	4
MATH-258	Probability and Statistics	4
MATH-327	Probability & Stochastic Modeling	4
MATH-330	Biostatistics	4
Two courses must be selected from the following list:		8
IME-332	Engineering Statistics I - Statistical Inference and Regression	
IME-422	Simulation	
IME-423	Operations Research II - Stochastic Models	
IME-471	Quality Assurance	
IME-472	Introduction to Reliability and Maintainability	
IME-473	Design of Experiments	
IME-476	Lean Six Sigma	
MATH-427	Statistical Inference & Modeling	
MATH-428	Sampling Theory	
Total Credit Hours		32

For more information on the Statistics Minor contact the Mathematics Department at math@kettering.edu.

Learning Outcomes

University Learning Outcomes

In keeping with its mission, core values, and goals, Kettering University strives to ensure that graduates of its baccalaureate degree programs achieve the following learning outcomes:

1. KNOWLEDGE - Graduating Kettering University students will possess the knowledge of their discipline and be able to work effectively within the larger STEAM context.

- Students will demonstrate competence in their own fields of study.
- Students will be able to apply their knowledge/skills across a variety of contexts.

2. REASONING - Graduating Kettering University students will possess the ability to apply critical thinking and reasoning in a variety of contexts.

- Students will demonstrate critical thinking and reasoning.
- Students will be able to apply problem solving techniques successfully while taking into consideration the potential impact of those solutions.

3. COMMUNICATION - Graduating Kettering University students will communicate effectively in a variety of contexts.

- Students will communicate effectively using a variety of genres and formats.
- Students will communicate effectively to various audiences.

4. TEAMWORK - Graduating Kettering University students will function effectively within teams.

- Students will serve effectively as members and/or leaders of teams.
- Students will foster collaboration within teams.

5. ETHICS - Graduating Kettering University students will demonstrate ethical and socially-conscious behavior.

- Students will demonstrate professionalism.
- Students will demonstrate honesty, fairness, and equality.
- Students will demonstrate socially-conscious decision-making.

Undergraduate Course Descriptions

The catalog menu item **Courses A-Z** has all Kettering's courses listed with their descriptions for all university courses; the descriptions appear in alphabetical order according to their course letter designations. These descriptions include any prerequisites (requirements student must satisfy before registering for the course), corequisites (requirements students must satisfy while taking the course), the number of credit hours applied for each course, and, where relevant, the hours devoted to lecture, recitation, and laboratory (see applicable department sections for the total credits required for each major or program). If no indication exists for lecture, discussion and laboratory hours, then the course is considered a lecture.

Students should be aware that the courses listed here are subject to change. Many courses are regularly offered in the fall, while others are offered in the winter or summer. However, semester enrollment, course demand, changes in faculty and other factors will sometimes affect the offering of courses. In addition, new courses may have been added and changes in existing courses may have occurred since the printing of this bulletin.

Many 500-level courses can apply to undergraduate or graduate credit. Contact the individual degree department or Graduate Studies Office for more information.

The course numbers 191, 291, 391, 491, and 591 shall be used to describe Special Topics courses at introductory, intermediate, advanced, and mezzanine levels, respectively. Special Topics courses are one-time offerings whose content is determined by current faculty interest. These courses may be repeated for credit when the course is run with different content.

The course numbers 197, 297, 397, and 497 shall be used to admit credit for transfer or guest courses that are not equivalent to existing Kettering courses within a discipline. The subject **FREE** (e.g FREE-297) is used to admit transfer or guest courses that are not equivalent to Kettering courses, and do not fall within existing Kettering disciplines.

The course numbers 398, 498, and 598 shall be used to describe transfer courses taken as part of a Kettering University International Studies Program.

The course numbers 399, 499, and 599 describe an independent study course. Independent study is student-directed exploration with faculty guidance at an advanced level. This course may be repeated for credit when the course is run with different content.

Sample Course Description

BIOL-441 Cellular Biology 4 Credits
Corequisites: BIOL-442
Prerequisites: CHEM-351
Minimum Class Standing: Junior
An introduction to the structure and function of cells. Topics include cell motility, intracellular transport, cellular chemistry, membranes, organelles, metabolism, reproduction, and signaling.
Lecture: 4, Lab 0, Other 0

Course availability is subject to change due to low enrollment, or faculty availability.

Admissions

Kettering University's Office of Undergraduate Admissions evaluates student credentials to determine who is best qualified to pursue a degree in any of the STEM (science, technology, engineering and mathematics) or management programs offered at the university. Emphasis is placed on applicants' overall academic records, especially grades in core academic courses (English, science and math). Kettering uses a holistic approach to admission, and consideration is also given to each student's personal essay, extracurricular activities, employment history and other evidence of achievement and motivation. Kettering does not discriminate on the basis of race, color, national origin, age, marital status, sex, sexual orientation including gender identity or expression, disability, religion, height, weight, genetic information or veteran status.

Scholastic Preparation

Applicants must possess a high school diploma or recognized equivalency. Applicants for first-year admission must have completed 16 credits in a college preparatory program for grades 9-12. Credits awarded in eighth grade for ninth grade algebra and recorded on an official high school transcript may count toward one credit of algebra. To be eligible for admission, a student will have completed the following courses prior to enrollment:

English	Six semesters required (eight semesters recommended)
Mathematics	Four Semesters - Algebra
	Two semesters - Geometry
	One semester - Trigonometry, often included in Algebra II and/or Pre-calculus
Science	Four semesters - science with lab including two semesters of either Chemistry or Physics. Both are strongly recommended.

We encourage all applicants to complete English, science, and math courses beyond these minimum requirements. Training and experience in computer aided design (CAD) and computer science may also be considered.

Beyond these minimum requirements, Kettering does not have a fixed formula for determining admission. Admission to Kettering University is competitive and a strong record of academic achievement is expected.

Freshman Online Applications

Students interested in admission to Kettering University must apply online. Students may apply using either the Common Application or the Kettering Application.

Students are encouraged to apply in the fall of their senior year. Kettering subscribes to the following deadlines: Early Action I - November 15; Early Action II - January 15. Kettering University reviews applications on a rolling basis after January 15. A completed online application, official transcripts, standardized test results (optional)*, and supplemental materials including personal essays, must all be received in order for evaluation to occur. All credentials submitted to the Admissions Office become part of the applicant file at Kettering University, and cannot be returned to the applicant nor forwarded to any other institution.

Admitted applicants may defer enrollment for up to one year after the initial offer of admission.

If you have any questions regarding the application process, please call the Office of Undergraduate Admissions at 810-762-7865.

Test-Optional Policy

As of August 2020, Kettering University will be test-optional for all students applying to the 2021 or 2022 entry terms. This change was made in response to the global COVID-19 pandemic and its continuing impact on access to these exams for students around the world. Students who are able to take SAT/ACT may submit test score(s) if they feel it will benefit their standing in the admissions review process. Kettering University will continue to take a holistic approach when reviewing a student's application. Therefore, students who choose to not submit standardized testing scores will not be negatively impacted during the review process.

Official Transcripts

Applicants must submit official transcripts and supporting information directly to Kettering University from their high school guidance offices. Transcripts handled by students are considered unofficial and will not be evaluated. Transcripts need to account for all high schools attended and, in the case of dual enrolled students, all colleges/universities attended (this includes all for-credit online classes).

Matriculation into Kettering is contingent upon satisfactory performance in, and completion of, senior-level courses in which the student is enrolled. Final high school and college/university transcripts must be submitted to the Office of Undergraduate Admissions. Failure to do so will impact a student's ability to register for classes.

Homeschool Student Applicants

Kettering University welcomes applications from homeschooled students. Students must submit the same application materials and meet the same admission requirements as all other high school students including a completed online application (including essay), standardized test scores (optional)*, and official transcripts developed by the home school association or by primary teachers.

All transcripts should include: course names, credits, in progress/final grades for all grade 9-12 courses, graduation date, and a signature affirming that the transcript is the official record of academic studies. If any high school credit was earned in a formal high school or college setting, the applicant must also supply an official transcript from that respective school. Courses taken online or through correspondence programs should be similarly documented. For evaluation purposes, we encourage especially clear documentation and explanation of all English, math, and science courses. The Office of Undergraduate Admissions will contact the student's primary educator if additional information is needed.

Please note that all materials sent as part of the application become the property of Kettering University and will not be returned to the student. Final transcripts showing a high school graduation date and/or final college transcripts must be submitted by all incoming students. Failure to do so will impact a student's ability to register for classes.

International Student Applicants

Students who reside outside of the United States, and non-U.S. Citizens living in the United States, are welcome to apply for admission to

Kettering University. Admission decisions will be based on academic achievement in secondary school and/or university studies.

Official/certified copies of transcripts/educational certificates and records with English translations must be sent directly from the school to Kettering University. Before matriculating, all international students must also provide a financial plan for tuition, a copy of a valid passport, and a final transcript. Additional items may be requested to complete the admission process, such as a secondary school/university grading scale or a professional credential evaluation.

Students from non-English language speaking countries may be *conditionally* admitted based on academic merit with the understanding that English proficiency standards must be met before full matriculation into a degree-seeking program. To demonstrate English-language proficiency, students should submit at least one of the following test results: SAT, ACT, Test of English as a Foreign Language (TOEFL), International English Language Testing System (IELTS), MELAB/MET, or Duolingo. Test requirements may be waived if a student has attended at least two academic years of high school where English is the language of instruction (documentation may be requested). International transfer students may have testing waived if a student has attended an accredited U.S. college or university for one calendar year or two academic semesters with a minimum 3.00 grade point average. Students may also demonstrate competency in Kettering University's ESL Program or by completing an ESL program offered by an approved ELS center.

Immigration Information: F-1 Student Visa Applicants

Admitted international students will receive an I-20 form with their official letter of admission. All international students are required to present the I-20 when applying for an F-1 Student Visa and again at their port of entry into the United States. Applicants enrolled at another U.S. institution with an F-1 Student Visa must complete Kettering's Transfer-In form and be released from the Student & Exchange Visitor Program (SEVIS) by their current institution before Kettering University can issue a new I-20 form.

Co-op Employment of International Students

Undergraduate degree-seeking international students are required to participate in Kettering's Cooperative and Experiential Education program. Participation in the Kettering Co-op program is a mandatory graduation requirement, and is included in a student's F-1 Student Visa parameters. As is the case for domestic students, international students are responsible for work term living expenses, transportation, and personal expenses.

Transfer Student Applicants

Kettering University is transfer-friendly and encourages students with prior college experience to apply for admission. Kettering is an MTA (Michigan Transfer Agreement) university. Students who have taken ***any*** college courses after graduation from high school are considered transfer students.

Transfer applicants must have official transcripts sent directly to Kettering from all colleges/universities attended. Additional information, such as high school transcripts or SAT/ACT scores*, may also be requested from students who have completed fewer than 24 credit hours. A list of courses in progress and the catalog(s) with course descriptions from each college attended may also be requested.

Kettering University offers rolling admission and transfers students may apply at any time during the year for entry in July, October, January or April.

Scholastic Preparation

To be eligible for admission to Kettering University, transfer students must complete the below courses prior to enrollment (some of these requirements may have been completed at the high school level). College-level math and laboratory science coursework will be strongly considered when evaluating transfer applications, especially for majors in the College of Engineering or the College of Sciences and Liberal Arts.

English	Six semesters required (eight semesters recommended)
Mathematics	Four semesters - Algebra
	Two semesters - Geometry
	One semester - Trigonometry, often included in Algebra II and/or Pre-calculus
Science	Four semesters - science with lab including two semesters of either Chemistry or Physics. Both are strongly recommended.

Academic Requirements for Transfer Students

Beyond the above minimum scholastic requirements, Kettering does not have a fixed formula for determining admission. However, a strong record of academic achievement is expected. Primary consideration is given to the applicant's overall grade point average and number of credit hours taken. Secondary consideration is given to the student's employment history, extracurricular activities and honors, and other evidence of ability, achievement and motivation.

A typical transfer student will have pursued 12-16 credit hours per semester of coursework similar to that which is taken by a Kettering University student. Candidates who have not pursued full-time collegiate study and/or have followed a program that does not include the extensive study of mathematics and science will be evaluated individually on their college and high school records and college entrance exam scores.

Prospective transfer students should maintain an overall grade point average of at least a "B". Applicants with majors in the College of Engineering or the College of Sciences and Liberal Arts should also have strong math and science grades – again of at least a "B".

Transfer Credit Evaluation

Courses submitted for transfer credit should be comparable in content and difficulty to those offered at Kettering University. To complete a preliminary credit self-audit, use the Transfer Course Equivalency Tool. Applicants must provide official transcripts and may be required to provide the Registrar's Office with a college course catalog, course syllabi, or additional information for evaluation purposes. Transfer applicants who have completed Advanced Placement (AP) or International Baccalaureate (IB) courses may also need to have official AP/IB scores sent to the university.

Admitted students will be contacted with the results of an ***official*** credit evaluation after submitting an enrollment deposit.

Suggested Courses

Transfer courses should reflect a strong background in math and science and can include general education classes common to undergraduate degree programs:

Code	Title	Credit Hours
CHEM-135 & CHEM-136	Principles of Chemistry and Principles of Chemistry Lab	4
COMM-101	Rhetoric & Writing (Composition & Speech)	4
ECON-201	Economic Principles (Micro and/or Macro)	4
MATH-101	Calculus I (Differential Calculus)	4
MATH-102	Calculus II (Integral Calculus)	4
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory (Calculus-based)	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
History, Literature, Philosophy, etc. (300+ level)		4

Transfer of Experiential and Cooperative Education Work Experience

Transfer students entering Kettering with less than Junior 1 (JR1) standing who have participated in another comparable college-level cooperative and experiential education program, or those who have significant work experience related to their Kettering University degree program, may be eligible to transfer these experiences towards their co-op degree requirements. Students should contact the Cooperative and Experiential Education Office at 810-762-9846 to determine the documentation necessary to transfer a maximum of two work terms (only applicable toward freshman-sophomore requirements).

Military Veterans and Families

Kettering University is a member of the Post-911 G.I. Bill (Chapter 33) and Yellow Ribbon programs. Those on active duty, released from active duty, active reserve, inactive reserve, and dependents of military service members may apply for admission as a freshman, transfer student, or for graduate studies. To utilize the Post-911 G.I. Bill or Yellow Ribbon program, the military service member must speak with the appropriate Educational Service Officer or counselor and apply for the benefits through the Veteran's Administration.

Additional Requirements for Admitted Students

Enrollment Deposit

All admitted students must submit a $300 enrollment deposit in order to confirm enrollment to Kettering University and hold their seats in the class. This money will be credited towards tuition. The enrollment deposit is fully refundable until May 1, 2021.

Math Placement Examination

A mathematics placement examination may be required of incoming freshmen and transfer students. Students who have received appropriate transfer credit, or Advanced Placement or International Baccalaureate credit, may be exempt from the exam. See below for more information concerning AP and IB credits. Additionally, students who score high on math subsections of college entrance exams may also be exempted from the mathematics placement exam.

Health, Counseling, Disability Services & Health Insurance Information

Prior to enrollment, all students must complete a Health Inquiry Form. All medical information is treated confidentially and cannot be released without the student's knowledge or written consent. The Kettering University Wellness Center uses this information to create a continuous record of student wellness care. Within the inquiry, all students must answer the TB screening questions and submit documentation, if needed. Information on what to do about physical and/or mental health concerns, including disability accommodations, are addressed directly with the Wellness Center staff via email at wellness@kettering.edu.

Kettering University requires all enrolled students to carry health insurance. International students are automatically enrolled into the Kettering Student Health Insurance Plan upon arrival to campus. Domestic students must provide proof of insurance annually online to a third party, Wellfleet (formerly Consolidated Health Plans), to waive out of Kettering's Student Health Insurance Plan. Contact the Wellness Center for updates on annual deadlines to submit health insurance information. Students who do not complete a waiver will be automatically enrolled. Students who fail to provide proof of health insurance through the verification process will remain enrolled in the Kettering Student Health Insurance Plan and will be responsible for associated costs. The University will make no exceptions.

Kettering University does not require a medical examination prior to enrollment. However, some co-op employers may require such an exam as a condition of employment or due to particular working conditions.

Cooperative and Experiential Education Employment Process

Accepted students are eligible to begin the co-op employment search process in the spring of their senior year of high school. Students need to have a Kettering-approved resume and are encouraged to work with their assigned Co-op Managers. The Cooperative and Experiential Education Office may begin forwarding the resumes of applicants to potential co-op employers starting as early as February. Careful attention is given to the student's objectives, needs and preferences, as well as to employer criteria.

Companies may choose to interview applicants based on academic performance, employment history, extracurricular activities and honors. Factors influencing final selection include communication skills, leadership potential, a desire for a career in the industry, and the capacity to acquire the necessary academic and practical background for a future position of responsibility. Information concerning the interviewing process is available from the Cooperative and Experiential Education Office at 810-762-9846.

Housing Application

In recognition of the educational value of an on-campus living experience, the Kettering University Board of Trustees has officially adopted an on-campus residency and meal plan requirement. Students must complete housing applications before moving onto campus. All first-year students are required to live in Thompson Hall and have a full meal plan during their first two academic terms. Students who transfer to Kettering University must reside in Thompson Hall and have a full meal plan for their first two academic terms at Kettering University

unless they meet one or more of the following documented criteria: be 21 years of age or older prior to the last day of classes of the term; be married; have child(ren) in residence with legal custody or guardianship; have previously completed two terms in a residence hall (at a college/university). Documentation may be requested for verification. Housing waivers may be requested by emailing reslife@kettering.edu.

International Baccalaureate Credit

Applicants seeking International Baccalaureate (IB) credit should have an official IB transcript sent directly to Kettering's Office of Undergraduate Admissions. Credit will be granted for passes at the "IB Standard Level *(SL)" in Computer Science only. Credit will be issued for passes at the "IB Higher Level (HL)" according to the IBO table below.

IBO Exam	Required Score	Credits Granted	Kettering Course Number
Biology (HL)	6, 7[1]	4	BIOL-241 & BIOL-242
Chemistry (HL)	5, 6, 7	4	CHEM-135 & CHEM-136
Computer Science (HL)	5, 6, 7	8	CS-101 & CS-102
Computer Science (SL)	5, 6, 7	4	CS-101
Economics (HL)	6, 7	4	ECON-201
English (HL)	6, 7	4	HUMN-297
Foreign Language - Any (HL)	5, 6, 7	4	LANG-297
History (HL)	6, 7	4	SSCI-297
Mathematics (HL)	5, 6, 7	4	MATH-101
Philosophy (HL)	5, 6, 7	4	PHIL-297
Physics (HL)	6, 7[1]	4	PHYS-114 & PHYS-115
Social & Cultural Anthropology (HL)	6, 7	4	SSCI-297

[1] Kettering University awards credit for IB scores of 5, 6 or 7 for physics and biology when the full IB diploma has been earned.

Advanced Placement Credit

Applicants who have completed Advanced Placement (AP) courses are encouraged to take the College Board AP Examinations. The below chart indicates scores needed to receive Kettering University credit. Students should have an official AP transcript sent to Kettering directly from the College Board AP Program. AP credits do not override prerequisite requirements.

Advanced Placement Exam	Required Score	Credits Granted	Kettering Course Number
Art History[1]	4, 5	4	ART-297
Art Studio 2-D Design[1]	4, 5	4	ART-297
Art Studio 3-D Design[1]	4, 5	4	ART-297
Biology[2]	4, 5	3 and 1	BIOL-141 & BIOL-142
Calculus AB	4, 5	4	MATH-101
Calculus AB Subgrade	4, 5	4	MATH-101
Calculus BC	4, 5	4 and 4	MATH-101 & MATH-102
Chemistry	4, 5	3 and 1	CHEM-135 & CHEM-136 or CHEM-137 & CHEM-136
Comparative Government and Politics[1]	4, 5	4	SSCI-297
Computer Science A	4, 5	4	CS-101
Computer Science Principles[1, 2]	4, 5	4	CS-297
English Language and Composition[1]	4, 5	4	COMM-297
English Literature and Composition[1]	4, 5	4	HUMN-297
Environmental Science[2]	4, 5	4	BIOL-297
European History[1]	4, 5	4	SSCI-297
Foreign Language and Culture - Any[1]	4, 5	4	LANG-297
Foreign Literature and Culture - Any[1]	4,5	4	HUMN-297
Human Geography[1]	4, 5	4	SSCI-297
Macroeconomics[3]	4, 5	4	ECON-201
Microeconomics[3]	4, 5	4	ECON-201
Music Theory[1]	4, 5	4	MUS-297
Physics C, Mechanics	4, 5	3 and 1	PHYS-114 & PHYS-115
Physics C, Electricity & Magnetism	4, 5	3 and 1	PHYS-224 & PHYS-225
Psychology[1]	4, 5	4	SSCI-297
Research[1]	4, 5	4	LS-297
Seminar[1]	4, 5	4	LS-297
Statistics[2]	3, 4, 5	4	BUSN-271
U.S. Government and Politics[1]	4, 5	4	SSCI-297
U.S. History[1]	4, 5	4	HIST-297
World History[1]	4, 5	4	SSCI-297

[1] Course counts as a free elective in all degree programs.

[2] Seek department advisement for the curriculum requirement application.

[3] This AP course can count as ECON-297 (Free Elective) if student already has credit for ECON-201.

NOTE: The course numbers 297 shall be used to admit credit for AP courses that are not equivalent to existing Kettering courses.

Admission of Non-degree Seeking Students

Dual/Early Enrollment

Kettering University offers exceptional high school students an opportunity to experience university academics at our nationally recognized university through the State of Michigan guidelines for early enrollment or dual enrollment programs. Scholarships are awarded to students who qualify. This program is available to any 11th or 12th grade student who meets Kettering's registration requirements listed below. The student/parent is responsible for all costs associated with early enrollment at Kettering University. Through dual enrollment, the student's high school pays a portion or all of the tuition and the student/parent/guardian is responsible for any additional costs not paid by the high school. State guidelines and the high school determine the course eligibility and the amount of tuition the high school is responsible to pay. No application fee is required. Two courses per term are allowed, and a maximum of 16 credit hours per academic year.

Dual/Early Enrollment Registration Requirements

The following must be submitted for course registration:

- High School transcript with 3.2 G.P.A.
- Completed application and registration form.

Registrations are approved by the Admissions Office based on available space.

Dual Enrollment – Scholarship

A scholarship is awarded to a student who is admitted to Kettering University as a dual enrollment student.

Questions about early/dual enrollment can be directed to the Admissions Office at admissions@kettering.edu or 810-762-7865.

Financial Aid

Financial Aid Policies

Required Forms

- Free Application for Federal Student Aid (FAFSA)
- Other documentation required for federal verification as requested

Deadline Dates

- To be considered for all available awards, freshmen applicants are encouraged to apply by February 15, and continuing students are encouraged to apply by March 1.
- All required documents must be submitted to the Financial Aid Office in a timely manner. Loan requests will be certified, need-based grants will be credited to accounts, and FWS (Federal Work-Study) will be initiated once all documents requested for verification process are submitted. Verification must be completed before, or during, at least half-time attendance; failure to do so will result in the loss of eligibility.
- Scholarships and grants are credited to student accounts according to the schedule on the award letter. Loans are credited upon receipt of funds from the lender. Earnings from on-campus employment are paid on a bi-weekly basis.
- Students may contact the Financial Aid Office in Room 4-700 CC between the hours of 8:00 a.m. and 5:00 p.m. (Monday - Friday) for specific details regarding eligibility, application procedures, deadlines, and required documents.

In addition to cooperative education earnings, there are three basic types of financial assistance for students: gift aid, loans, and campus employment. While these are described below, the Kettering University website contains detailed information about these awards.

Gift Aid Sources

- **Federal Pell Grant** This grant is from the federal government and is awarded based on the student's Expected Family Contribution (EFC) as determined by the federal methodology needs analysis formula by completing the FAFSA.
- **Federal Supplemental Educational Opportunity Grant (SEOG)** This grant is from the federal government and may be awarded by the Kettering University Financial Aid Office to undergraduate students who demonstrate exceptional financial need.
- **Michigan Competitive Scholarship** This scholarship is awarded by the Michigan Department of Education to Michigan residents. Eligibility is based on academic requirements and financial need. Students must initially qualify for the scholarship before enrolling as college freshmen. The scholarship is renewable for a maximum of ten semesters, with renewal based on continued need and satisfactory academic progress. Recipients must file the Free Application for Federal Student Aid (FAFSA) each year before the State of Michigan deadline of March 1.
- ***Endowed Scholarships*** *Some scholarships are open to a wide spectrum of students, while others have specialized criteria. Questions regarding eligibility, scholarship guidelines, and the application process and deadlines should be directed to the Financial Aid Office.*

Loan Sources

Federal Direct Subsidized/Unsubsidized Loans These are loans that are available to students through the government's loan program. The amount students are eligible to borrow is based on their grade level. These loans have a fixed interest rate and can be deferred while the student is enrolled at least half-time. An origination fee is deducted from the approved loan amount before disbursement. This fee is determined each year and is subject to change. Repayment on these loans begins six months after graduation or when the student ceases to be enrolled at least half-time. These loans have a 10-year repayment plan.

- **Federal Direct Subsidized Loan** This is a need-based loan for which students are not responsible for the interest while in school at least half-time.
- **Federal Direct Unsubsidized Loan** This is a non-need loan for which the student is fully responsible for paying the interest. Interest begins to accrue once the loan has disbursed.

Dependent Students	Maximum Subsidized Loan	Maximum Unsubsidized Loan	Total Loan Eligibility
Freshman	3,500	2,000	5,500
Sophomore	4,500	2,000	6,500
Junior/Senior	5,500	2,000	7,500

Students that do not qualify for the need-based Subsidized Loan are eligible to borrow the "Total Loan Eligibility" from the Unsubsidized Loan. The student's award letter will reflect the amount they are eligible to borrow.

- **Federal Direct PLUS Loan** A credit-based loan that is available to the parents of dependent students who have completed the FAFSA. The amount that a parent may borrow is based on the student's educational costs minus any other financial aid received. The interest rate is fixed; however, interest does begin to accrue once the loan has disbursed. A payment deferment is an option is available if it is requested by the parent. Otherwise, repayment begins 60 days after the final disbursement of the academic year. An origination fee is deducted from the approved loan before disbursement. This fee is determined each year and is subject to change.
  Note: If a parent is denied a PLUS Loan due to an adverse credit history, the dependent student can access an additional loan through the Federal Direct Unsubsidized Loan program listed above. The amounts are as follows:

Dependent Students with a PLUS Denial or Independent Students	Maximum Subsidized Loan	Maximum Unsubsidized Loan	Total Loan Eligibility
Freshman	3,500	6,000	9,500
Sophomore	4,500	6,000	10,500
Junior/Senior	5,500	7,000	12,500

- **Private Student Loan Programs** These programs are intended to provide students and their families an alternate source of loan funds to assist in meeting the cost of postsecondary education. These loans are credit-based and offered through third-party lenders to the student. Interest on a private loan will begin to accrue once the loan has disbursed. Repayment on most loans begins six months after graduation or when the student ceases to be enrolled at least half-time. Contact the Financial Aid Office for further details.

On-Campus Student Employment

Federal Work-Study (FWS) is a program that assists Kettering University in providing on-campus employment for students with demonstrated need.

Campus employment (Student Labor) is available on a limited basis to students without financial need who would like to earn money toward educational cost while attending school.

Satisfactory Academic Progress (SAP)

To maintain financial aid eligibility, you must make Satisfactory Academic Progress (SAP) toward obtaining a degree. Satisfactory Academic Progress will be monitored at the end of each academic term whether or not you have received financial aid. This policy applies to all federal, state, and university-funded grants, along with some private student loans.

Minimum standard requirements:

- **Qualitative Measure (Cumulative GPA):** Must maintain a cumulative grade point average (GPA) of at least 2.0 at the end of each academic term.
- **Qualitative Measure (Term GPA) -** Must maintain a term GPA of at least 2.0 at the end of each academic term.
- **Quantitative Measure (Pace of progression to ensure completion within the maximum time frame):** Pace of progression is determined by dividing the cumulative number of credit hours successfully completed by the cumulative number of credit hours attempted, including transfer hours that have been accepted. Undergraduate students must maintain a pace of progression of 67% for all course work attempted, including transfer credits.
- **Credits Attempted** are defined as all classes for which a student received a passing grade ("D" or better), or an "F", "FN", "W", "WN" or "I".
- **Credits Completed** are defined as all classes for which a student receives a passing grade of "D" or better.
- **Audit Credits** do not count as credits attempted or completed.
- **Repeated Courses** count as credits attempted during each term the student is enrolled in the course; however, they will be counted only once as credits completed the first time a passing grade is received for the course.
- **Transfer Credits** count towards the quantitative measure.
- **Maximum Time Frame (to Complete a Degree):** The maximum allowable timeframe for receiving aid is equal to 150 percent of the length of your academic program. If you are a transfer student, your accepted transfer coursework will be counted in the maximum timeframe.

Financial Aid Warning

Students who fail to meet the minimum standards for Satisfactory Academic Progress at the end of the academic term will be placed on Financial Aid Warning. A student may continue to receive financial aid for one semester while on Financial Aid Warning. Students should use this opportunity to re-establish Satisfactory Academic Progress.

If at the end of the Financial Aid Warning period, the student is meeting the minimum requirements for Satisfactory Academic Progress, the Financial Aid Warning is lifted.

Students who fail to make Satisfactory Academic Progress after the Financial Aid Warning semester will be ineligible for financial aid. You may appeal this status. If your appeal is approved, your financial aid eligibility will be reinstated, and you will be placed on Financial Aid Probation for one term. If your appeal is denied, your financial aid will be suspended for the next academic term.

Financial Aid Probation

To be on Financial Aid Probation you would have to successfully appeal not making Satisfactory Academic Progress after a Financial Aid Warning term. Students may receive aid for one more academic term if an appeal is granted.

If at the end of the Financial Aid Probation period, the student is meeting the minimum requirements for Satisfactory Academic Progress, the Financial Aid Probation is lifted.

Students who fail to make Satisfactory Academic Progress after the Financial Aid Probation semester will be ineligible for financial aid and placed on Financial Aid Suspension.

Financial Aid Suspension

If the Financial Aid Office determines that you have not met the minimum standard requirements to receive financial aid, and your appeal is denied, you will not be eligible to receive aid for your next period of enrollment.

Appeal

If extenuating circumstances exist which caused a student to fail to meet one of the above standards, a written appeal may be submitted. Examples of extenuating circumstances include, but are not limited to unexpected death or major hospitalization of an immediate family member, extended hospitalization or medical condition of the student, house fire victim, or victim of a violent crime. The appeal should address and document these extenuating circumstances **and** include:

- Why you failed to make Satisfactory Academic Progress
- What has changed that will allow you to make Satisfactory Academic Progress during your next academic term

The appeal form is available on the Financial Aid website. The appeal form must be turned into the Financial Aid Office within 30 days of the notification that you are not meeting Satisfactory Academic Progress. Appeals must include supporting documentation. Incomplete appeals or those missing adequate documentation are typically denied.

Those suspended due to attempting credits more than the 150% of the program are not eligible for appeal.

Withdrawing from Courses

Financial aid is based on the number of credits for which students are enrolled at the end of the refund period. Students who are not registered for full-time at that point will have their aid reduced accordingly. Students are encouraged to meet with a financial aid advisor before making withdrawal decisions.

Withdrawing from Kettering

For financial aid purposes there are two types of withdrawals: complete and unofficial.

- Complete: Official withdrawal from the university by the student.
- Unofficial: Federal financial aid regulations consider a student to be an unofficial withdrawal if the student receives all fail (F) grades or a combination of all fail (F) and withdraw (W) grades for the term.

Student Fails to Earn a Passing Grade in any Class

Never Attended: If a student receives a grade of an F due to not attending class, Federal Title IV aid will be adjusted for those classes never attended.

- Example: A student is in four classes which are all worth four credits. The student receives three A grades and one F grade. The instructor reported that the student never attended the class that received the F grade. Aid will be adjusted from 16 credits (full time) to 12 credits (three-quarter time).
- Example: A student is in four classes which are all worth four credits. The student receives all F or W grades (no passing grades). If attendance has not been achieved up through the 60% point of the semester, a calculation is done to determine the amount of the Title IV funds that the student has earned at the time of withdrawal.

Why do we monitor students receiving all 'F' grades?

The University is obligated by federal regulation to review aid recipients receiving all 'F' grades. The assumption behind the law is that a student receiving all 'F' grades walked away from the semester without properly withdrawing from the University. Schools must identify students with 'F' grades within 30 days from the date final grades are posted.

Withdrawing Prior to Completing 60% of Term

Unless a student completes 60% of the term in which federal aid was disbursed, the student will be required to return all or part of the financial aid disbursed in the term. This applies to students who have officially (including medical) or unofficially withdrawn.

Student Financial Aid Enrollment Requirements

Kettering University is a semester-based University with two semesters. Each semester consists of an academic term and a work term.

- July-December is a semester (includes summer and fall terms).
- January-June is a semester (includes winter and spring terms).

Student aid, by law, is paid in semesters. Therefore, students who participate in non-standard enrollment (for example, attending school for two terms July-December and then working January-June) may experience decreased financial aid eligibility.

- Enrollment patterns that will not affect aid eligibility for traditional A-section students include the first and second examples on the chart below.
- Enrollment patterns that will not affect aid eligibility for traditional B-section students include the third and fourth examples on the chart below.

In summary, enrollment patterns that create problems include two academic terms within one semester.

Acceptable Academic Enrollments to Receive Financial Aid

Summer	Fall	Winter	Spring	Enrollment Pattern
X		X		Traditional A
X			X	A/B
	X		X	Traditional B
	X	X		B/A

Note: Students may, according to special needs by their employer, follow other patterns of academic/co-op terms. Students wishing to work three consecutive work terms may do so but will be listed inactive (not a student) for one of the three terms. A student must demonstrate progress toward a degree by attending two academic terms within a given year. Students should send a written request to the Registrar if interested in pursuing this option.

Financial Suspension

Failure to meet financial obligations or agreements with Kettering University may result in financial suspension. Financial suspension (determined by the Business Office) includes suspension from portions of or all privileges to which active students are entitled. Two privileges include issuance of transcripts and processing of current, and future, course registrations.

Honors Program

Incoming freshmen with exceptional academic backgrounds will be considered (by invitation only) for the Honors Program prior to matriculation at Kettering University. The Honors Program provides additional opportunities and enhanced learning experiences beyond the normal Kettering curriculum. Students who graduate as an Honors Program student in good standing will have this designation placed on their official transcripts and diplomas. For additional information, please contact the Admissions Office at admissions@kettering.edu or 810-762-7865.

Program Requirements

- Be accepted to Kettering University, receive an Honors Program invitation from the Provost Office, and submit a Statement of Intent to admissions@kettering.edu
- Earn a minimum of 15 credits per term, with possible exceptions senior year
- Complete an enhanced learning experience for two courses each term
- Maintain a cumulative GPA of 3.5 (students may have a 3.0 at the end of their first year after matriculation but must maintain a 3.5 GPA thereafter)
- Complete a minimum of 161 credit hours

Program Benefits

Honors Program Engagement

Honors Program students benefit from additional engagement with faculty members in the completion of enhanced learning experiences each academic term; in select classes designated specifically for Honors Program students; and with an especially talented and motivated peer group.

Research Placements

Students have the option to pursue an Undergraduate Research Assistant position with a faculty member, usually following freshman year. Once a mutually-agreeable arrangement is made with a faculty member, the student may work for up to eight hours a week (for one academic year maximum) during academic terms and be paid through the Office of the Provost.

Early Admission into the Accelerated Masters Option

Honors Program students are accepted into the Accelerated Masters Option if they choose to pursue that option. Program prerequisite requirements will apply. With proper advising, students can complete a masters degree within a year of finishing their undergraduate coursework.

Honors Designation

Notice of honors designation appears on students' Kettering University transcripts and diplomas, and students will be recognized at Commencement.

Undergraduate Tuition and Fees

Expenses

The current tuition, room, board and business related fees are listed below. The Student Accounts Office will send an email notification to your Kettering email when your tuition bill is ready to view via KU.ePay in Banner Self Service (approximately one month prior to the start of the term). All invoiced amounts are due by the beginning of each academic term and all financial aid arrangements must be made by the end of the first day of classes.

KU.ePay is the university's online billing and payment service, which provides our students the ability to view and pay their student account bill online, 24 hours/day, seven days a week. Students may authorize others to access their KU.ePay account and make payments on their behalf.

With KU.ePay, students and authorized users are able to:

- Review their student account activity.
- View and print billing statements.
- Make payment on their student account, including a single payment or sign up for a payment plan.
- View and print form 1098-T.

Payments may be made via an ACH transaction from a bank account or credit card. International payments may be made through KU.ePay, and will be processed as a bank wire. Please visit KU.ePay for more information. Payment in the form of a check, money order, or cashier's check may be sent directly to the Student Accounts Office.

A $300 late fee will be assessed to accounts which have not been paid in full by 4:00 p.m. fourth week Friday of each academic term. Financial aid is available for students with a demonstrated need; sources of aid are discussed in the Financial Aid (p. 61) section of this catalog.

When registered for courses, students acknowledge enrollment in the courses selected and authorize Kettering University to bill for any related tuition and fees. To avoid any penalties, payment is due no later than 4th week Friday of each academic term. A financial hold and a $300 late fee will be assessed on any account not paid in full which prohibits future course registration and/or cancellation and will result in grades and transcripts being withheld.

Tuition

For purposes of determining financial aid, a full academic load at Kettering University is considered to be 15 credit hours. Kettering University has a fixed rate tuition plan for full-time students. Simply put, Kettering students will be able to rely upon the tuition rate at the University remaining level for the duration of each student's full-time study at Kettering. The tuition rate is inclusive of all tuition-related University fees. *Please see below for Undergraduate Fixed Tuition Guarantee Plan terms and conditions.

Our reason for "fixing" tuition is simple – to take away the guesswork involved in college costs. The Kettering fixed tuition plan means that college costs for the entire program are predictable. While other universities will likely raise tuition every year (creating significant cost increases over the time to a degree), at Kettering, those costs will remain stable.

Simultaneously, we are affirming our commitment to providing superb undergraduate programs in science, technology, engineering, mathematics and business with a rigorous experiential education component. We are dedicated to ensuring every element of your education here is rooted in excellence – whether in the classroom, laboratories, on the playing fields or in the gym.

The following provides you with a listing of tuition and other rates which will be in effect at Kettering University during the 2021-22 school year, which runs from July 1, 2021 through June 30, 2022:

Tuition Rates

Full-time, 15-22 credit hours, per term

Entering Class 2021-22	$22,190
Returning Students 2020-21	$22,190
Returning Students 2019-20	$22,190
Returning Students 2018-19	$21,745
Returning Students 2017-18	$21,245

Part-time, less than 15 credit hours, or overload in excess of 22 credit hours, per credit hour

Entering Class 2021-22	$1,480
Returning Students 2020-21	$1,480
Returning Students 2019-20	$1,480
Returning Students 2018-19	$1,450
Returning Students 2017-18	$1,417

Room and Board

Room Rate Entering Class 2021-22, per term	$2,550
Room Rate Returning Students 2020-21 and prior, per term	$1,990
Board Rate (meal plan), per term	$1,650

Business Related

Exchange Student Enrollment Fee, per term	$250
NSF ACH/Check Processing Fee	$25
Student ID Card Replacement Fee	$10
Student Health Insurance, per year[1]	$1,358
Late Payment Fee	$300
Enrollment Deposit[2]	$300

1 The University requires students to submit proof of health insurance each academic year, or to purchase Kettering's Student Health Insurance Plan.

2 Enrollment Deposit is non-refundable after May 1.

Refund Rates

Tuition, Room, and Board

The following refund rates apply to students who separate from Kettering University before the end of an academic term. These rates also apply to those taking individual courses when dropping classes reduces total credit hours to part-time status (fewer than 15 credit hours), or from overload to full-time status (15-22 credit hours).

First Week	100%
Second Week	75%

Third Week	50%
Fourth Week	25%
Fifth Week	0%

Refund rates are calculated through Sunday of each week.

Any questions related to the tuition and fees can be directed to the Student Accounts Office at 800-955-4464 ext. 9552 or studentaccounts@kettering.edu.

VA Education Benefits

Kettering University will permit any covered individual to attend or participate in the course of education during the period beginning on the date on which the individual provides to the educational institution a certificate of eligibility for entitlement to educational assistance under chapter 31 or 33 (a "certificate of eligibility" can also include a "Statement of Benefits" obtained from the Department of Veterans Affairs' (VA) website – eBenefits, or a VAF 28-1905 form for chapter 31 authorization purposes) and ending on the earlier of the following dates:

1. The date on which payment from VA is made to the institution.

2. 90 days after the date the institution certified tuition and fees following the receipt of the certificate of eligibility.

Kettering University will not impose any penalty, including the assessment of late fees, the denial of access to classes, libraries, or other institutional facilities, or the requirement that a student borrow additional funds because of the student's inability to meet their financial obligations to the institution due to the delayed disbursement of a payment to be provided under chapter 31 or 33.

*Undergraduate Fixed Tuition Guarantee Plan - Terms and Conditions:

- The policy is for 10 successive academic terms.
- Students must remain in good standing and be studying full-time to keep their fixed tuition guarantee.
- Students who exceed 22 credits per term are charged the overload rate based on their entering fixed tuition rate.
- If a student withdraws or is separated at any time, the student is subject to adhere to the University's course withdrawal schedule. If the student is readmitted to the University, the student will be subject to the tuition rate that is equivalent to the fixed tuition rate paid by the entering class students at the time of re-admittance.
- If a student does not graduate by the end of the 10th term, the student will be subject to the tuition rate that is equivalent to the fixed tuition rate paid by the entering class students at that time.
- Transfer students will receive a fixed tuition rate schedule prorated for successive academic terms based on their academic standing when they enroll.
- Room and board and other business related fees are not included in the plan and are subject to change.
- The Board of Trustees reserves the right to modify this program for future entering classes.

Student Affairs

Health, Counseling, Disability, and Insurance Services

On-Campus Health Services:

A licensed practical nurse [LPN] is available during regular business hours for triage services. Students may drop in during business hours or call ahead to make an appointment. Services and programs include, but are not limited to:

- Treatment of minor ailments and injuries (such as scrapes, colds, flu, minor injuries)
- Advice on effective self-care and well-being
- Wellness workshops

Where appropriate, the LPN and/or counselor will refer students to a physician at McLaren Family Medicine Residency Center or to local Urgent Care facilities, located less than two miles from campus.

Off-Campus Health Services:

McLaren Family Medicine Residency Center - An Affiliate of Kettering University

3230 Beecher Road, Suite #1
Flint, MI 48532
(810) 342-5656

Business Hours:
8:00 A.M. – 5:00 P.M., Monday, Wednesday, Friday
8:00 A.M. – 6:30 P.M., Tuesday, Thursday

Acute Care Clinic Hours: 12:30-1:15 P.M., Monday-Friday sign-in time (Drop-in; first-come, first-served)

All students, whether referred by the Wellness Center or self-referred, may utilize the services of McLaren Family Medicine Residency Center physicians by making an appointment or dropping by the Acute Care Clinic during the posted hours. McLaren will bill students' insurance companies and coordinate insurance benefits and referrals for treatment. Students must present their Kettering ID and health insurance cards at each visit. Students are responsible for co-payments and uncovered costs.

For after-hours care that cannot wait until the Wellness Center and/or McLaren Family Medicine Residency Center are open, please refer to the Community Resources section of the Wellness Center website for local urgent care centers. Students will need personal identification and their health insurance card to obtain care. Students are responsible for co-payments and uncovered costs.

Counseling Services

The Wellness Center provides individual counseling to students who experience psychological or emotional difficulties whenever they occur. A counselor is available by appointment. Students can drop by or call the Wellness Center to make an appointment. Some issues that a counselor can help with include, but are not limited to:

- Relationship conflicts
- Stress and/or other emotional difficulties
- Grief and loss issues
- Alcohol or other drug use
- Transition to college life
- Harassing and bullying issues
- Workshops on a variety of topics

24/7/365 Student Assistance Program Telephonic Counseling

Additional confidential counseling is available, 24/7/365, by phone at (855) 774-4700. The Student Assistance Program provides students with the same resources as the on-site counselor and is available to all students regardless of whether they are attending classes or working during a co-op term.

24/7/365 Crisis Counseling

Crisis counseling is available by phone at (800) 273-TALK and available 24/7, 365 days a year. Students in crisis (whether on campus, at a co-op assignment, or elsewhere) should utilize the Suicide Prevention Hotline.

Disability Services

Kettering University provides disability services in compliance with the American with Disabilities Act (1990) and its amendments, along with state and local regulations regarding students, employees, and applicants with disabilities. Under these laws, no qualified individual with a disability shall be denied access to participation in services, programs, and/or activities at Kettering University. In carrying out Kettering's policy regarding disabled students, employees and applicants, we recognize mobility, sensory, medical, psychological, and learning disabilities. We attempt to provide reasonable accommodations for these disabilities for all students who meet the criteria described in the Americans with Disabilities Act.

Any Kettering student who has been diagnosed with a physical, medical, psychological, or learning disability, or suspects that s/he may have one, must contact the Wellness Center. The staff will evaluate the required documentation in support of the claim of disability and make an assessment of a student's needs on a case-by-case basis. The Wellness Center will then make recommendations for the appropriate services and accommodations. The Center will inform faculty and staff who may be responsible for providing the services and/or accommodations. Each term, students must request current accommodations from the Wellness Center and meet with each professor to arrange individual accommodations.

Prospective students in the admissions process should contact the Wellness Center as soon as possible to discuss appropriate documentation needed to verify a disability and to identify the type of services, accommodations, and adaptive equipment that may be necessary.

Mandatory Student Health Insurance

Kettering University requires all enrolled, degree seeking students to carry health insurance coverage. Students are automatically enrolled into the insurance and must provide proof of insurance to be waived. Students who have coverage through their parents or other means must provide proof of health insurance once a year through a third party, Wellfleet, which verifies coverage through their online system. Students who fail to provide proof of health insurance through the verification process will remain enrolled in the Student Health Insurance Plan. The University will make no exceptions. Students and parents may contact Wellfleet at (877) 657-5030 for further information regarding policy coverage.

International Students & Mandatory Health Insurance: Kettering requires that all enrolled international students, including degree-seeking and exchange students, must purchase the Kettering University Student

Health Insurance Plan. Waivers do not apply to international students under any circumstances.

Confidentiality

We are not permitted by law to disclose any medical information to anyone, including a parent or guardian, without the express written consent of the student unless the student is mentally incapacitated or threatens to harm him/herself or someone else. A completed Authorization of Release of Information form must be submitted to the Wellness Center by the student and can be downloaded from the Wellness Center website.

Campus Safety and Other Services

Campus Safety

Kettering University Campus Safety provides 24-hour safety and security services, 365 days a year, to promote a safe learning environment for students. Campus Safety officers provide the following services:

- Student assistance
- Crime prevention
- Complaints and crime investigations
- Emergency management
- General patrol of the Kettering campus
- Information and central communication center
- Security of buildings
- Safety and fire inspections
- Register student and employee vehicles
- Lost and found
- Identification of your valuables
- An escort service for a student or employee leaving a campus building alone at night
- A monthly summary of campus safety activity (published on the Campus Safety website)
- Enforce parking regulations

Kettering University contracts with the City of Flint Police Department to provide around the clock patrols of the campus and the surrounding neighborhood.

In the event of an emergency on campus, DIAL 911 from any campus telephone, or (810) 762-9501, and the Campus Safety Desk Officer will assist you, including calling emergency response personnel.

The Campus Safety office is located on the second (ground) floor of the Campus Center.

Food Services

Kettering Dining Services operates several venues to serve the campus community, including Sunrise Café all-you-can-eat, BJ's Lounge & Grill, Einstein Bros. Bagels, KDS Catering, along with beverage & snack vending machines across campus. All first-year students who reside in Thompson Hall are required to purchase a meal plan during their residency. Meal plans are also available to upperclassmen. Current information including hours of operation may be found on the Kettering Dining Services website. BJ Bucks work just like cash and come with a 10% addition to the amount purchased. They can be purchased online using your Kettering eAccount or in either the C-Store or the food service office. This is tax-free money that can be used in any of the on-campus dining locations including Einstein Bros. Bagels to purchase any food items.

The C-Store

The on-campus convenience store in the Sunset Café, generally referred to as the “C-Store,” is located in the Campus Center (CC) southwest corner off the Great Court. We offer convenience foods, f'real milkshakes & smoothies, Starbucks coffee & lattes, along with everyday essentials. "Bulldog Wear" apparel and Kettering merchandise can also be purchased in the C-Store.

Normal C-Store hours are 8 am to 8 pm Monday through Friday, & 11:30 am to 7 pm Saturday and Sunday. We accept cash, checks, Visa, MasterCard, American Express & Discover credit cards. Student are able to use BJ Bucks on convenience foods in the store, but they cannot be used on Bulldog Wear or Kettering University branded items.

The Online Bookstore

The Online Bookstore is a virtual bookstore operated by MBS Direct/BNC for the University. MBS Direct/BNC offers new, used, rental and digital textbooks, including Book Buyback and Guaranteed Buyback options. The online bookstore accepts Visa, MasterCard, American Express and Discover credit cards, Visa and MasterCard debit cards, as well as PayPal, Diner's Club International, China Union Pay, JCB and/or book vouchers.

The Online Spirit Store

Kettering Bulldog Wear is a virtual spirit store operated by Advanced Online that offers official Kettering Bulldog apparel, accessories & gifts. They accept Visa, Mastercard, American Express and Discover credit cards.

Shipping & Receiving

Shipping & Receiving provides mail delivery, eShip Now, US postage stamps & package pickup/drop off. Located on the 1st floor of the Academic Building, hours of operation are 7:30-5pm Monday through Friday. For your convenience, we supply bubble wrap, packing paper, shipping tape & boxes for a nominal cost. For more information regarding these services, email supply@kettering.edu.

Electronic Vehicle Charging Stations

In partnership with ChargePoint, we maintain two electric vehicle charging stations on Kettering’s campus. One stations is located in the visitor lot outside the Campus Center and is intended for guests. A dual unit is located in the fleet parking area south of the Campus Center and is intended for faculty, staff and student use. In order to use the charging station, you must have a ChargePoint card, which can be obtained by joining for free at https://www.chargepoint.com/. Follow the prompts on the screen of the charging station after you’ve swiped your card. You can now download the mobile app to find stations, check availability and more.

Zipcar

Kettering University offers a rent-a-car program for your convenience!

We have partnered with Zipcar to bring self-service, on-demand car sharing to campus. You must be a registered member to reserve a car online. Rentals are hourly, daily or weekly. When you’re finished with your rental, return the car to its designated parking spot, located in lot EE, just outside of Thompson Hall. For more information, please visit https://www.zipcar.com/universities/kettering-university.

Greek Life

Fraternities and sororities have played an important role in the collegiate experience at Kettering since the school's beginnings in the early 20th century. Currently, nearly 40% of our students belong to Greek organizations, which include 13 fraternities and five sororities. The Greek Life motto, "Civita, Scientia, Officium, Duces," translates to "Community, Knowledge, Service, Leaders" and describes the four cornerstones of the Greek experience at Kettering University. Greek organizations offer many opportunities to meet new people, build life-long friendships, practice and hone leadership and management skills, and in many cases, to provide a home away from home through available housing. Members are expected to strive for academic excellence and to serve local and national communities by donating time and raising money for a variety of philanthropic causes. See the Student Handbook for more information on Kettering's Greek Community.

Kagle Leadership Initiatives (KLI)

Through the Kagle Leadership Initiatives (KLI), Kettering students nurture academic excellence and promote urban leadership qualities and civic engagement among Flint area youth and their families to increase college attendance and graduation and foster life-long community involvement. KLI sponsors a variety of enrichment programs and activities, including mentoring, tutoring, coaching, and targeted special seminars such as taking the ACT/SAT, gaining admission to college, finding financial aid, and managing peer pressure and social acceptance. Students who are interested in making a difference in the Flint community are encouraged to apply. Application dates vary throughout the year.

Office of Multicultural Student Affairs [OMSA]

The Office of Multicultural Student Affairs works to ensure underrepresented students thrive and succeed at Kettering University. It provides academic support services for students to facilitate their retention and graduation. It also creates and implements special activities and events geared toward creating positive self-images and professional development skills. OMSA carries out pre-college programs to increase the number of underrepresented students qualified to pursue degrees at Kettering in science, technology, engineering, mathematics, and business.

OMSA provides these services for underrepresented students:

- Academic Excellence Workshops
- Maximizing Academic Growth in College [MAGIC] Seminars
- Mentoring
- Pre-college Programs
- Professional Development Advice
- Tutoring

New Student Orientation: Campus Orientation Meetings to Prepare Students for Academic and Social Success [COMPASS] and Camp COMPASS

COMPASS, our new student orientation program, provides new students with information and social opportunities that will facilitate a smooth transition to Kettering University. Carried out over four days immediately preceding the beginning of new students' first academic term, COMPASS presents students with a wide variety of opportunities for integration into the campus community, including meeting and getting to know faculty, staff, and students; learning about campus resources, where to obtain specific services, and how to transact business; finding out where to get help, etc. All new students must participate in COMPASS prior to attending classes for the first time.

Camp COMPASS, an optional off-campus leadership development program, is offered each Summer and Fall to new students. Our orientation leaders as well as camp staff, work together to provide a robust leadership experience. We encourage new students to take advantage of this unique program, designed to jump start their first year experience.

Parking

Parking of all motor vehicles at Kettering University is by permit only. Parking for students, faculty and staff is allowed in designated permit lots only when vehicles are properly registered and display the appropriate parking identification. Parking permits may be obtained at the Campus Safety office located in the Campus Center. All campus visitors must register their vehicles with the Campus Safety office and obtain a Visitor's Permit. Parking regulations are posted throughout campus and on the Campus Safety web site.

Recreation Services

Recreation Services provides facilities and programs to meet the recreational interests of the Kettering University community, which includes students, faculty, staff, alumni and their immediate families. Opportunities exist to practice and learn skills which lead to healthy and satisfying life style. Numerous competitive and cooperative activities provide an ideal environment to test one's skills and value system. Specific attention is devoted to addressing students' needs and balancing the academic rigor for which Kettering University is known. Recreation Service programs and facilities are rooted in student ability and desire. Students are employed to operate facilities and conduct programs. Kettering University students use the recreational opportunities as a stress release mechanism and as a means to fitness.

The Recreation Center features an open multi-sports forum with both wood and synthetic flooring. It includes five volleyball courts or four basketball courts or two tennis courts. This area is also used for indoor soccer and the First Robotics competition. Other amenities include: three racquetball/wallyball courts, one squash court, a 1/8 mile suspended jogging track, locker rooms, steam rooms, 25-yard six-lane pool, spa, group exercise room, fitness room with exercise equipment, weight room featuring Cybex equipment, equipment issue area, Student Lounge, Sargent Alumni Lounge, and professional staff offices. The facility is used for formal recreational sports programs (intramurals), informal recreation activities, fitness programs and other Kettering University events. Reservations and drop-in play are accommodated.

Kettering Student Government

Kettering Student Government incorporates Student Senate, Operations Council, Academic Council, and Finance Council. Each year, the student body elects class representatives to the Student Senate, along with the Student Senate President, Vice President, and Administrator. This group's primary charge is to determine student needs, set guidelines and priorities for meeting these needs.

The Student Senate oversees the general operation, approves planned programs and budget, and makes certain that actions of the Operations Council and Finance Council are consistent with the Student Government Constitution. The Student Senate also hears any appeals or grievances brought before it involving matters of constitutional interpretation.

Operations Council is responsible for planning, organizing, and conducting a comprehensive program of activities that meet the

students' needs identified by the Student Senate. Areas of planned activities include such things as intramural athletic events, social events, special interest clubs and major events. The Director of Operations is responsible for appointing student chairpersons to the Operations Council.

Academic Council (AC) serves as the Student Government's primary channel of lobbying for student interest in academic matters. A few of the main objectives for AC are to create and evaluate proposals pertaining to University Policies and practices, investigate issues concerning academic quality for students of the University, and recommend the approval of resolutions and specific courses of actions concerning academic affairs.

Finance Council is responsible for maintaining up-to-date accounting records for each programming account, maintaining equipment inventories, formulation of the budget, and purchasing new equipment for students.

Women's Resource Center/Office of Women Student Affairs

The Clara Elizabeth Davidson Women's Resource Center serves as a meeting space for all women on campus and provides leadership programs and engagement that enhances their academic, professional, and personal development. Annually, the WRC presents programs planned and carried out by students and staff, as well as a number of special events designed to ensure the support and development of our women students as global citizens.

Kettering's Office of Women Student Affairs (OWSA) provides leadership concerning women's issues to ensure our students live and learn in a productive climate that encourages them to reach their full potential.

Fine and Performing Arts

Kettering University is committed to providing a well-rounded education to our students. We are able to offer opportunities to participate in band, choir, piano and guitar lessons. Instruction is provided by professionals from the Flint Institute of Music.

Clubs and Organizations

Kettering University Clubs and Organizations Recognized by Kettering Student Government (KSG)

KSG recognizes and supports a variety of campus clubs and organizations which operate under the Constitution of Kettering Student Government. Students may obtain further information regarding these groups, and procedures on how they can start their own, through the Student Affairs office and in the Student Handbook.

Student Housing

On Campus Student Housing

Frances Wilson Thompson Hall provides an on-campus living and learning community for all students. Several living options are available, including co-ed, single gender, and 24-hour quiet units. Thompson Hall's design affords maximum individual privacy; each resident occupies their own room within units of 30-40 residents. The residence hall is air conditioned, heated, and networked for the internet . Each student's room is equipped with a bed, desk, dresser(s), bookshelf, closet space, a Micro Fridge, telephone jack, and a computer jack. Resident Assistants [RA's] staff individual units. RAs and professional staff carry out programs and activities which contribute to students' personal development.

All first year students, including transfer students, are required to live in Thompson Hall for a minimum of two academic terms. Exceptions may be granted to students over 21 years of age, are married, have children residing in the student's home, or have previously completed a minimum of two terms/one academic year in a residence hall at a college or university. Students who meet at least one of these requirements may request a housing contract release. Release applications may be obtained from the Director of Residence Life and must be submitted at least two weeks from the first day of any term. Contact the director of residence life at reslife@kettering.edu.

Cooperative and Experiential Education

Cooperative and Experiential Education is the key experiential learning component of Kettering University's academic program. It is best exemplified as a three-way partnership agreement between a student, an employer, and the university. The purpose of the program is three-fold:

1. To develop a strong, positive connection between your academic program and your Co-op work experience.
2. To provide educational experiences which orient and integrate you into productive and professional roles with your Co-op employer.
3. To create positive work-related habits, characteristics, and transferable skills which promote professionalism, ethical behavior, diversity, and global awareness.

Requirements

Cooperative and Experiential Education at Kettering University is based on an alternating full-time schedule. Students alternate 11-week academic terms with 12-week terms of progressively challenging work with an approved employer. Students will also participate in professional development modules designed to integrate academic and work experiences at key points in their progression. The minimum requirement for a work term is six weeks (240 hours) worked to receive credit for the term*.

Students who complete their academic requirements in nine full-time terms or more must complete at least five satisfactory work terms. Three of these five must occur after achieving Junior 1 status.

Students who complete their academic requirements in eight full-time terms (minimum of 16 earned credit hours per term) must complete at least four satisfactory work terms. Three of these four must occur after achieving Junior 1 status.

Students transferring to Kettering University with 24 - 55 earned hours (sophomore status) must complete at least four satisfactory work terms. Three after achieving junior status. The work experience terms must be earned while a Kettering University student.

Students transferring to Kettering University with 56 or more earned hours (junior status) without a baccalaureate degree must complete at least three satisfactory work terms. The work experience terms must be earned while a Kettering University student.

Students transferring to Kettering University with a baccalaureate degree must complete at least three satisfactory work terms. The work experience terms must be earned while a Kettering University student.

*Co-op Alternatives based on special circumstances may be considered, including approved alternative options Spring 2020-Spring 2021 terms.

Co-op Managers

Co-op managers serve as a liaison between the employer partner, the student and the university. They help address any concerns and ensure a successful co-op experience for all parties. Co-op managers are highly qualified professionals and a valuable resource, coaching students throughout the entire experiential learning program. Students will learn career-readiness skills and enhance their professionalism by following the advice of co-op managers.

The co-op team also develops and maintains employer relationships and promotes co-op positions to students seeking employment. The co-op office maintains the employment records of all students in the Connect system. It is therefore essential for students to update their co-op manager on any changes to their employment status as they work toward meeting co-op requirements.

Academics

Students placed with a co-op employer are expected to be in good academic standing. Many employers have specific grade requirements, and it is the student's responsibility to know what those requirements are and any resulting consequences of not meeting them. Students whose cumulative GPA falls below 3.0 may be in jeopardy of being released from their co-op assignment from those employers that have a minimum GPA requirement. It is the student's responsibility to submit their grades to their employer if required. Students with poor academic performance may be required to complete consecutive academic terms successfully before being allowed to search for employment. Students must complete the Altering the Academic/Work Sequence process initiated with the Academic Success Center and consult with their Cooperative Education Manager with questions about this process. Locating positions for students with unsatisfactory academic performance can be challenging. Students who are on academic probation and/or have been released for cause by their employer may forfeit their right to university assistance in finding new co-op employment until they satisfy the University set requirements.

The Alternating Sequence

Each student assumes responsibility for maintaining satisfactory progress toward their degree. This includes following an alternating sequence between school and work while enrolled (two school terms and two work terms per academic year). This alternation schedule is determined based on the student's section status (A or B section) noted below.

Term	A-section	B-section
Summer: July - September	School	Work
Fall: October - December	Work	School
Winter: January - March	School	Work
Spring: April - June	Work	School

Any changes to this school/work sequence must be approved in advance through the petition process. Refer to the Academic Policies and Regulations (p. 75) section of this catalog (Petition to Alter Academic/Work Sequence) for more information. Incoming freshman, B-section, are not required to secure a co-op in July, prior to attending school in October, Fall term.

Continuous Growth

The cooperative education partnership is designed to achieve our students' educational and career goals in conjunction with meeting the future talent needs of the co-op employers. Because co-op is an academic program, Kettering students are encouraged to remain with the same employer throughout the entire program. Experience has shown that, in most cases, it is more advantageous for the student to progress within one organization than to change from one to another. Each time a student begins with a new company, they start over in the learning process and are often given less responsibility until their learning curve increases. Partnering with the same employer throughout the entire program has proven to increase opportunities and the level of challenge afforded to the student.

The program provides numerous opportunities for students to develop technical, essential and career-readiness skills. Participation in professional development seminars, one on one coaching meetings with co-op managers, as well as training and mentoring with co-op employers will enhance a student's confidence and marketability. The university encourages students to seek out and take advantage of these additional - often informal - learning resources.

There are appropriate reasons for some students to request a new co-op employer or for an employer to terminate a student. This process is referred to as Reassignment. Students seeking reassignment must meet with their Cooperative Education Manager to help determine if the process is necessary. Kettering will approve reassignment after it has been determined that it would be in the student's best interest and the employer (see below: Changing Co-op Employers). Changes in assignment are permitted but are not granted solely on the basis of student financial gain, personal commitments, or assumed responsibilities. The cooperative relationship intends to meet both the student and the employer's goals, but not at the expense of the other. A healthy respect for both is needed to maintain a successful program.

In the spirit of continuous growth and recognition of the comprehensive student experience, the co-op office liaises with other student-centered offices to best serve the needs of our students. Shared student support and solutions with the Academic Service Center, Office of the Registrar, Student Affairs, Office of International Programs, Wellness Center, and other departments enhance success. The co-op team encourages students to be proactive in engaging with student support teams.

Other Experiential Learning Opportunities

Kettering University offers an array of experiential learning opportunities that can be interchanged or used to greatly enhance our students' co-op experiences. The best examples of these experiences include:

- On-campus co-op opportunities
- Internships
- Research opportunities
- Entrepreneurship opportunities

Students interested in integrating some of these options should work closely with their Cooperative Education Manager; in conjunction with their degree departments.

Selection by a Co-op Employer

Resumes of eligible students are forwarded to co-op employers by the Cooperative Education Managers or various other means such as Co-op Employment Fairs, personal referrals, or self-selection via our Kettering Connect system, where employers may post their positions online for students to review. Careful attention is given to student objectives, interests, needs, and preferences. While most students obtain co-op employment through these efforts, students are equally encouraged to assist in the process by initiating contact with potential co-op employers through their own personal networks. The Kettering Cooperative Education Managers will work with students who wish to pursue new co-op employers. All employers must be approved and entered into our database in order for students to receive credit for their work terms.

Co-op employers choose to interview an applicant based on the student's academic background, employment history, skills, extracurricular activities, and honors. Factors that may influence selection by a co-op employer include communication skills, leadership potential, career interests, desire to work, and the capacity to acquire the necessary academic and practical experiences that lead to greater responsibility.

Section Assignments

A-Section students begin school in July; B-Section students begin school in October. Kettering University assigns students into a section based upon space and class-load balance. The University will attempt to meet student requests but has the right to determine section assignments. Co-op employers may also request section assignments for students based upon their co-op hiring needs.

Registration

All students are automatically registered in their cooperative work experience term according to the alternation sequence. Students are allowed to register for a maximum of eight credits of coursework at Kettering University while registered for a co-op or thesis term.

Students may not adjust their alternating academic and work term sequence without approval. This ensures that all relevant university offices are aware of the changes in the students' plans. As such, arrangements made between students and employers without university approval will result in no co-op credit granted for the term. It is the student's responsibility to submit the completed, signed form to the Office of the Registrar so those appropriate registration adjustments are made. Please note that students may not request to complete more than 2 consecutive co-op terms.

Grading System

To receive a satisfactory grade for a co-op work term, each student must have on file both the Supervisor and Student Evaluation of the co-op experience and evidence of completing a Work-Term Reflection. The supervisor's evaluation of the student's co-op experience should be reviewed with the student and then signed by the employer. During a co-op work term, students generally work full-time (40 hours) a week, and in some cases, are required to work overtime or various shifts depending on the employer's needs. A student hired later than the start of the term or released before the end of the term (except under extreme conditions) must work at least six weeks (240 hours) of the twelve-week term and receive a "satisfactory" grade to have their work experience count toward graduation requirements.

Professional Development Modules

Cooperative and experiential learning is fully integrated into our academic and educational programs and supports University learning outcomes. Over the course of their academic career, students will participate in professional development modules designed to reflect upon, plan for, and be intentional in their personal work experiences.

Work Experience Evaluations

During a cooperative work experience term, the student's performance is evaluated by the student's supervisor, who is assigned for that term by the co-op employer. This evaluation is required by Kettering and is kept on file for five years after graduation or separation from the University. The terms are evaluated on a "satisfactory/unsatisfactory" grading format. No academic credit hours or quality points are earned through the work experience requirements of the program.

S = Satisfactory evaluation received (credit awarded)

U = Unsatisfactory evaluation received (no credit awarded and Academic Standing impacted)

NR = One or both evaluations were not received or were not signed by the student or the employer.

P or PD = Thesis Completed

EX = Thesis Extension

Students Released From a Co-op Employer

Students released from an employer one or more times based upon performance will be required to meet with the Cooperative Education Director, Academic Services, and/or Dean of Students. Students could be required to work on campus as they acquire personal and professional development skills before returning to the workplace. If a student is released due to grades, they may be required to take back-to-back school terms with a reduced number of credits to improve their academic standing.

Changing Co-op Employers

It is strongly encouraged that students work at least two (2) work terms with an employer before they petition for reassignment. Students desiring a change in co-op employer must meet with their Kettering University Cooperative Education Manager to discuss the reason(s) for the request. Requests for reassignment must be approved by the Cooperative Education Manager or Review Team. If it is determined that reassignment is the best option, prior notification to their current employer will be necessary before a new job search process is initiated. Students should not initiate a discussion with a prospective new employer without the Cooperative and Experiential Education Office's knowledge and approval.

It should be emphasized that any deviation from this policy, or unilateral student action, to secure a new co-op employer without prior approval may result in that student jeopardizing receiving work experience credits for graduation and/or being placed on probation. It is imperative that we maintain good relationships with our employer partners, in addition to assisting students in successfully negotiating change.

The Cooperative and Experiential Education Office will assist students who are granted permission to seek new co-op employment. All students available for reassignment will be given access to the current co-op

database, enabling their resume to be sent to co-op employers currently seeking students with similar profiles (academic major, skills, etc.).

Reassignment Process

Reassignment requests are considered on a case-by-case basis. To submit requests; students must follow these steps:

- Make an appointment with the Cooperative Education Manager before pursuing reassignment, preferably at the beginning of a term (or by 3rd week).
- The Cooperative Education Manager will work with the student to determine if reassignment is the right step.
- Documented reasons for the reassignment will be noted by the co-op manager in the student's file for future reference.
- If pursuing reassignment is agreed upon, the student will be required to complete the following:
  - Employer Notification - A phone call to employer followed by a formal resignation email including the Cooperative Education Manager
  - Reflection Form (for terminations)
  - Written approval for passed health screenings (for terminations only)
  - Ensure copies of the following are accurate and up-to-date:
    - All evaluations, both student and employer, are complete
    - Updated resume uploaded to Kettering Connect is required

The Cooperative Education Manager and/or Cooperative Education Director will preview all submitted materials and make a decision. The Cooperative and Experiential Education Office is prepared to help guide and assist all students as they continue to grow with their organizations and move toward graduation. The student is required to contact their Cooperative Education Manager for advice and counsel before making any change to their cooperative education program. The reassignment timing should occur at the end of the work term or within three (3) weeks of the academic term. This ensures both the student and employer adequate time to prepare.

Transfer of Work Experience

Students who have participated in other comparable college-level cooperative work experience programs or who believe they have significant work experiences related to their Kettering degree program may be eligible to transfer this work experience toward their Kettering degree requirements. Students wishing to pursue such action should contact the Cooperative and Experiential Education Office to determine the documentation necessary to transfer a maximum of two work experiences. These work experiences will apply toward the student's freshman and sophomore level experiences only.

Students without a Co-op Employer

Students who are not employed by the start of their work term can complete a back-to-back academic term. This choice will require students to fill out the Altering the Academic/Work Sequence form and gain the necessary signatures from their Cooperative Education Manager, Academic Success Center, and Registrar's office. Students seeking employment while attending classes must maintain a current resume, attend seminars on employment search skills, and apply for positions. They must be easily reached and available for interviews with prospective employers and be proactive in the co-op search process with the Cooperative Education Managers' assistance.

Locating positions for students with unsatisfactory academic performance can be challenging. Students who continue to remain on academic probation and/or have been released for cause by their employer may forfeit their right to university assistance in finding new co-op employment. These students should immediately make an appointment with their Cooperative Education Manager or Director.

Cooperative Education Program Student Agreement

Students acknowledge their understanding of the co-op program and policies via the Cooperative Education Program Student Agreement in Kettering Connect. Active student involvement and participation are paramount to a student's co-op success.

Behavioral Standards and the Kettering University Code of Student Conduct

The Kettering University Code of Student Conduct represents a body of behavioral standards for all students. These standards are strictly and vigorously enforced by the University to ensure members of this educational community a productive, safe, and equitable environment for growth and development. The University expects its students to conduct themselves as mature individuals while enrolled at Kettering wherever they are located, including on campus, at home, and in their work section communities.

Students are expected to comply with all University regulations governing student conduct and the use of University property and facilities. Kettering University has the right to take action and investigate any offense that involves our students, either as victims reporting or students accused of violating the Code of Student Conduct or any federal, state, and/or local laws/ordinances. The Code of Student Conduct extends to students at their places of co-op employment. We expect students to honor their co-op employer's standards for workplace demeanor and may impose our Judicial Affairs procedures upon any student charged by an employer with workplace misconduct.

Student Concerns and Complaints

Refer to the Academic Policies and Regulations (p. 75) section of this catalog, under Student Complaint Procedures.

Culminating Undergraduate Experience: Thesis

The Culminating Undergraduate Experience: Thesis (p. 118) represents a Kettering student's crowning achievement – the tangible proof of growth, knowledge, understanding, and mastery of applicable, real-world skills necessary for the student's transition to professional status upon graduation. All Kettering University baccalaureate programs require completion of the Culminating Undergraduate Experience, also known as the Senior Thesis. The Senior Thesis is a professional document describing a comprehensive project managed and performed by the student. The project is generally performed for the student's co-op employer (p. 70) (Co-op Thesis); however, with employer permission the student is eligible to pursue another option for their thesis: Research Thesis project (with degree program faculty) or Entrepreneurship Thesis project (a comprehensive business plan based on a student idea for a new business, new product, etc.). Students become eligible to conduct work on the thesis when they have earned a minimum of 88 credit

hours (senior I standing). The thesis is an academic requirement taking approximately 240 hours to complete the objectives of the project work and additional time to write the thesis manuscript. Students are introduced to the thesis through an online introductory assignment that is accessible during their junior II co-op term. There are four (4) credit hours awarded upon completion of the thesis and the student will earn a grade of pass with distinction or pass upon faculty approval of a Kettering standardized written thesis manuscript. The focus of this project may be a product, system, creation of a comprehensive business plan, investigation and experimentation of a new idea, etc.

Please Note: Students facing challenges for completing their thesis requirement, including students who have completed all other graduation requirements, are to contact the Academic Success Center - Thesis Office (ASC - Thesis Office) for immediate advisement at thesis@kettering.edu.

Thesis Options and Finding a Thesis Topic

For all thesis options, it is the student's responsibility to find a topic for their thesis project. If the student is unable to secure a thesis project through their co-op employer, with employer approval provided by the company to the ASC - Thesis Office, the student can pursue one of the non co-op thesis options.

Co-op Thesis

A topic idea for the Co-op Thesis project is determined by the employer and student; a project the company needs to be performed and a topic that is of value to the employer. The student manages the project from start to finish and performs a majority of the work. The student is required to complete and submit a thesis topic proposal (known as the PTA) in the thesis software tool, KqUest, in order to obtain topic approval prior to starting the work on the thesis. Upon submission, the thesis topic proposal is electronically forwarded to the student's Employer Thesis Advisor and degree department for evaluation. Upon approval, the student is notified via e-mail of their assigned Faculty Thesis Advisor and acceptance to begin work on the project.

Research Thesis

The Research Thesis focuses on conducting research (most often) on campus with a Kettering faculty member. It is an opportunity for the senior student to apply their academic and co-op experience to the investigation and experimentation of new ideas. Usually, the topic is provided by a Kettering faculty member in the student's degree department. The student is required to complete and submit the Research Thesis Proposal which is available in the thesis software tool, KqUest under "Documents". Once the proposal form is completed, the student and Faculty Thesis Advisor will obtain an approval signature from the Department Head, the proposal is then considered approved. Upon approval, the proposal form is submitted to the ASC - Thesis Office and the student can begin work on the project. The projects are limited and students are selected based on their expertise matching the project scope. For more information contact your degree Department Head or appointed Thesis Administrator within your degree department.

Entrepreneurship Thesis

The Entrepreneurship Thesis focuses on a student-generated idea. An applicant for an Entrepreneurship (E-ship) Thesis project will formalize a comprehensive business plan that can be used in an effort to secure funding for the establishment and/or expansion of a new or existing operating venture. The student is required to complete and submit the E-ship Thesis Proposal form available in Blackboard by sending a request for access to thesis@kettering.edu. Upon submission, the proposal is evaluated by the School of Management. Upon approval, the student is notified via e-mail of their assigned SBDC advisor in the Small Business Development Center - SBDC (located on campus and funded through the State of Michigan) as well as their Faculty Thesis Advisor and acceptance to begin work on the project.

Please note: Students who have exhausted all efforts to identify a thesis topic and require Kettering's assistance to find one, are to complete a Directed Thesis Request Form. The form can be provided by sending a request to thesis@kettering.edu. Upon completion, the form will then be sent to the student's degree Department Head as an alert that the student needs assistance. The degree Department Head will attempt to identify a thesis topic that fits the student's skill set and experience defined in the Directed Thesis Request Form. Please note: The ASC - Thesis Office recommends this request form to be submitted if the student is unable to identify a Thesis topic by the end of the student's senior I co-op term.

Alternative to Thesis (COVID-19 Option)

In response to the COVID-19 pandemic of 2020/2021, the ASC Thesis Office and Thesis Advisory Board developed an alternative thesis project for students whose projects were disrupted due to the pandemic. These students were informed of their eligibility through the Kettering email system with exceptions granted to those unable to complete existing thesis projects. This option has been made available since June 2020 and will remain available for eligible students until the Office of the Provost determines we no longer require an alternative due to the global pandemic.

The Alternative Thesis Project (Culminating Reflection Project) is comprised of three distinct and diverse experiences from the student's college career. The project asks the student to reflect upon the ways these experiences contributed to their growth and development.

Student Process

Students will be acclimated to the thesis on their junior II co-op term through an online introductory assignment. Students will have two advisors upon topic approval through completion that will serve as mentors. The manuscript will be assessed by the student's Faculty Thesis Advisor, additionally, for Research Thesis or Entrepreneurship Thesis students the Committee Member will review the manuscript. If the co-op employer deems that the thesis should be confidential, Kettering has a standardized Confidential Thesis Agreement available in Blackboard. Students are required to complete four University thesis modules through their thesis experience, including Thesis Introductory Assignment in Blackboard - Module 1, Thesis Topic Proposal - Module 2, Thesis Progress Report - Module 3, and Thesis Manuscript Submission - Module 4.

Registration

Students who achieve junior II standing and are registered in a co-op term will be automatically registered for the Culminating Undergraduate Experience: Thesis (CILE-400). CILE-400 is a one-time registration applicable for the entire process. Upon completion of the thesis, a final passing grade is submitted by the ASC - Thesis Office to the Office of the Registrar, posted to the student's record and the four credits are earned.

Additional University Thesis Policies to Encourage Completion of Thesis Requirement:

- **Active/Not Enrolled Registration (Thesis Extension Terms)** - Students that do not complete their thesis requirement by the end of their last required academic term, are automatically enrolled in their first active/not enrolled term (thesis extension term). Students will be required to demonstrate progress on their thesis with a required plan and advisement session through the ASC – Thesis Office within this term (required due date set by the ASC – Thesis Office). If the ASC – Thesis Office determines student progress is made, the student will be registered into an additional active/not enrolled term with a maximum of four active/not enrolled terms.
- **Academic Completion of Overdue Co-op Thesis -** Students may complete an overdue Co-op Thesis to meet their thesis requirement. The Faculty Thesis Advisor will review the student's written thesis manuscript for academic completion and it is due to one of the following reasons: The sponsoring Co-op Employer no longer supports the thesis and makes a determination not to sign off on the thesis (official co-op employer required to the ASC – Thesis Office) or twelve (12) months have passed since the last day of the student's last academic term.
- **All But Thesis: 10 Year Out -** Students who have completed all degree requirements except thesis and their last academic term was more than 10 years ago are eligible to write a narrative of two significant projects through their professional experiences applicable to their Kettering degree program. The narrative will be reviewed by a faculty member in the student's degree department.

For more information about Kettering University's Thesis Program, please contact thesis@kettering.edu.

Professional Development and First Year Experience (FYE)

The Professional Development and First Year Experience programs are housed within the Academic Success Center (ASC) to promote best practices for student success by integrating the academic and professional experiences, in which all students participate.

Professional Development

Cooperative and experiential learning is fully integrated in our academic and educational program and supports University learning outcomes. Over the course of their academic career, in cooperation with the Cooperative Education Office, students participate in professional development modules designed to allow them to reflect upon, plan for, and be intentional in their personal work experiences.

First Year Experience (FYE)

The primary goal of FYE is to build a strong foundation for student success during the time of transition from high school to college. Kettering students experience not only a personal and academic transition but also a professional transition as they embark upon their first co-op experience. FYE fosters a sense of belonging for students in the Kettering campus community and provides informative solutions for students.

CILE 101

The CILE101 First Year Foundations course provides critical information on personal, academic, and professional development for first-year students. Class discussions support student's engagement in the Kettering community, makes important connections for students to develop a sense of self-governance, and sets a foundation for both a critical thinking and reflective learning mindset. Students learn to successfully interact in the academic and cooperative work environment. Mentoring and interaction with the instructors provide support and guidance for students to be fully integrated into Kettering University. Discussions and assignments enhance student transition and acclimation to Kettering University and the workplace.

Instructional Model

Small groups of students meet for one hour per week to discuss academic and professional development topics to enable a successful transition to Kettering University. There is an instructor along with an upper class peer mentor leading the classroom experience. A flipped classroom approach delivers relevant content as asynchronous video or text modules, allowing more time for classroom discussion. Assignments outside of class time average less than one hour per week.

Academic Policies and Regulations

All faculty and students are urged to review and understand the University's Academic Policies and Regulations. The chapters under this section are intended as a convenient reference for faculty, staff and students. It also serves as a description of the student's academic rights and responsibilities and as a guarantee of equitable treatment for all students. Some sections may reference other areas of the catalog, when necessary. Each section also concludes with the name of the person or office to contact with questions.

Academic Advising/Support; Academic Standing

Academic Advising and Support

Kettering University provides a number of academic support services for students. All of the services listed below are free to all students and available during work and academic terms.

Advising and Coaching

Advising is a collaborative teaching and learning process that by intention and design facilitates students' understanding of the meaning and purpose of higher education while fostering their intellectual, personal, and professional development. Advising at Kettering is delivered by professional advisors within the Academic Success Center (ASC) and faculty advisors within the individual degree departments.

Students are encouraged to meet regularly with an academic advisor (at least once per academic term) to discuss short- and long-term goals, determine progress toward degree completion, and address any questions or concerns.

Each academic department has its own process for facilitating academic advising. Advising within the Academic Success Center is scheduled through the ASC website.

Success coaching is provided by the ASC advisors to help students become more effective and successful. In the success coaching meeting, students may work with advisors on time management, study strategies, test-taking, note-taking, organization, and more. Success coaching appointments with an advisor can be requested through the ASC website.

Academic Support

The ASC provides a wide range of academic support to Kettering University students. Peer Tutors assist students with subject knowledge in undergraduate math and science courses. Select courses, typically math and physics, are supported through Supplemental Instruction (SI). SI provides students with a structured, peer-led, and collaborative group-study environment in which students are able to engage actively in the review and study of the material. SI sessions are offered twice a week and are open to all students in the designated courses. Information about the SI courses and Peer Tutors can be found on the ASC website. The ASC Writing Consultant helps students with writing assignments and thesis work. All Peer Tutors, SI Leaders, and Writing Consultants are trained and certified through the Center for Reading and Learning, a national organization serving as a foundation to peer-led support programs. There are additional opportunities for students to seek support for their courses through on-line platforms which they may access through the ASC website and our learning management system, Blackboard.

Testing Assistance

The ASC provides an alternative testing space for students enrolled in Kettering University courses who require ADA accommodations. These accommodations may include extended test time, individual testing space, reader/scribe, or other accommodations as needed. Any student seeking accommodations for testing must first meet with the Wellness Center to determine and approve all necessary accommodations. This must be done at the beginning of every academic term.

Testing services are not available for students taking courses at institutions outside of Kettering University as guest courses, for students who have a testing conflict and do not have ADA accommodations in place, or as an alternative to virtual testing.

Academic Standing

Kettering University has four levels of academic standing: Good Standing, Academic Warning, Academic Probation, and Academic Review. The four levels are discussed in detail below.

ASC Flowchart for academic standing

Good Standing

To be in good academic standing, a student must meet ***all*** of the following criteria:

- Term GPA ≥ 2.0
- Cumulative GPA ≥ 2.0
- Co-op grade of Satisfactory

Academic Warning

Students are placed on Academic Warning when the criteria for good standing are not met. Students on Academic Warning are strongly encouraged to work with an advisor in the ASC to develop a plan for improvement to return to Good Standing.

Academic Probation

Students are placed on Academic Probation if they do not meet the criteria for good standing following the Academic Warning term. Students on Academic Probation are ***required*** to participate in success coaching with an ASC advisor to develop and implement strategies for academic success. Appointments for success coaching can be scheduled through the ASC website. Students on Academic Probation will have a registration hold placed on their student account, requiring them to meet with an advisor in the ASC before scheduling for their next academic term. **NOTE:** Students on probation cannot register for consecutive academic terms.

Academic Review

Students who do not improve their academic standing while on Academic Probation will move to Academic Review (AR). Once on Academic Review, the student has two options:

1. Withdraw from the university (AR Withdrawal) to avoid a permanent negative mark on the transcript.

2. Appeal to the Academic Review Council. See below for guidelines for writing an effective appeal.

Appeal to Academic Review Council

Academic Review Council (ARC) meetings are held in the 7th week of each term. The ARC consists of select faculty and staff members who review all materials anonymously and discuss whether a student will be granted approval to remain at Kettering or be dismissed. If the student is granted approval, they will be given guidelines they must meet in order to remain at the university. These guidelines will vary for each student and are decided upon individual needs and circumstances. If the ARC votes for a student's dismissal, the student is only able to readmit following the readmission guidelines below.

Appeal materials must be submitted via email or mail to the ASC no later than 8 AM Monday of the 6th week of the term which a student is up for Academic Review. Students on Academic Review are provided detailed guidelines for presenting an effective appeal including an appeal letter, letters of support, and additional relevant documentation. Academic advisors in the ASC are available to coach students through each step of the appeal process.

Readmission to Kettering

Readmission in Good Standing

Students that have been separated or withdrew from the university while in Good Standing may request to be readmitted by contacting the ASC. An advisor in the ASC will discuss and assist with the Application for Readmission. If a student is re-entering in a different catalog year, they may be subject to any new catalog requirements and/or catalog and program changes. Readmitted students are subject to the tuition rate that is equivalent to the fixed-tuition rate paid by the entering class of students at the time of re-admittance.

Readmission in Warning or Probation Standing

Students that have withdrawn from the university while on Academic Warning or Academic Probation may request to be readmitted by contacting the ASC. An advisor in the ASC will discuss and assist with the Application for Readmission. Students will be admitted back to the institution and remain on the academic standing they were on upon withdrawing. These students may be required to meet additional requirements upon readmission to ensure overall success. If a student is re-entering in a different catalog year, they may be subject to any new

catalog requirements and/or catalog and program changes. Readmitted students are subject to the tuition rate that is equivalent to the fixed-tuition rate paid by the entering class of students at the time of re-admittance.

Readmission following Academic Review

Students who withdrew or have been dismissed as a result of the academic review process may request to be readmitted by selecting one of the two paths to readmission. The first is Evidence-Based Readmission and is available to all students. The second is Recommendation-Based Readmission and is available only to students at a junior or senior academic level. Students may be subject to the catalog requirements effective the term they return; the Academic Review Council will make that determination. Readmitted students who do not return to good standing after one term and/or did not follow the recommendations for the Academic Review Council can be permanently dismissed. Readmitted students are subject to the tuition rate that is equivalent to the fixed-tuition rate paid by the entering class of students at the time of re-admittance. Students may apply for readmission only once following Academic Review.

Evidence-Based Readmission [Available to all students]

The student must provide an official college transcript demonstrating academic success at another accredited educational institution.

The evidence-based path allows the student to be readmitted to the term starting no less than nine (9) consecutive months after the date of dismissal. In order to be considered for evidence-based readmission, students must complete the following:

- Attend another institute of higher education for at least one term as a full-time student, completing at least four (4) courses or 12 credit hours, earning a minimum grade of a B average. The courses must be selected from one or more of the following areas – math, science, technology, engineering, management, and/or liberal studies – and must be related to and at a level commensurate with their Kettering degree program. The courses do not need to be transferable to Kettering, but they should not be redundant with courses already successfully completed with grades higher than a C-. The student may choose to meet with an ASC advisor to review the selected courses before registering for them at another institution.
- Submit a letter requesting readmission. The letter should include an explanation of the changes in the student's life that have had a significant positive effect on their potential for success at Kettering University. They may also include any applicable supporting documents.
- Submit official transcript(s) of classes the student has completed.

Recommendation-Based Readmission [Available to juniors/seniors only]

The recommendation-based path allows a junior or senior to be readmitted to the term starting no less than six (6) consecutive months after the date of dismissal. The recommendation-based readmission comes with specific conditions, which must be met within the first term of return in order for students to remain enrolled. A mandatory condition is completing at least 12 credits with a 3.0 GPA and no individual course grade below a C. Additional conditions may be imposed by the student's degree department and/or the Academic Review Council. If the conditions are not met, the student will be permanently dismissed from the university. In order to be considered for recommendation-based readmission, students must complete the following:

- Submit a letter requesting readmission to the department head of the student's academic department. Dual-major students must submit the request to heads of both academic departments. The readmission request must also be submitted to the Academic Review Council. The letter should include an explanation of changes in the student's life that have had a significant positive effect on their potential for success at Kettering University. Include any applicable supporting documents.
- The student is required to request the department head(s) to submit a letter of recommendation outlining any additional conditions to the Academic Review Council.

All documents for readmission must be submitted to academicsuccess@kettering.edu by 8 a.m. on Monday of the 6th week in the term prior to readmission. All questions should be directed to the Academic Success Center at (800) 955-4464 x 9775.

Conduct Expectations

Student Conduct

Student Computer Requirement

It is required that students have their own laptops and **do not use a computer at their place of employment due to frequent limitations related to Firewalls.**

E-mail: Notification/Obligation to Read

All students have the privilege of having a Kettering University Google Apps e-mail account. The Kettering e-mail account is the official way Kettering University faculty and staff communicate to students. Students are responsible for required actions conveyed to them through this communication vehicle, **whether or not they read the message**.

Kettering provides each student with unlimited e-mail server storage. Therefore, we strongly recommend that students do not auto forward to another e-mail service provider which may have less storage capacity, fewer features, and may hinder you to reply directly to the original email source.

Due to the proliferation of spam and phishing emails, be advised that you may receive emails that may request personal information such as usernames and passwords. Although it may look authentic, pretending to originate from a legitimate source such as Kettering, do not respond. Immediately delete it recognizing that a legitimate source such as the Kettering IT department would never ask you to provide information such as passwords. Be cautious regarding any unsolicited email as it may contain elements that would prove to be detrimental to your computer.

Questions: Contact Information Technology

Ethics in the University

The mission of Kettering University rests on the premise of intellectual honesty; in the classroom, the laboratory, the office, and at the examination desk. The very search for knowledge is impaired without a prevailing ethic of honor and integrity in all scholarly, professional, and personal activities. The principles of honor and integrity make it possible for society to place trust in the degrees we confer, the research we produce, the scholarship we present and disseminate, and the

critical assessments we make of the performance of students. In order to achieve our goals of preserving, disseminating, and advancing knowledge, Kettering University expects all members of the community to be open to new ideas, to be governed by truthfulness, and to be considerate of the rights of others. We strive to foster these values in all our endeavors and will employ all possible means to discourage dishonest behavior in any form. We hold students accountable for their choices and actions through the Code of Student Conduct, administered by the Vice President of Student Affairs & Dean of Students.

Academic Integrity

We believe fairness, openness, and intellectual honesty to be the keystones of our educational mission. We foster these qualities in all our endeavors and use all possible means to discourage dishonesty, in any form. All members of the Kettering community should report academic dishonesty to the appropriate faculty person, as well as to the Vice President of Student Affairs & Dean of Students. Academic dishonesty prohibited at Kettering includes, but is not limited to, the following forms:

- **Cheating**
  Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- **Fabrication**
  Intentional and/or unauthorized falsification or invention of any information or citation in an academic exercise.
- **Facilitating Academic Dishonesty**
  Intentionally or knowingly helping or attempting to help another to engage in academic dishonesty in any form.
- **Plagiarism**
  Intentionally or knowingly representing the words, ideas, or images of another as one's own in any academic exercise.

Students found to have carried out any form of academic dishonesty are subject to the faculty member's scrutiny and sanctions, as well as Student Conduct policies and procedures.

Kettering University Code of Student Conduct

The Kettering University Code of Student Conduct represents a body of behavioral standards for all students. These standards are strictly and vigorously enforced by Kettering University to ensure members of this educational community a productive, safe, and equitable environment for growth and development. Kettering University students are expected to conduct themselves as responsible, mature individuals while on campus, at home, and in their work-section communities.

Students are expected to comply with all University regulations governing student conduct and the use of University property and facilities. Kettering University has the right to take action and investigate any offense that involves our students, either as victims reporting or students accused of violating the Code of Student Conduct and any federal, state, and/or local laws/ordinances. The Code of Student Conduct extends to students at their places of cooperative employment. We expect students to honor their co-op employer's standards for workplace demeanor and may impose our Student Conduct procedures upon any student charged by an employer with workplace misconduct.

Conduct for which students may be subject to disciplinary action falls into, but is not limited to, the following categories:

- Endangering people or their property.
- Obstructing the normal functions of Kettering University or a co-op employer.
- Theft or damage to property, including intellectual property, of Kettering University, a co-op employer, or any individual.
- Any willful damage to the reputation or psychological well-being of others.
- Threatening, intimidating, harassing, coercing, or verbally abusing another.
- Any physical violence directed at any member of the Kettering University community or a co-op employer's.
- Unauthorized entry to, use of, or occupancy of Kettering University facilities or a co-op employer's.
- Any dishonesty, cheating, forgery, plagiarism, or alteration of, or misuse of Kettering University documents, records or identification, or a co-op employer's.
- Computer misuse, while on academic or work term, at the University or at co-op employment, including but not limited to:
  - Theft or other abuse of computer operations.
  - Unauthorized entry into a file to use, read, or change the contents, or for any other purpose.
  - Unauthorized transfer of a file or files.
  - Unauthorized use of another individual's identification and/or password[s].
  - Use of computing facilities to interfere with the work of another student, faculty member, or university official.
  - Use of computing facilities to send obscene or abusive messages.
  - Use of computing facilities to interfere with the normal operation of the University's or a co-op employer's computer system.
- Violation of applicable public laws while on Kettering University owned property, University or student-sponsored or supervised functions, a co-op employer's owned or controlled property, or at a co-op employer-sponsored or supervised function.
- Possession or use on campus or at a place of co-op employment of firearms, explosives, explosive fuels, dangerous chemicals or other dangerous weapons, except as specifically authorized by Kettering University or a co-op employer.
- Use, possession, or distribution of narcotics or controlled substances except as expressly permitted by law.
- Possession or use of alcohol on Kettering's campus; any underage possession or use of alcohol.
- Failure to comply with directions of Kettering University or co-op employer officials acting in performance of their duties.
- Conduct which adversely affects the student's suitability as a member of the Kettering University and/or co-op employment communities.

Student Conduct at Kettering University

Student conduct serves and protects Kettering students by encouraging responsible behavior and civic competence. We expect students to develop their characters by exercising self-discipline and taking responsibility for their actions. We also expect students to make themselves aware of the regulations governing them as members of the Kettering community. Student Conduct supports the academic mission of the university by promoting student development, fostering a harmonious and stimulating environment, and protecting the well-being of all students.

Student Conduct Policies and Procedures

Members of the Kettering community should contact the Vice President of Student Affairs and Dean of Students whenever a violation or

suspected violation of Kettering's Code of Student Conduct takes place. The University will take appropriate measures to investigate each incident and decide how best to proceed: to dismiss charges, to refer the charge[s] to a designated Conduct Officer(UBSC). If the charges are referred for further action, the Conduct Officer will hold a pre-hearing with the accused student[s]. The pre-hearing serves the following purposes:

- To explain Kettering University's conduct process
- To inform the accused of his/her rights accorded through the University's conduct process
- To inform the accused, in writing, of all charges
- To request that the accused write an official response to all charges
- To inform the accused of all available resolution options appropriate to the specific charges.

Student Rights and Responsibilities Provided by Kettering University's Student Conduct Procedures

Any student accused of any violation of Kettering University's Code of Student Conduct will be extended the following rights and responsibilities:

- Formal, written notification of all charges to be heard at either an Administrative Hearing or a University Board of Student Conduct.
- Right to a timely hearing. The University has the right to establish deadlines for hearing a case, as well as hear a case in a student's absence should they fail to appear at the established time and place.
- Opportunity to review the conduct file which will be presented at an Administrative Hearing or University Board of Student Conduct.
- Time to prepare a defense. Students will receive at least 48 hours notice of the time and place of an Administrative Hearing or University Board of Student Conduct.
- Right to be present at an Administrative Hearing or University Board of Student Conduct.
- Right to have an adviser present at an Administrative Hearing or University Board of Student Conduct. The adviser must be a member of the Kettering University community and may advise the accused student, but may not conduct the student's defense.
- Right to ask questions of any witnesses who appear at an Administrative Hearing or University Board of Student Conduct.
- Right to present defense witnesses whose presences has been requested, in writing, at least 48 hours prior to an Administrative Hearing or University Board of Student Conduct.
- The Vice President of Student Affairs & Dean of Students may determine that other Kettering University officials ought to be aware of the results, and will inform them.
- Crime victims will be notified of hearing results, in accordance with existing federal, state, and local laws.

Kettering University has the right to request a student return to campus during a work-term or off-term in order to expedite a case perceived as serious and pressing in nature. Students are entitled to the rights afforded by the Family Educational Rights and Privacy Act (FERPA).

Public Criminal Justice System Versus Kettering University's Student Conduct Process

Kettering's Student Conduct process differs in both purpose and function from the public criminal justice system. The University's process is designed to be educational and to afford students opportunities for personal growth and development. The criminal process is designed primarily to be punitive. Protections afforded the accused are less comprehensive in Kettering's Student Conduct process than those extended in the criminal system. The University is not required to follow federal, state, and/or local rules of evidence. Instead, charges against a student need only be proven by "preponderance of evidence," i.e., such evidence as a reasonable person might accept as adequate to support a conclusion that the offense more likely than not took place. Criminal investigations and/or charges do not hinder or delay the University's responsibility to investigate and adjudicate allegations of student misconduct in a timely fashion.

Resolution Options

Administrative Hearing

In cases where charges do not appear to merit suspension or expulsion, or in cases which the accused does not contest the charges, the Vice President of Student Affairs & Dean of Students may designate a Conduct Officer (CO). The CO will investigate the case and conduct a hearing with the accused. Administrative hearings accommodate all the rights and procedures accorded to students by the University's policies. Following the hearing, the University will provide the student with written notification of the results of the hearing, as well as information about the appeal process.

University Board of Student Conduct

The Vice President of Student Affairs & Dean of Students designates a conduct board or University Board of Student Conduct (UBSC) whenever charges may result in suspension or expulsion, including all cases involving academic misconduct. In these cases, a designated Conduct Officer of the University chairs the UBSC, comprised of a minimum of three members of the Kettering community and including representatives from faculty, staff, and students. The Conduct Officer investigates the charges and prepares the case for presentation to the UBSC. All presentations include resolution options. The UBSC makes recommendations to the Vice President of Student Affairs & Dean of Students, who may endorse, alter, or dismiss them.

Other Resolution Options

The Vice President of Student Affairs & Dean of Students may, after consultation with the involved parties, provide other avenues of resolution, including mediation and/or conciliation.

Administrative and University Board of Student Conduct Hearings Decisions

All decisions will be based only on documents, testimony, and evidence presented at administrative and University Board of Student Conduct hearings.

Sanctions

The University has the right to enforce a variety of sanctions upon students who are found to have violated the Code of Student Conduct. They include, but are not limited to, the following:

- **Creation of a Misconduct File**
  The University applies this sanction whenever the Conduct Officer or other hearing officer[s] uphold charges against a student for violating the Kettering Code of Student Conduct, yet it appears that interviews and counseling associated with the pre-hearing and hearing are sufficient to deter further violation. The Conduct Officer creates an official file detailing the student's offense.
- **Misconduct Warning**

A Misconduct Warning consists of a formal, written notice that the student has violated the Code of Student Conduct and that any future violation will result in more serious consequences.

- **Restitution and/or Fines**
  When a violation of the Code of Student Conduct results in costs to other students, Kettering University, or others, a student may be required to make restitution and/or pay a fine. The University applies fines to community endeavors.
- **Community Service**
  This sanction requires students to contribute a fixed number of hours, without compensation, to benefit the University or the local community. The University retains the right to require that students complete community service with particular organizations it specifies.
- **Misconduct Probation**
  Misconduct probation implies a medial status between good standing at Kettering, and suspension or expulsion. A student on Misconduct Probation will be permitted to remain enrolled at Kettering University under certain stated situational conditions, depending on the nature of the violation and the potential learning value that may be derived from such conditions. Usually, Misconduct Probation extends over a stated period, during which it is clearly understood that the student is subject to further disciplinary action, including suspension or expulsion, if the student violates the terms of probation or in any way fails to conduct him/herself as a responsible member of the Kettering University community. Misconduct Probation serves as a final warning to the student to re-evaluate and modify his/her unacceptable behavior. Students on Misconduct Probation will not be allowed to represent the University in any formal manner and may not serve in a student leadership position during the period of probation. Knowledge of a student's Misconduct Probation status may be made known to others at the University on a need-to-know basis.
- **Interim Suspension and/or Altered Privileges**
  Kettering imposes Interim Suspension when it appears the accused poses a threat to him/herself or others at the University. It may also be imposed following allegations of sexual or physical assault, drug use and/or distribution, threats of violence, etc.
  The Vice President of Student Affairs & Dean of Students or designate may alter or suspend the privileges/rights of a student to be present on campus and/or to attend classes for an interim period prior to the resolution of a conduct proceeding. Decisions of this sort will be based upon whether the allegation of misconduct appears reliable and whether the student's continued presence reasonably poses a threat to the physical or emotional condition and/or well-being of any individual, including the accused student's. Interim suspension may also be imposed when the accused student's continued presence appears to disrupt the University's regular or special functions, or threatens the safety or welfare of university property.
  Interim Suspension and/or altered privileges remain in effect until a final decision is made on a pending incident. The Vice President of Student Life & Dean of Students or designate may repeal interim suspension or altered privileges at his/her discretion.
- **Suspension**
  Suspension—an involuntary separation of a student from Kettering University—implies and states a time for return to the university. Suspension may extend for a school and/or work term, for a specified period, until a specified date, or until a stated condition is met. A University Board of Conduct may recommend suspension, but only the Vice President of Student Affairs & Dean of Students may impose it.
- **Expulsion**
  Expulsion—a permanent involuntary separation of a student from Kettering University—may be recommended by a University Board of Conduct, but only the Vice President of Student Affairs & Dean of Students may impose it.
- **Notification of Sanction to Co-Op Employers**
  The University has the right and responsibility to notify a student's co-op employer whenever the student is found to have violated the Kettering Code of Student Conduct.
- **Student Conduct Appeals**

Any student who has been sanctioned through Kettering University Code of Student Conduct processes has the right to appeal to the Vice President of Student Affairs & Dean of Students. All appeals must be made in writing within five [5] business days of notification of the results of a hearing and must state the grounds upon which the appeal is based. Grounds for appeal might include claims of procedural errors, new information, denial of rights, or inappropriately severe punishment. Should the Vice President of Student Affairs & Dean of Students choose to grant an appeal, the case will be reviewed and a written decision will be conveyed to the student indicating whether the sanction[s] shall stand, be modified, or reversed.

Students' Use of Technology

The use of any personal computational or communication devices in the classroom, not otherwise governed by the University or course policies, is subject to the approval of the instructor. This includes, but is not limited to, the use of calculators, computers, personal digital assitants, text pagers, and cell phones. Any use of such devices without the instructor's approval is prohibited. The use of such devices without the permission of the instructor may be considered disruptive behavior. Students who persist in such activity may be subject to the University's "Dismissal Due to Disruptive Behavior" policy.

The use of electronic devices to facilitate an act of academic misconduct, such as cheating or plagiarism, will be considered a violation of the Code of Student Conduct and adjudicated following standard Student Conduct policies and procedures.

Students are expected to familiarize themselves with Kettering University's Acceptable Use Policy, posted on the "Policies and Standards" section of the Information Technology website.

Dismissal from Class Due to Disruptive Behavior

Whenever an enrolled student's presence or behavior in class disrupts the learning environment and, in the faculty member's opinion, undermines the best interests of the class and/or the student, the faculty member may request in writing (with a copy to the appropriate Department Head) that the student be issued an administrative dismissal. The faculty member should discuss the student's behavior with the Vice President of Student Affairs & Dean of Students (VPSA) and/or his designate, who will meet with the faculty member to discuss the alleged incident. The VPSA will also meet with the student to determine possible judicial action after determining whether or not the student's behavior violates the Kettering Code of Student Conduct. The VPSA will either adjudicate the matter or refer it for action by a designated conduct officer and/or University Board of Student Conduct. If the dismissal occurs by Friday of seventh week, the student will receive a grade of W (withdrawal). If the dismissal occurs after Friday of seventh week, the student will receive a grade of F.

Productive Learning Environment

Kettering University expects all students, faculty, and staff to contribute to a productive learning environment by demonstrating behavior that neither interferes with another individual's performance nor creates an intimidating, offensive, or hostile environment. The University will not tolerate harassment or discrimination in any forms, regardless of intent and/or the victim's reaction.

Harassment

The University prohibits all sexual harassment and/or offensive conduct, on campus and in students' work section communities. Such conduct includes, but is not limited to sexual flirtation, touching, verbal or physical advances or propositions, verbal abuse of a sexual nature, graphic or suggestive comments about an individual's dress or body, sexually degrading words to describe an individual, and/or the display of sexually suggestive objects or pictures, including nude photographs. Behavior constitutes sexual harassment when it is unwelcome and it interferes with the ability of another person to carry out his/her responsibilities, creates a hostile learning or work environment, or its expression implies that acceptance of the behavior is a condition of course registration, course completion, course evaluation, or employment.

If you believe the words or actions of a University employee or student on campus constitutes unwelcome harassment, take the following steps:

- Inform him or her that his/her actions are unwelcome and the harassing behavior must cease.
- Keep a written record of the details, including time, date, what was said, or what occurred.
- Report the discrimination to the Vice President of Student Affairs & Dean of Students, the Director of Human Resources, other University officials, or via our Non-Academic Grievance Form, available in the Student Affairs Office, Academic Services, the Wellness Center, Thompson Hall, and online at the Student Affairs website.

If harassment occurs at your work site, you should report it to your supervisor or the appropriate person as directed by your employee handbook, as well as to your Cooperative Education Manager/Educator. Enlist the counsel of a trusted adviser, if necessary, to report sexual harassment wherever and whenever it occurs. The University pledges to investigate promptly all complaints of harassment and to pursue a timely resolution, which the appropriate University officials will communicate to the parties involved. Confidentiality will be maintained to the extent reasonably possible.

Discrimination

Kettering University is committed to a policy of non-discrimination and equal opportunity for all persons regardless of race/ethnicity, color, ancestry, national origin, religion, sex, sexual orientation, age, marital status, height, weight, marital, military or disability status or any other basis protected by federal or state law. Discrimination includes, but is not limited to the following:

- Preventing any person from using University facilities or services because of that person's race/ethnicity, color, ancestry, national origin, religion, sex, sexual orientation, age, height, weight, and/or marital, military, or disability status.
- Making determinations regarding a person's salary based on race/ethnicity, color, ancestry, national origin, religion, sex, sexual orientation, age, height, weight, and/or marital, military, or disability status.
- Denying a person access to an educational program based on that person's race/ethnicity, color, ancestry, national origin, religion, sex, sexual orientation, age, height, weight, and/or marital, military, or disability status.
- Instigating or allowing an environment that is unwelcoming or hostile based on a person's race/ethnicity, color, ancestry, national origin, religion, sex, sexual orientation, age, height, weight, and/or marital, military, or disability status.
- Denying raises, benefits, promotions, leadership opportunities, or performance evaluations on the basis of a person's race/ethnicity, color, ancestry, national origin, religion, sex, sexual orientation, age, height, weight, and/or marital, military, or disability status.

If discrimination takes place at your work site, you should report it to your supervisor or the appropriate person as directed by your employee handbook, as well as to your Cooperative Education Manager/Educator. Enlist the counsel of a trusted adviser, if necessary, to report discrimination wherever and whenever it occurs. The University pledges to investigate promptly all complaints of discrimination and to pursue a timely resolution, which the appropriate University officials will communicate to the parties involved. We will maintain confidentiality to the extent reasonably possible.

If you believe the words or actions of a University employee or student constitutes discrimination, take the following steps:

- Inform him or her that his/her actions are unwelcome and the discriminating behavior must cease.
- Keep a written record of the details, including time, date, what was said, or what occurred.
- Report the discrimination to the Vice President of Student Affairs & Dean of Students, the Director of Human Resources, other University officials, or via our Non-Academic Grievance Form, available in the Student Affairs Office, Academic Services, the Wellness Center, and Thompson Hall.

Student Complaint Procedures

A complaint is a written or verbal expression of dissatisfaction or formal allegation against the university, its units, its employees (including faculty and staff), and/or its students.

Other Complaints

Currently enrolled students who have a complaint or issue should first try to work out the problem informally by discussing it in an honest and constructive manner with those persons most involved with the issue. Many complaints can be resolved when a student makes an effort to honestly communicate his/her frustrations or concerns. If a student has a complaint related to a specific course he or she is enrolled in, he/she should first consult with the instructor of the course. If necessary, the student or instructor may consult with the academic department head responsible for the course for guidance on how to best resolve the student's concern.

For any complaints that the student cannot resolve informally with the parties involved, the student should contact either the Dean of Students (for non-academic-related issues) or the Associate Provost for Assessment and Academic Support (for academic-related issues).

Questions: Contact the Student Affairs Office for non-academic issues or the Office of the Provost for academic-related issues

Undergraduate Course of Study

Accelerated Masters Option

This option is available to Kettering University undergraduate students entering any Kettering University graduate program, either residential or online.

Kettering University undergraduate students interested in graduate study may elect to apply to the Accelerated Masters Option which provides students an opportunity to accelerate the process and complete a baccalaureate degree while earning credit towards a graduate degree. This program is only available to Kettering University undergraduate students and leverages Kettering University's premier academic programs. Students who are admitted into the Accelerated Masters Option will complete the same total number of Co-op work terms as conventional undergraduate students.

- Students can apply before graduating (after completing 120 undergraduate credit hours) or within four (4) years of obtaining their baccalaureate degree.
- The student completes the baccalaureate degree, with the traditional undergraduate thesis (BS), and receives the degree at the conventional time.
- Up to 12 credits, of 400*or 500 level courses completed as an undergraduate, and for which a grade of B or better was earned, are also applied to the graduate degree. (Undergraduate capstone courses are not eligible.) **(*400 level courses must be part of an approved 400/600 course offering.)**
- 28 credits remain to complete the graduate degree (total of 40 credits).

Grade Requirements for Admission to Accelerated Masters Option

A minimum GPA of 3.0 is required. Students with a GPA below 3.0 may be considered on an individual basis. The degree granting department will determine acceptance.

Other Requirements

- Both part-time and full-time students may qualify for this program.
- This program is only available to students who will receive (or have received) a Kettering University bachelor's degree.

For more information, please contact the Graduate School at gsr@kettering.edu.

Concentrations

A concentration is a specialized area of study within a major area of study. A concentration requires a minimum of two classes (eight credits) in a directed area of study. Concentrations appear on a student's transcript at student declaration, and requirements must be completed at the time of graduation. A concentration is not required for all majors for graduation.

A student wishing to declare a concentration should consult an advisor. It the responsibility of the student to inform the department of the selected concentration. The department, in turn, will update the student record.

Questions: Contact the degree/program department

Cooperative and Experiential Education

Refer to the Cooperative and Experiential Education section of this catalog for related policies and procedures.

Questions: Contact the Cooperative and Experiential Education department

Independent/Directed Study

In order to increase the scope and flexibility of course offerings, many departments offer courses under the designation of Independent or Directed Study. A student who desires a course not normally offered or not available during a given term should approach the instructor in whose discipline the course would normally fall to discuss the possibility of an Independent or Directed Study. If the instructor agrees, a written proposal may be required from the student, specifying the reading and/or research to be undertaken, reports or tests to be used for grading purposes, number of meetings per week, number of credits to be awarded, etc.

Independent Study

An independent study is a unique topic in a specific area of study not offered in an existing course. Requirements and meeting times are arranged by the instructor and student. A student must request and receive approval for an independent study through the instructional department. This is done by completing an Independent Study Form stating the independent study name and description, and obtaining all required signatures. The completed form must be submitted to the Office of the Registrar no later than the last day of the drop/add period specified on the published academic calendar.

Directed Study

A directed study is a course listed in the undergraduate catalog but not scheduled during a given term. It is done on a one-on-one basis with an instructor for that course. A student must request and receive approval for a directed study through the instructional department. If approved, the department will notify the Registrar's Office to create the course no later than the last day of the drop/add period specified on the published academic calendar.

Questions: Contact the department offering the course

Majors (Declaring/Changing)

A student wishing to declare, change, or add a major should consult an advisor. The student is then responsible for communicating this change to the Office of the Registrar. The Registrar will update the student record and send official notification of the change to the appropriate departments.

Double Majors

Students may earn a double major as part of a single bachelor's degree by completing all course requirements for the two majors. If capstone courses are required in both majors, both must be completed. Only one thesis is required. To pursue a double major, obtain approval from departments for both majors. Both majors will be shown on one diploma and on the transcript.

Questions: Contact the Office of the Registrar

Minors (Declaring/Removing)

A minor is an area of concentrated study outside of the major area of study. A minor requires a minimum of four classes (16 credits) in a directed area of study. Minors may require coursework beyond the minimum 161 credits required for completion of the major. Minors are not required for graduation though a student may elect to pursue a minor in an area of additional interest. Minors appear on a student's transcript at student declaration, and requirements must be completed at the time of graduation. Refer to the "Minors" section of this catalog for a complete list of minors and their requirements.

A student wishing to declare, change, or add a minor should consult an advisor. **Minors must be added to the student's record prior to taking the courses within the minor.** The student is then responsible for communicating this change to the Office of the Registrar. The Registrar will update the student record.

Questions: Contact the Office of the Registrar

Second Baccalaureate

Students can earn a second bachelor's degree after graduating. The student must complete all the degree requirements, with a minimum of 28 credits required in earning the second degree, along with a minimum of three coop terms and a thesis. The department offering the major sought for the second bachelor's degree must evaluate the student's transcript to determine which courses are required.

Questions: Contact the degree/program department head

Study Abroad

Refer to the International Programs section of this catalog.

Questions: Contact the Office of International Programs

Undergraduate Credits

Classification

Kettering University designates the classification of students, regardless of the degree program being pursued, according to the total earned hours accumulated.

Classification	Code	Earned Hours
Freshman	FRI	0-11
Freshman	FRII	12-23
Sophomore	SOI	24-39
Sophomore	SOII	40-55
Junior	JRI	56-71
Junior	JRII	72-87
Senior	SRI	88-103
Senior	SRII	104-119
Senior	SRIII	120 and above

Note: Major classification (Freshman, Sophomore, etc.) is subdivided into the classification code (FRI, FRII, SOI, SOII, etc.) for internal tracking of progress and estimation of the expected graduation date.

Questions: Contact the Office of the Registrar

Transfer Credits

New Transfer Students

Students transferring to Kettering University may receive earned hours for a Kettering course for which they have taken an equivalent course (in content and level) at their previous institution.

The following conditions apply:

- Transfer credit is accepted only from accredited colleges and universities.
- Upon receipt of transfer credit information from the Admissions Office, coursework will be evaluated for transferability to Kettering University, along with applicability to the student's degree requirements.
- Only courses in which a C (2.0 on a 4.0 grade scale) or higher were earned will be evaluated for transfer credit.
- Only the credit will transfer; the grades do not transfer and will not affect the GPA.
- A maximum of 72 earned hours may be awarded by transfer upon admission.
- Any requests for transfer coursework review must be submitted along with any requested supporting documentation by the end of the student's first academic term.
- Final official transcripts are required to be mailed or received electronically from the student's transferring institution(s) prior to registration for the next academic term.
- Transfer evaluations are processed by the Registrar's Office (registrar@kettering.edu).

Current Students

Students enrolled in a Kettering University degree program may take selected coursework at other institutions if the need arises and the opportunity is available. Such transfer credits are called "guest credit." Students who want to take a course at another institution and transfer the credits to Kettering University must have the course approved *prior* to registration at the other institution.

The following conditions apply:

- Guest transfer credit is accepted only from accredited colleges and universities.
- A Guest Application Form must be completed by the student and submitted to the Office of the Registrar for approval. **Note:** Even if a course is listed on the Course Equivalency System, it does not guarantee approval. Official approval is obtained by completing the Guest Application and receiving all required signatures of approval. The Office of the Registrar will send an email to the student's Kettering email account confirming approval or non-approval.
- Students should consult with their advisor to confirm the course being taken as guest credit will apply towards their degree requirements before registering for the course.
- A maximum of 12 guest transfer credits are allowed while a student is in active status.
- The course must carry a grade of C (2.0) or above to transfer. Grades of C- or below are not transferable.
- Only the credit will transfer. The grades do not transfer and will not affect the GPA. Therefore, the grades cannot replace grades earned at Kettering University. This means credit for a guest course can earn

credit for a failed Kettering course but the Kettering course grade will remain on the student transcript and in the GPA.

- The course repeat policy only affects courses repeated at Kettering University. Guest credits do not qualify under this policy.
- Courses approved for guest credit do not eliminate pre-requisite requirements.
- Independent Study work is not transferable.

Free Elective Transfer Credits

A student's degree-granting discipline may allow the transfer of a course taken outside of Kettering University even though no other academic discipline has allowed the transfer because the course does not correspond to an existing Kettering University discipline. Such a course will be transferred as FREE-297 or FREE-497.

The following conditions apply:

- A course is eligible under this policy if the course is from an institution with U.S. regional accreditation.
- A course from an institution outside the U.S. will be considered for FREE-297/FREE-497 if the course is from an institution which has been approved for transfer of courses with Kettering University equivalents.
- The course must be considered non-remedial at both Kettering University and the transfer institution.
- Courses at the 100 or 200 level at the transfer institution will be transferred as FREE-297.
- Courses at the 300 or 400 level at the transfer institution will be transferred as FREE-497.
- A minimum of 2400 classroom minutes in one or more courses is required for four credits of FREE-297/FREE-497. A number of credits different from four is not allowed.
- A student must receive academic advisement from their degree department before initiating the process of transferring FREE-297/FREE-497.
- The number of credits of FREE-297/FREE-497 shall be limited to the number of Free Electives in the student's degree program that have not already been fulfilled through other transfer or Kettering courses.
- Current Kettering students may apply for FREE-297/FREE-497 credit through the normal Application for Guest Credit process.

Questions: Contact the Office of the Registrar

Proficiency Credit by Examination

Students may petition the Head of the department responsible for a given course to receive earned hours by examination for that course. If the Department Head deems it appropriate and acceptable, the student will be given the means to demonstrate knowledge and performance of the course material at a level no less than an average student enrolled in the course. Specific performance expectations for proficiency exams are set by the individual departments. If such demonstration is successful, the course credit hours are awarded to the student as earned hours by examination and will be indicated on the student's transcript. A student who previously attempted a course or is currently enrolled in a course may not use the proficiency credit by examination option for that course. Students may attempt to earn credit by proficiency in a specific course only once, regardless of whether the examination is passed or failed.

Questions: Contact the degree/program department head for the course

Undergraduate Enrollment

Attendance

Student Responsibilities

Prompt and regular attendance is expected of students for all scheduled course and laboratory work. Student participation in class discussion, question/answer sessions, and problem solving is critical to the expected student learning outcomes. Faculty may include explicit attendance requirements and any applicable grade penalties in their course syllabi. Students are expected to be aware of such requirements if they exist. Most faculty require documentation for course absences. Students are responsible for providing such documentation if they wish to have their absences excused. Only faculty may excuse an absence.

Students who stop attending courses prior to the course withdrawal deadline specified on the academic calendar should immediately withdraw from those courses. Students who do not officially withdraw from the course they are not attending may be reported to the Registrar by their instructor with the last date of attendance. When this happens, the student will remain responsible for any financial liability, less applicable refunds they have incurred associated with the last date of attendance reported, and for any academic consequences associated with the last date of attendance reported and the assignment of the WN or FN grade. Once a faculty member has reported a last date of attendance, the student can no longer attend or participate in the class.

Consequences of Non-Attendance

Students that do not attend classes may be issued the following grades:

- A grade of WN (withdrawal for non-attendance) is issued if the last known date of attendance is within the course withdrawal period specified on the academic calendar. A WN grade is treated the same as a W (withdrawal) grade in that it does not affect a student's term or overall GPA.
- A grade of FN (failure for non-attendance) is issued if the last known date of attendance is after the course withdrawal period specified on the academic calendar. An FN grade is treated the same as a failing grade in that it is included in the students' term and overall GPA.

The grade change resulting from non-attendance can be initiated by faculty based on their individual course attendance policy. It may also result from the university's Last Known Date of Attendance Reporting Policy. This policy is required by the U.S. Department of Education to differentiate between students who fail a class for non-attendance and those who fail based on merit. This information is used for determining financial aid liability and eligibility. The assumption is that a grade of F demonstrates failure based on merit, while FN demonstrates failure resulting from non-attendance.

Questions: Contact the Office of the Registrar

Class Attendance Policy Related to Required Military Duty or Veteran Status

Questions on whether an activity is a required military service activity for purposes of this policy should be directed to the Associate Provost. If anticipated absences for a term appear to be extraordinarily numerous or difficult to accommodate, a faculty member may appeal the need for the full accommodation to the Associate Provost.

Absences due to military duty or veteran status must be excused. This includes, but is not limited to, the following:

- Mandatory monthly drill instruction, such as duty completed by national guard members and military reservists (typically this involves a one-day absence in order to extend weekend training).
- Service-related medical appointments where failure to appear might result in a loss of benefits.

Students must give written notice to the faculty member at least one week in advance of the absence unless last-minute schedule changes make this notice impossible. Students are strongly encouraged to inform each faculty member of their known and anticipated absences as far in advance as possible, preferably at the start of the term.

The faculty shall accord students the opportunity to independently make up coursework or work of equal value, for the day(s) the event was scheduled and to take a scheduled exam at an alternate time. The faculty member shall determine alternate exam times and due dates for missed course work. These assigned dates may be prior to the date of the absence.

Students are still responsible for demonstrating achievement of course learning goals, even when absences due to military duty are necessary and reasonable. In situations with many absences or extended periods of military duty (e.g. being called to active duty), it may be most appropriate for the student to withdraw and retake the course in a future term.

Enrollment

Impact of Non-enrollment

Students must have a registration in each term for course work, co-op, or the culminating undergraduate experience (CUE) in order to remain in active status. When circumstances occur where this may not be possible, students may take a Leave of Absence (LOA) or withdraw from a term or the University until the next academic term in which they could be enrolled. (Refer to the "Leave of Absence" and "Withdrawals" sections below for more information.)

Students with no registrations who do not formally withdraw or take a leave of absence will automatically become inactive (separated) due to non-enrollment. Inactive students may apply for readmission by submitting an Application for Readmission Form to the Office of the Registrar. Students' cooperative employers are not obligated to continue their agreement with the student if the student status becomes inactive. Students in an inactive status will no longer have access to any campus buildings, the Recreation Center, or Banner Self-Service. Inactive students are not eligible to participate in commencement.

Questions: Contact the Office of the Registrar

Sections

Kettering students follow one of the two rotations of academic and co-op terms (A or B section). The **A-section students** attend classes in the summer and winter, while **B-section students** attend classes in the fall and spring. Students complete work terms on the off-school terms. Any changes to this school/work sequence must be approved **in advance** by following the Altering the Academic/Work Sequence Process. Students may not adjust their sequence without an approval. This ensures that all relevant university offices are aware of the changes in the students' plans. As such, arrangements made between students and employers without university approval will result in no co-op credit granted for the term. Students should consult with the Financial Aid Office for information on how altering the academic/work sequence may affect financial aid.

Questions: Contact the Academic Success Center

Status

Students may have the following undergraduate enrollment statuses:

Full time: 15 or more credits or co-op or Culminating Undergraduate Experience (thesis)
Three Quarter Time: 12-14 credits
Half Time: 8-11 credits
Less Than Half Time: 1-7 credits

Enrollment verifications for medical insurance, loan deferments, employment, or other needs may be obtained through the Office of the Registrar. Enrollment verifications confirm a student's enrollment status (full-time, three-quarter time, half-time and less than half-time) and expected graduation date.

Leave of Absence

The Undergraduate Student Leave of Absence (LOA) Policy assists and encourages students to return and complete their degree after up to two consecutive terms of absence from Kettering University. Eligible students are encouraged to take advantage of the benefits provided by an LOA, e.g., no need to apply for readmission and ability to participate in their regularly scheduled registration/enrollment period upon return to the University. Refer to the Leave of Absence Request Form for more information and instructions.

Questions: Contact the Office of the Registrar

Registration

Course Load

The representative program of courses shown term-by-term for each of the degrees offered indicates what is considered a normal course load. In general, those loads are four courses per term for underclassmen amounting to approximately 16 attempted hours, and five per term for upperclassmen, amounting to 20 attempted hours. Refer to the Tuition and Fees section of this catalog for tuition rates/credit hours.

Course Overload

Students are eligible to register for one additional course beyond the limits if they meet the following criteria:

- Their cumulative GPA is 3.5 or higher, and
- They have completed a minimum of 16 credit hours with no course withdrawals or failures in both the current term and previous academic term, and
- They are not currently enrolled in college mathematics (MATH 100).

Students wishing to take overloads beyond the standards above will need to request approval by submitting a request outlined in the Request for Overload Procedure. Only students in good academic standing are allowed to attempt an overload. Students whose performance is less-than-good standing may be required to take a course load less than that represented for their degree program. These students should contact the Academic Success Center (Room 3-322 AB).

New Student registration

New undergraduate students (freshmen and transfer) are registered for their first academic term by the Academic Success Center (ASC) after they sign up for their SOAR (Student Orientation and Academic Registration) session, complete the pre-registration form, and once all relevant information (math placement score, AP scores, transfer credits) has been gathered. While registration will be completed as early as possible, schedules are not considered final until the orientation/ move-in weekend to allow for unavoidable scheduling adjustments. All new students will participate in SOAR prior to the start of the term. They will sign up for a SOAR session through their New Student Portal where they can also find access to the math placement and pre-registration form.

All new students must take a math placement exam in order to have their schedule built unless they meet one of the following criteria:

- Students earned an ACT Math score of 31 or higher
- Student earned an SAT Math score of 690 or higher
- Student has college transfer credit for calculus
- Students has Advanced Placement credit for calculus.

Continuing Student registration

Registration for the next academic term takes place each term beginning in the seventh week. The registration time period is based on the students' current class standing and does not count current registrations or class rank. Students in each class standing will have a 24-hour window of opportunity to register for classes before the students with the next standing are allowed to register.

Most students require a PIN to access registration. Requirements for registration should be clarified with the students' advisors. Students may receive academic advising within the Academic Success Center (ME freshmen and sophomores, undeclared majors) or within the degree department. Students with dual majors should be advised by both degree departments.

Course Registration during Co-op or with Thesis

All students are automatically registered in their cooperative work experience and thesis terms. Students are allowed to register for a maximum of eight credits of coursework while registered for a co-op or thesis term. To register for coursework during a co-op term, students must complete the Course Selection During Co-op Term Form and submit it to the Registrar's Office.

Drop/Add

Students may drop and add courses before the drop/add deadline noted on the published academic calendar. Any student who does not appear on the final roster by the conclusion of the drop/add period will not receive credit for the course.

Repeating a Course

Students may repeat any course taken at Kettering University as long as it is still offered; however, several conditions apply. Students may repeat a course only two times (for a total of three attempts). Any repeats beyond one require the approval of the Academic Success Center, which will be provided only after a face-to-face conversation with an advisor. After the second retake (third attempt), students will be required to transfer the course from another institution. A student on their third and final attempt for a course will be limited to 16 or less credits that term. Withdrawals and audits are included in the number of repeat attempts. All grades will appear on the student record and transcript. The highest grade received is used in computing the term and cumulative GPA values; the lower grade(s) will be excluded from the term and cumulative GPA values. The recalculation of GPAs to account for repeated courses occurs at the end of the term after all grades for all students have been processed. Courses repeated at another institution and transferred to Kettering will not replace any attempts at Kettering. Hours earned in repeated courses may be counted toward graduation only once. Once a degree has been awarded, students cannot repeat a course and have the new grade count towards that degree.

Questions: Contact the Office of the Registrar

Terms and Semesters

- **Academic term** - an eleven-week period of instruction and evaluation.
- **Cooperative work experience term** - a twelve-week period of supervised employment at an authorized Kettering University corporate affiliate; no credit, quality points, or hours are earned through the work experience.
- **Semester** - a combination of one academic term and one cooperative work experience term for a total of twenty-three weeks.
- **Academic year** - a period of two semesters for a total of forty-six weeks.

Undergraduates Taking Graduate Courses

Students taking 500+ level courses are not automatically admissible to the graduate program. They still have to meet all published admissions requirements. **Note:** Courses taken for undergraduate credit at Kettering University may not be repeated at the graduate level and count towards the graduate program. Furthermore, 500-level courses taken at Kettering University for undergraduate credit may not count as graduate credit except as approved per the BS/MS and BS/MBA policy guidelines.

Undergraduates Taking Graduate Courses for Undergraduate Credit

Students enrolled in an undergraduate degree program at Kettering University may request registration in a Kettering graduate level course (500+ level) for undergraduate credit. To do this, students must:

- Complete and receive instructional department and degree department approvals on the Undergraduate Request to take Graduate Course Form and submit form to Registrar's Office for proper registration.

Undergraduates Taking Graduate Courses for Graduate Credit

Students enrolled in an undergraduate program at Kettering University may request registration in a Kettering graduate level course (500+ level) for graduate credit. Undergraduate students may take up to three graduate courses for graduate credit while an undergraduate student (no more than two per term).

Students are eligible to take a Kettering graduate level course (500 or above level) for graduate credit if they meet all of the following criteria:

- They are enrolled in an undergraduate program at Kettering University.
- They are in good academic standing.
- They have a minimum of 120 earned credits.

- They are enrolled in no more than 20 credits, unless qualified to take 24 credits.

In order to receive graduate level credit, students must do the following:

- Complete and receive instructional department and degree department approvals on the Undergraduate Request to take Graduate Course Form and submit the form to Registrar's Office for proper registration.
- The student must earn a grade of "B" or better in the course.

Questions: Contact the Office of the Registrar

Withdrawals

Course Withdrawal

When circumstances occur whereby a student feels that completion of a course is not possible or in the student's best interest, the student may withdraw from the course and receive a non-punitive grade of W (withdrawn). The following conditions apply:

- Withdrawals are allowed during the course withdrawal period specified on the academic calendar. After that period, the student is not allowed to withdraw from the course and is committed to receiving a Kettering letter grade, which may include a grade of FN (failure for non-attendance). Retroactive withdrawals are not allowed.
- Withdrawals are included in the number of repeat attempts.
- Refer to the Tuition and Financial Aid sections of this catalog for the refund rate schedule and how withdrawing from a course may affect financial aid.

Medical/Compassionate Withdrawal (After 7th Sunday)

A medical/compassionate withdrawal request may be made in extraordinary cases. Such cases in which serious illness or injury (medical) or another significant personal situation (compassionate) prevents a student from continuing his/her classes or withdrawing during the course withdrawal period (specified on the academic calendar), and where incompletes or other arrangements with the instructors are not possible.

The usual consideration is for a complete term withdrawal. All applications for withdrawal require thorough and credible documentation; however, applications for less than a complete course term withdrawal must be specifically documented to justify the selective nature of the partial medical/compassionate withdrawal.

A student may request and be considered for a medical withdrawal when extraordinary circumstances, such as a serious illness or injury, prevent the student from continuing classes. The medical withdrawal policy covers both physical and mental health difficulties.

A student may request and be considered for a compassionate withdrawal when extraordinary personal reasons, not related to the student's personal physical or mental health (for example, a death in the student's immediate family, care of a seriously ill family member, etc.), prevent the student from continuing in classes.

All requests for medical and compassionate withdrawals must be made through the Wellness Center. Each request is reviewed, but they are not automatically approved. The Vice President for Student Affairs and Dean of Students will determine the status of a case based on the documents provided. When requesting either of these withdrawals, students must provide:

- A written statement summarizing the circumstances and providing detailed information regarding the reason for the request. If the withdrawal began or took place during the course withdrawal period specified on the academic calendar, students must explain why they did not withdraw by the published deadline.
- Medical withdrawal requests must include supporting documentation from a licensed health care professional detailing:
  - The date of onset.
  - Dates of treatment.
  - The general nature of your condition.
  - How and why it prevented you from completing your course work, including the last date you attended class.
  - This documentation must be on official letterhead and must be specific to this request.
  - Prescriptions and similar types of documentation will not be sufficient.
- Compassionate withdrawal requests must be accompanied by documentation pertinent to the precipitating event. For example, a compassionate withdrawal request to care for a seriously ill family member may require information similar to that for a medical withdrawal. Other required documentation may include police reports, legal documents, airline ticket receipts, newspaper clippings, death certificates, etc.

Students considering a request for medical or compassionate withdrawals after the course withdrawal period specified on the academic calendar should consult with the Wellness Center as soon as possible. No refunds apply to approved medical or compassionate withdrawals, which occur after the course withdrawal deadline.

Questions: Contact the Wellness Center

Military Call to Active Duty Withdrawal

Students may withdraw from the University and receive a 100% tuition refund upon presenting original Armed Forces orders to the Registrar. Non-punitive grades of W will be issued. Should the call come during or after the eighth week of the term, an incomplete may be given (with the approval of the instructor) with no reimbursement of tuition. A written agreement must be developed between the instructor and the student to clarify a plan for completion of the course. The student initiates this agreement by completing an Incomplete Grade Agreement form after the incomplete grade has been issued by the instructor. This form will be filed in the Office of the Registrar an official documentation of this agreement.

Term Withdrawal

Withdrawing from all courses in a term requires students to contact the Academic Success Center.

University Withdrawal

Withdrawing from the University requires a completed Undergraduate Withdrawal from University Form. Complete instructions and information are included on the form.

FERPA (The Family Educational Rights and Privacy Act)

The Family Educational Rights and Privacy Act (commonly referred to as "FERPA" or the "Buckley Amendment"), helps protect the privacy of student records. The Act provides for the right to inspect and review

education records, the right to seek to amend those records and to limit disclosure of information from the records. The Act applies to all institutions that are the recipients of federal funding.

In accordance with FERPA, Kettering University has policies and procedures in place to protect the privacy of education records. Students will be notified of their FERPA rights annually by publication in the Undergraduate and Graduate Catalogs and by an annual email message to students at the beginning of the academic year.

Disclosure of Education Records

Kettering University will disclose information from a student's education record only with the written consent of the student, except:

1. To school officials who have a legitimate educational interest in the records.
   A school official is:
   - A person employed by the university in an administrative, supervisory, academic, research, or support staff position (including Campus Safety and Wellness Center staff);
   - A person elected to the Board of Trustees;
   - A student serving on an official committee, such as disciplinary or grievance committee, or assisting another school official in performing his or her task;
   - A volunteer or person employed by or under contract to the university to perform a special task, such as legal counsel or an auditor;
   - Agencies conducting business on behalf of Kettering University (i.e. National Student Clearinghouse, officials of the U.S. Department of Education and state and local educational authorities, accrediting organizations and banks).

   Educational Need to Know:
   A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibilities for Kettering University.
2. To officials of another school, upon request, in which a student seeks or intends to enroll.
3. In connection with a student's request for or receipt of financial aid, as necessary to determine the eligibility, amount, or conditions of the financial aid, or to enforce the terms and conditions of the aid.
4. To organizations conducting certain studies for or on behalf of the university.
5. To comply with a judicial order or a lawfully issued subpoena.
6. To appropriate parties in a health or safety emergency.
7. When the request is for directory information (see below).

Directory Information

Institutions may disclose information on a student without violating FERPA through what is known as "directory information." Kettering University designates the following categories of student information as public or "Directory Information." Such information may be disclosed by the institution at its discretion.

- Corporate affiliation
- Degrees awarded, including dates (actual and expected)
- Dates of attendance
- Degree program (major field of study, concentrations and minors)
- Degrees and honors awarded (including Dean's List)
- Enrollment Status (including full or part-time)
- Honor Societies
- Photo
- Previous institutions attended
- Class standing (freshman, sophomore, junior, senior, graduate student)
- Name, address and phone number
- E-mail address

Solomon Amendment

Federal law requires that all institutions of higher learning provide directory information to the military upon request, including student name, address, telephone number, age or year of birth, academic major and level of education (e.g. freshman, sophomore, etc. or degree awarded). Where there is a conflict between the Family Educational Rights and Privacy Act of 1974 (FERPA), the Solomon Amendment would supersede FERPA.

Annual Notification to Students of Rights Under FERPA

FERPA affords students certain rights with respect to their education records. They include:

1. **Inspect and Review of Records**
   The right to inspect and review the student's education records within 45 days after the day the University receives a request for access. A student should submit to the registrar, dean, head of the academic department, or other appropriate official, a written request that identifies the record(s) the student wishes to inspect. The University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.
2. **Amendment of Records**
   The right to request the amendment of the student's education records that the student believes are inaccurate, misleading, or otherwise violate the student's privacy rights under FERPA. Students should write the University official responsible for the record, clearly identify the part of the record they want changed, and specify why it should be changed. If the University decides not to amend the record as requested, the University will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.
3. **Consent to Disclosure**
   The right to provide written consent before the university discloses personally identifiable information from the student's education records, except to the extent that FERPA authorizes disclosure without consent.
   The school discloses education records without a student's prior written consent under the FERPA exception for disclosure to school officials with legitimate educational interests. A school official is a person employed by Kettering University in an administrative, supervisory, academic, research, or support staff position (including Campus Safety and Wellness Center staff); a person serving on the board of trustees; a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her task; a volunteer or person employed by or under contract to the university to perform a special task, such

as legal counsel or an auditor; agencies conducting business on behalf of Kettering University (i.e. National Student Clearinghouse, accrediting organizations and banks).
A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibilities for Kettering University.

4. **FERPA Complaints**
The right to file a complaint with the U.S. Department of Education concerning alleged failures by Kettering University to comply with the requirements of FERPA. The name and address of the Office that administers FERPA is:
Family Policy Compliance Office
U.S. Department of Education
400 Maryland Avenue, SW.
Washington, DC, 20202

For more information on the Family Educational Rights and Privacy Act, visit the Office of the Registrar Website, under FERPA.

Grades

Grades

Students may view and print their term grades through Banner Self Service, accessed with their Email/LDAP user name and password. Unofficial transcripts are also available on Banner Web.

Grade	Description	Points
A A-	These grades are awarded to students whose level of performance in meeting the requirements of the course is outstanding. These students understand the concepts and the principles of the course and are able to apply them creatively to unfamiliar situations, use correct methods accurately in problem solving, and communicate their findings to others effectively.	4.0 3.7
B+ B B-	These grades are awarded to students whose level of performance in meeting the requirements of the course is definitely better than average. These students have a good understanding of most or all of the concepts and principles, generally use correct methods, and are usually accurate in their thinking. They do a good, though not superior, job in communicating within the context of the course.	3.3 3.0 2.7
C+ C C-	These grades are awarded to students whose level of performance is adequate. These students meet the essential requirements of the course and have a basic understanding of course concepts and principles, but have some difficulty applying them correctly. They do a fair job of communicating their ideas.	2.3 2.0 1.7
D+ D	These grades are awarded to students whose level of performance in general is poor but not failing. These students meet minimum course requirements but lack adequate understanding of some concepts and principles and make rather frequent mistakes in applying them. They do a poor job of communicating ideas relating to the course.	1.3 1.0
F	This grade is issued to students whose level of performance fails to meet even the minimum requirements of the course. These students fail to grasp most of the essential concepts and principles and make frequent mistakes in applying them. Their performance is definitely unsatisfactory.	0.0
FN	A student is issued a grade of FN (failure for non-attendance) if they stopped attending and the last known date of attendance is after the course withdrawal period specified on the academic calendar.	0.0
AU	A student is issued the non-punitive grade of Audit (AU) upon submission of "Request to Audit" form during the registration or the add/drop period specified in the academic calendar.	0.0
I	A student is issued an Incomplete (I) at the request of the faculty when circumstances outside of the student's control do not allow completion in the normal time period.	0.0
S	A student is issued a grade of Satisfactory (S) upon receipt of a satisfactory employer/student evaluation.	0.0
U	A student is issued a grade of Unsatisfactory (U) upon receipt of a unsatisfactory employer/student evaluation.	0.0
W	A student is issued a non-punitive grade of (W) whenever withdrawing from a course during the course withdrawal period specified on the academic calendar.	0.0
WN	A student is issued a grade of WN (withdrawal for non-attendance) if they stopped attending and the last known date of attendance is during the course withdrawal period specified on the academic calendar.	0.0
P, PD, F, EX, NR	The thesis project is awarded the grade of Pass (P), Pass with Distinction (PD), Fail (F), Extension (EX), or Not Required (NR)	0.0
NR	Beginning July, 2018, this grade for CILE-400 will indicate Not Recorded.	0.0

Course Hours and Points Definitions

Quality Points = Grade x Credit Hours
GPA = Quality Points ÷ GPA Hours

Attempted hours (AHRS) - the sum of the course credit hours for which a student has registered. Attempted hours per term is the basis for determining tuition charges and the student load.

Earned hours (EHRS) - work equivalent to that defined for a University credit hour which the student has successfully completed at Kettering University, at another institution, or by examination. Not all earned hours necessarily apply to the specific degree program being pursued by the student.

Grade Point Average (GPA) - computed for each term individually and cumulatively. In either case, the weighted GPA is computed by dividing the total quality points earned by the total quality hours accumulated.

GPA hours (GPA-HRS) - credit-hour value of the course that is awarded only for course work taken at Kettering University. Only course work

resulting in GPA hours is used in computing a student's grade point average (GPA).

Quality Points (QPTS) - computational value used to compute a student's grade point average (GPA). The quality points earned for a given course are equal to the credit hour value of the course multiplied by the numerical equivalent of the letter grade.

Questions: Contact the Office of the Registrar

Credit Hour Policy

Kettering University defines a credit hour as one 60-minute class period per week. The University assigns four [4] credits to all courses in all undergraduate and graduate degree programs: on-ground and Kettering University Online [KUO]. Undergraduates and onground graduate students are expected to spend at least two hours outside of class preparing for each hour in class. A 4-credit course requires these students to devote 120 hours of effort per term, or approximately three [3] hours of effort per week, for 10 weeks, for each registered credit hour.

Kettering University Online [KUO] graduate courses, which may follow either a 6-week or 8-week schedule, require the same total amount of effort, i.e., 6-week courses require 20 hours of student work per week; 8-week courses require 15 hours per week, for a total effort of 120 hours. Kettering University Online [KUO] courses require a considerable amount of class time in the form of discussion board activities, synchronous webinars, or other online interactions, including individual interactions with professors. Preparation, research, viewing of media, and assignment completion require additional time.

These credit hour requirements fulfill federal definitions and regulations regarding the assignment of credit hours as follows under Section 600.2 and 600.24(f) of the Higher Education Opportunity Act:

Credit hour: Except as provided in 34 CFR 668.8(k) and (l), a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than ---

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out of class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or

2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

Grade Appeal Process

The course instructor has the authority and obligation to assign appropriate grades in any course. Questions concerning an assigned final grade are to be handled through the grade appeal process. Final course grades may be appealed only if the student can demonstrate that the grading policy applied to his/her grade does not conform to the stated grading policy of the course instructor. The absence of a grading policy will be considered reasonable grounds for appeal. Appeals should be initiated as soon as possible but no later than ***12 weeks*** after the grade has been posted. The student's failure to access grades does not provide an exemption from the time limitation.

Grade Appeal Process

1. **Student** - The student completes a Grade Appeal Form attaching any pertinent documentation to support his/her claim.
2. **Instructor** - Within two (2) weeks of the student's request for a grade appeal, the course instructor accepts or denies the appeal in writing.
3. **Department Head** - Students who are not satisfied with the decision of the course instructor may appeal to the course instructor's department head within 30 days of the course instructor's response. Students appealing to the department head assume the burden of proof. The appeal must include: a statement of the reason the student is appealing the grade, evidence to support the appeal, the steps taken to resolve the disagreement over the assigned course grade and the resolution sought. The department head will serve as a mediator between the student and the course instructor but cannot change a grade. The department head must respond in writing to the student, course instructor, and dean within 30 days of receipt of the appeal with the result of mediated discussion between the student and course instructor.
4. **Dean** - Students who are not satisfied with the result of the discussions between the student and course instructor, mediated by the department head (step 3 above), may submit an appeal to the college dean (or graduate dean in the case of a graduate student). The student must forward all documents submitted in steps 1-3 above to the college dean (or graduate dean in the case of a graduate student). If the dean concludes that the facts alleged by the student do not constitute grounds for appeal, the dean may dismiss the review. The student will not be allowed any further appeal. If the dean determines that the facts alleged by the student are true, the dean shall refer the appeal to the Final Appeal Board.
5. **Final Appeal Board** – The Associate Provost (or designee) will convene an appeal board comprised of the following members: one tenured faculty member from the course instructor's department, chosen by the course instructor; one tenured faculty member from the course instructor's department, chosen by the Department Head; one tenured faculty member from outside the course instructor's department, chosen by the Chair of the Promotion, Tenure and Ethics (PTE) Committee; and the Associate Provost (or designee), who does not vote, but chairs the board and handles all administrative matters.
6. **Provost** - The Final Appeal Board makes a recommendation to the Provost to change the grade to a "P" for passing or keep the course instructor's original grade. The Associate Provost will provide a written overview of the Appeal Board's decision to all involved parties. The decision of the Provost represents a final University decision.

Questions: Contact the Office of the Registrar

Grade Changes

Grades (except incompletes) reported by an course instructor are considered permanent and final. However, requests for a change of grade after a course instructor reports a final grade will be honored to correct an error in calculating or assigning that grade. To facilitate this process, the course instructor will submit to the Registrar an email, with the Department Head copied, noting the rationale for the change and what retroactive correction is to be made. Grade changes must be processed within one calendar year (12 months) from the last date of the term in which the course was taken. This includes incomplete grades that have been changed to a grade or have converted to a failing grade. Grade changes are not permitted after a degree has been awarded.

Questions: Contact the Office of the Registrar

Auditing a Course

Occasionally, a student may wish to attend a course without earning credit (for example, to refresh course knowledge). This arrangement is called “auditing” a course. Audited courses are listed on the students’ official transcript with the grade AU (audit) and no credits earned.

A student needs the course instructor’s permission to audit a course. Students who want to audit a course must complete a Request to Audit Course Form, have it signed by the course instructor, and submit it to the Office of the Registrar by the end of the drop/add period specified on the academic calendar. Audits cannot be changed to a regular enrollment after the drop/add period noted on the academic calendar. Audited courses do not count toward completing program or degree requirements.

Students who choose an audit option are expected to attend the audited class and complete all course requirements (with the exclusion of the tests). If the students do not meet attendance requirements for the course, they earn the grade of WN (withdrawn for non-attendance). Once a WN grade is issued, the student may no longer attend or participate in the class. AU and WN grades do not affect the term and cumulative grade point averages.

Audited courses incur regular tuition fees; however, audits are not considered part of a course load for academic or financial aid purposes, which means that students cannot count audited credits toward a full-time student status or receive financial aid for an audited class.

Questions: Contact the Office of the Registrar

Incomplete Grades

Incomplete Grade Policy

The grade of "I" (Incomplete) is a temporary grade assigned by the instructor in cases where a student is unable to complete course requirements within the term. The grade of “I” may be issued by a course instructor for any course in which the following conditions are met:

1. **Undergraduate Students and On-campus Graduate students:** Student requests the "I" grade from instructor no later than 10th week Friday
2. The student has satisfactorily completed a substantial portion (typically about 75%) of the total coursework and has convinced the instructor of his or her ability to complete the remaining work without re-registering for the course. It is not to be given if a student is failing the course.
3. The student is unable to complete the course requirements within the regular time frame due to significant, extenuating circumstances which can be documented.
4. The student and course instructor must complete an Incomplete Grade Agreement Form that clearly states the requirements to be completed and the due date for the completion of each requirement. The form must be signed by the Department Head and submitted to the Office of the Registrar as official documentation of the agreement.

Deadline for completion of the coursework:

Undergraduate Students and On-campus graduate students: not to exceed 6 months from the last day of the term in which the incomplete was assigned.

If a final grade is not submitted within the specified deadline for completion, the incomplete grade converts to an “F” (Fail) on the student’s record and will be reflected in the students’ GPA. The grade of “F” will be considered a permanent grade on the student’s record.

Students should note that an incomplete grade does not yet reflect credit in the course. This means if a course with an incomplete grade is a prerequisite for another course, they may not register for that course until the incomplete grade has been changed to reflect a passing grade.

Example: An incomplete is issued in spring 2018 for MATH-101. The student may not register for MATH-102 until the coursework required to fulfill the incomplete is completed and the “I” grade is removed.

Questions: Contact the Office of the Registrar

Final Examinations

Kettering University policy requires each student to participate in a comprehensive final learning experience in each course. The extent to which that experience contributes to the student's course grade may vary by course instructor and by course, but generally amounts to between 20 and 40 percent.

Questions: Contact the Office of the Registrar

Dean’s List

The Dean's List recognizes overall academic performance based upon the student’s term grade point average (GPA). To be eligible for the Dean’s List, students must satisfy the following requirements: be a degree-seeking student with a minimum term grade point average of 3.5, no grades below B, and a minimum of 16 earned credits for the term.

After each term grading process is complete, eligible students are recognized on the Registrar's website and in a hallway cabinet display outside the Provost's Office. Dean’s List eligibility for each term is reflected on student transcripts.

Questions: Contact the Office of the Registrar

Honor Societies

Alpha Pi Mu is a national industrial engineering honor society. The eligibility of industrial engineering students is based upon superior scholarship and character of a fiduciary nature. Members of Alpha Pi Mu work responsibly to further the ideals and aims of the engineering profession.

Eta Kappa Nu is a national electrical and computer engineering honor society and has its Theta Epsilon Chapter at Kettering. Electrical engineering students who rank in the top quarter of their class are admitted after their junior year. Students ranking in the top third of their class are admitted after they become degree seniors.

Gamma Sigma Alpha is a national honor society that promotes intellectual interaction between Greek students and the academic community.

Gamma Sigma Epsilon is a national honor society recognizing scholarship in the field of chemistry has its Eta Beta Chapter at Kettering University. Its aim is to promote professionalism and scholarship in chemistry and the general welfare of its members.

Kappa Mu Epsilon was founded to promote the interest of mathematics among undergraduate students. This is fostered by activities such as

outside speakers, films, student presentations, and participation in events such as National Mathematics Awareness Week.

National Order of Omega is a national honor society for fraternity members who have attained a high standard of leadership in inter-Greek activities.

Nu Chi is the Kettering University chapter of Delta Mu Delta initiated on February 20, 2020. Delta Mu Delta is an international honor society that recognizes academic excellence among ACBSP accredited schools. Nu Chi membership eligibility requires students to be of a junior or senior class standing, major of an undergraduate management program with a 3.7 GPA or higher, and are in the 20th percentile of their college class in cumulative average grades.

Phi Eta Sigma, a national freshman honor society. To become a lifetime member, a student must qualify during one of the two freshman semesters. Normally about 5 percent of the class will achieve this scholastic honor.

Pi Tau Sigma, a national mechanical engineering honor society, selects members from the top-ranked junior and senior students on the basis of personality, leadership, and probable future success in mechanical engineering. The largest local chapter of this society is Kettering's Delta Chi Chapter.

Professional Leadership Honor Society Professional Leadership Honor Society, formerly Management Honor Society is an organization comprised of upperclassmen who have demonstrated leadership potential as evaluated by the management of their co-op employer. All members are appointed for one academic year. Activities consist of lunch and dinner meetings each year. Speakers are leading executives in industry and business. Members are given an opportunity to ask questions of these top executives and become acquainted with their ideas, backgrounds, and managerial philosophies.

Rho Lambda is a national honor society recognizing Panhellenic women with the highest qualities of leadership and service to their sorority.

Robots This honor society was organized in 1928 for the purpose of giving recognition to those students who have demonstrated outstanding leadership, citizenship, and service to the Kettering community. Scholastic standing is an added criterion for election.

Sigma Alpha Chi is a Kettering scholastic honor society founded in 1970 for the purpose of recognizing high scholarship among management students at Kettering.

Sigma Pi Sigma is a national honor society which exists to honor outstanding scholarship in physics. Membership is by invitation to students who have junior or senior standing, overall GPA of 3.0 or greater, completion of four physics courses of 3 credits or more, cumulative GPA of 3.5 or more in physics courses, standing in the top third of their graduating class and a record of active service to the Physics Department.

Tau Beta Pi is a national engineering honor society and has its Michigan Zeta Chapter at Kettering. This association offers appropriate recognition to engineering students for scholarship and exemplary character.

Upsilon Pi Epsilon is an international computer science honor society and has its Michigan Epsilon chapter at Kettering. Its mission is to recognize academic excellence in computer science. Students qualify for membership as seniors by being in the top third of computer science majors in their graduating class.

Graduation

Detailed graduation information is available on the Office of the Registrar website. This information includes important deadlines and eligibility requirements. Students should review this information carefully to ensure successful completion of the graduation process.

Kettering University awards degrees at the conclusion of each term; summer, fall, winter and spring.

Graduation Requirements

Students must apply to graduate to begin the graduation process. The time-frame to submit this application is at least six months prior to your expected graduation date.

In order for an undergraduate degree to be awarded and verified by the Office of the Registrar, the following requirements must be satisfied:

Academic Course Requirements: Meet all specified course work, design credits, earned hours, and project requirements of the degree.

Cooperative Education Requirements:

- Students who complete their academic requirement in nine full-time terms or more must attain at least five satisfactory work evaluations at an authorized employer. Three of these five must occur after achieving Junior 1 status.
- Students who complete their academic requirements in eight full-time terms (minimum of 16 earned credit hours per term) must attain at least four satisfactory work evaluations at an authorized employer. Two of these four must occur after achieving Junior 1 status.
- Students transferring to Kettering University with 24 or more earned hours (sophomore status) must achieve at least four satisfactory work terms at an authorized employer (three after attaining junior status). The work experience terms must be earned while a Kettering University student.
- Students transferring to Kettering University with 56 or more earned hours (junior status), without a baccalaureate degree, must achieve at least three satisfactory work terms at an authorized employer. The work experience terms must be earned while a Kettering University student.
- Students transferring to Kettering University with a baccalaureate degree must achieve three satisfactory work terms at an authorized employer. The work experience terms must be earned while a Kettering University student.

Culminating Undergraduate Experience Requirement: Satisfactory thesis completion.

Academic Performance Requirements: Achieve a cumulative GPA of at least 2.0.

Financial Obligations

Diplomas and transcripts are withheld until the student has satisfied all financial obligations with the University.

Accelerated Pace to Graduate

It is possible to complete the academic portion of most Kettering degree programs in eight academic terms. Students who are interested in pursuing this possibility should contact their academic department

to obtain an individualized accelerated plan and to determine if it is appropriate for them.

Final Degree Verification Letter

Students and their co-op employers may request a final letter when all requirements for graduation are met. Final letters will not be issued until all grades for the graduating term are submitted and posted to the student's record. Final letters will not be issued once a degree has been awarded, students must request an official transcript.

Graduation Honors

Academic Honors

Summa Cum Laude: Highest distinction based on a cumulative weighted grade average of 3.90 or higher.
Magna Cum Laude: High distinction based on a cumulative weighted grade average of 3.70 or higher.
Cum Laude: Distinction based on a cumulative weighted grade average of 3.50 or higher.

Questions: Contact the Office of the Registrar

Institutional Honors

Outstanding Thesis Award: Recognizes exceptional performance in Kettering's Senior Thesis Project. Candidates for this award must have received a grade of "Pass with Distinction" on their thesis and be nominated by their faculty advisers.

Questions: Contact the Academic Success Center-Thesis Office

President's Medal: Recognizes graduating seniors who have excelled in scholarship, cooperative employment, and engagement in the Kettering community and in their home community. Students are nominated by employers, faculty, and staff and are selected by a committee appointed by the President of the University. The number of medals given is at the discretion of the President but generally will not exceed two percent of the graduating class.

Questions: Contact the Office of Student Affairs

Sobey Scholars: This award is made annually in memory of Albert Sobey, the founder and first president of GMI/Kettering University. It recognizes graduating seniors who have been elected to a national honor society and Robots [a Kettering honor society], or will graduate with academic honors. The following students receive the Albert Sobey Memorial Award:

- Biochemistry students who are elected to membership in both Gamma Sigma Epsilon and Robots
- Bioinformatics students who are elected to membership in both Upsilon Pi Epsilon and Robots
- Biology students who are elected to membership in both Beta Beta Beta and Robots
- Business students who are elected to membership in both Sigma Alpha Chi and Robots
- Chemistry students who are elected to membership in both Gamma Sigma Epsilon and Robots
- Computer Science students who are elected to membership in both Upsilon Pi Epsilon and Robots
- Engineering students who are elected to membership in both Tau Beta Pi and Robots.
- Mathematics students who are elected to membership in both Kappa Mu Epsilon and Robots
- Mechanical Engineering students who are elected to membership in both Pi Tau Sigma and Robots
- Physics students who are elected to membership in both Sigma Pi Sigma and Robots
- Students who earn summa cum laude, magna cum laude, or cum laude academic honors (as of the last completed grade period) and have been elected to membership in Robots

Questions: Contact the Office of Student Affairs

Student Records

The Office of the Registrar maintains the students' permanent academic record, including course registrations, enrollment status and the official transcript. The Registrar's Office is the point of contact for any required enrollment and degree certifications. As such, it is important that students keep the office current with their permanent mailing address so these services can be provided.

Note: The Registrar's Office will not discuss the student record with any third party without a written consent from the student.

Address, Phone, and Name Changes

Changes in addresses or phone numbers should be made by the student through Banner Self Service.

In order to process a name change, a copy of a government issued photo ID such as a driver's license and either a marriage license, a Social Security card, or a court order that reflects the new name are necessary. Name changes must be processed through the Registrar's Office.

Permanent Academic Records

All information, applications, correspondence, etc., involved in admitting and processing the active progress of an admitted student are maintained for five years after the student has last been an active degree-seeking student. After five years, only the student's attendance dates, academic performance, corporate affiliate, and degree awarded are kept as a permanent record.

Transcripts

A student's official academic record is maintained by the Registrar's Office at Kettering University and is normally reflected through a transcript. All requests for transcripts must be submitted through the National Student Clearinghouse. Transcripts are $2.50 for domestic mailing or pickup and $3.50 for electronic delivery. Official transcripts will not be issued to students who fail to meet their financial obligations or agreements with Kettering University. Unofficial transcripts are available on Banner Self Service.

Official transcripts from other institutions are not reissued or copied for distribution. If needed, they must be obtained directly from the issuing institution.

Information Technology

Information Technology (IT) is located in the Academic Building (AB), Room 2-340. All students have the privilege of using Kettering technology resources as long as they abide by the Acceptable Use of Information Technology Resources Policy, the Information Resources Policies, Etiquette & Rules and any other IT policies as documented. Some of the major technical services provided to students are:

Help Desk

The Help Desk provides technical support for our computing resources and is located in the Academic Building (AB), Room 2-336. During normal operations, staff are available Monday through Friday 8:00 a.m. – 5:00 p.m. Contact us by phone at 810-237-8324 or by coming in person to 2-336 AB. You may also send e-mail to helpdesk@kettering.edu at any time. The staff will respond to support requests during normal business hours.

E-mail

All students have the privilege of having a Kettering University Google e-mail account. The Kettering e-mail account is the official way Kettering University faculty and staff communicate to students. Students are responsible for required actions conveyed to them through this communication vehicle, **whether or not they read the message**. Kettering provides each student with unlimited e-mail server storage. Our policy is to communicate by Kettering email, to ensure FERPA compliance. Therefore, do not auto forward to another e-mail service provider which may have less storage capacity, fewer features, and may hinder you to reply directly to the original email source.

Due to the proliferation of spam and phishing emails, be advised that you may receive emails that request personal information such as usernames and passwords. Although it may look authentic, pretending to originate from a legitimate source such as Kettering, do not respond. Immediately delete it recognizing that a legitimate source such as the Kettering IT department would never ask you to provide information such as passwords. Be cautious regarding any unsolicited email as it may contain elements that would prove to be detrimental to your computer.

Virus Protection

We strongly recommend that all students install virus protection software and maintain it to protect their personal PCs. Any up-to-date properly licensed or free virus protection software would be acceptable.

It is mandatory to have virus protection installed, current, and running when connected to the Kettering network.

Internet Access

Internet access is available through the Kettering University network for business and academic purposes. Faculty, staff, and students will also have access to the Internet, as well as most network resources, using their wireless devices. Students are required to use the KUW Profile for encrypted high speed access.

Web-Based Student Services

All students have access to a variety of online services through their web browser. They can view academic information such as grades, class schedules, and transcripts, as well as information about their financial account. They can also have access to view and update addresses, telephone numbers, and email addresses to facilitate communication with Kettering University faculty and staff.

Blackboard

Blackboard Learning Management System is leveraged for course syllabi, homework assignments, and tests. Access to Blackboard is available from anywhere a student has an internet connection. To help protect your privacy, security, and confidential information, you must sign-on to Blackboard to access these services.

Virtualization

The Virtual Computer Lab (KUcloud) provides students virtual access to lab and classroom software typically only available while on campus. Virtualization provides access to classroom software anytime from anywhere.

Information and Help Sheets

Help for accessing the various systems, including the Internet, is available through the Help Desk and on the IT web site. The IT web pages contain valuable information to help maximize your use of the Kettering University computing resources.

Library Services

Kettering University Library

The Kettering University Library supports teaching, learning, and the university's research programs. We feature digital collections, friendly service and great space for collaborative and individual study.

Access is available in person during regular hours and 24/7 for all students, both on campus and off, through the Library website. The Library supports student research by subscribing to more than 100 databases that contain academic information resources. The collection includes books, journals, technical papers, standards, streaming films and documentaries on a variety of science, engineering, mathematics and computer science topics as well as the humanities. The reserve book collection offers a copy of all required textbooks for every class. The Library is also a great place to do research and work on group projects.

While most of the collection is available virtually through the Library website, we also have print books that are made available through a secure, touchless locker system. Resources not owned by the Library are often available through Inter-Library Loan. Linked-In Learning courses are available to catch up on specific skills and Mango Languages courses are ready for those interested in language learning.

Some helpful library telephone numbers include:

Phone Number	Contact
810-762-7814	Circulation Desk
810-762-9841	Interlibrary Loan
810-762-9598	Reference Desk
810-255-9009	Text a Librarian
800-955-4464, ext. 7814	Kettering University Toll-free Number

Kettering University Archives and Special Collections

The University Archives is located in the Durant-Dort Factory One building, at 303 W. Water Street near downtown Flint. It's just a twenty minute walk along the Flint River Trail. The Archives document America's industrial and business heritage with particular interest in the American automobile industry, the city of Flint, and the history of Kettering University.

The Charles F. Kettering Collection is one of the largest collections in the Archives and has been used by scholars worldwide. The digital photo collection now exceeds 100,000 images. A partial online catalog along with digitized photos can be found on the archives website. Kettering University's Curator of Special Collections may be reached at (810) 820-7747.

The Humanities Art Center is located on the fourth floor of the Academic Building. The gallery features world-class exhibits and collections that exemplify the craftsmanship of local and national artists. A variety of media are represented including paintings, photographs, sculpture, and ceramics. The center also holds a permanent collection of over 500 pieces. To schedule a visit to the Humanities Art Center, please contact Kettering University's Curator of Special Collections at (810) 820-7747 or the Library's Administrative Specialist at (810) 762-9840.

Alumni Engagement

The Office of Alumni Engagement connects and engages Kettering University alumni through gatherings and events with the end result being a dynamic relationship between the University and Alumni who will be more engaged and involved in volunteering, mentoring, recruiting, and giving back to the University.

By partnering with the Kettering/GMI Alumni Association Board, Admissions, Marketing, Co-op, Annual Giving, and all of University Advancement, the Office of Alumni Engagement will incrementally increase the number of alumni engaged each year, giving back to the University through well-timed and meaningful programs and activities.

Each year, programming includes regional alumni receptions throughout the country, company alumni "Bulldog Breakfasts," alumni recognition ceremonies, Alumni Connections Week, and affinity programs directed to specific alumni. Other types of programming include the Alumni Ambassador program and working to establish Alumni Regional Networks in geo-targeted areas.

The Kettering/GMI Alumni Association Board is made up of alumni who want to give back to the University with their time, talent, and resources. The Board is comprised of six committees:

1. Student Recruitment
2. Alumni Involvement & Events
3. Alumni Awards
4. Discounts and Benefits
5. Communications
6. Directorship
7. Revenue Generation/Fundraising

The Kettering/GMI Alumni Association annually recognizes outstanding and notable alumni for their professional accomplishments with the following awards:

1. Alumni Service Award
2. Young Alumni Award
3. Engineering Achievement Award
4. Entrepreneurial Achievement Award
5. Management Achievement Award
6. Civic Achievement Award
7. Outstanding Achievement Award
8. Human Relations Award
9. Distinguished Alumnus/Alumna Award

The Alumni Engagement Office and Alumni Board jointly support the Student Alumni Council (SAC) on campus. SAC is a student organization fostering interaction between alumni and students through various activities such as the Visiting Alumnus/Alumna Speaker Program. SAC typically brings three alumni speakers on campus each term representing a diversity of industries, careers, and subjects students are interested in.

International Programs

Laura Mazzeo Allen, M.Ed., Director
Room 3-340 AB, 810-762-9869
international@kettering.edu

Program Overview

The Office of International Programs (OIP) is the pivotal focal point for international engagement and education for Kettering University. The OIP supports and engages with international students, professors, and other visitors who come to Kettering University from around the world. The office builds strategic international partnerships with foreign academic institutions, governments, and industries to develop programs beneficial to all parties involved. The OIP also engages the Kettering community in international learning opportunities, such as exchange visitor programs, study abroad, and international training and research opportunities.

The OIP at Kettering University works closely with the Provost, President, and all officers of the University in drawing the University's strategic vision and creating mission objectives for the institution's international education. Together, we strive to execute the University's mission by integrating international and contemporary components in all academic programs and work with all academic units/departments to enhance global studies across the curriculum.

International Student and Scholar Services

Kettering University welcomes the following international visitors:

- Full-time, degree-seeking, undergraduate and graduate students
- Short-term exchange students

- Visiting professors, scholars, and other university representatives
- Corporate employer representatives

The OIP is required by federal law to maintain certain records of international students, professors and scholars. All incoming students and scholars are required to check in at the Office of International Programs with the stamped immigration documents and passports within the first week on campus.

The OIP provides a variety of services and programs to promote the success and well-being of all international visitors at Kettering University. Located in the Academic Building (3-340 AB), our staff is available to assist all international students, international faculty and international staff. The following is a list of some of the many services the OIP provides.

Administrative Services

- Ensure that the University maintains compliance with all applicable laws and regulations formulated by the U.S. Department of Homeland Security (DHS) and other government agencies relating to international students, international faculty, international staff, and other international visitors.
- Function as liaisons to local, state, and federal government agencies and academic institutions.
- Support and engage in efforts at the local, national, and international level promoting the value of international educational and cultural exchange.
- Oversee international activities at Kettering University, and serve as advisors to international student organizations.

Immigration Services

- Provide timely, competent, and professional services to international students, international faculty, international staff, and other international visitors concerning U.S. immigration laws regulating their stay in the United States.
- Assist visitors in meeting obligations and requirements of federal regulations relating to their status and period of authorized stay in the United States.
- Determine eligibility and issue appropriate visa documents for entry to or change of visa classification within the United States.
- Assist academic and administrative departments regarding employment-based immigration processes for international faculty, researchers and staff members.

Exchange and Visa Services

- Develop and oversee student exchange and study abroad programs.
- Maintain federal regulations for international visitors, export controls, and SEVIS systems for visas.
- Offer advisement on visa status maintenance for all international visitors and visa holders (such as students holding F-1 and J-1 visas, scholars holding J-1 visas, H-1B faculty, Permanent Residency for faculty, International Guest Speakers).
- Assist international students and exchange visitors with the application processes and endorsements for various non-immigrant benefits, such as practical training programs, employment, travel, and maintaining status.
- Organize orientation programs for international students and scholars to provide international newcomers with information on immigration regulations, academic issues, and social opportunities.
- Provide assistance with insurance, bank accounts, housing, applying for a driver's license, obtaining social security cards, taxation, and other settlement concerns.

F-1 Student Visas

The F-1 visa is used for students pursuing a degree at an academic or language institution within the United States. International students in F-1 status are generally enrolled in a full course of study. This visa is intended only for the purpose of study.

J-1 Student and Scholar Visas

The J-1 visa is used for students as well as exchange visitors. At Kettering University, this visa is used for visiting faculty, research scholars, and short-term scholars and students.

Important Documents for International Students and Visitors

Passport

The Passport is a document issued by an individual's home country government. It is the responsibility of the international students and scholars to keep their passport valid at all times. Although passport renewal procedures vary, all passports should be renewed 6 months prior to the expiration date.

I-94 Arrival and Departure Form

U.S. Immigration officials create this record when visitors enter the United States. It is an electronic record that can be retrieved online. The I-94 record shows when and where the visitor entered the U.S., the type of visa status the visitor holds, and how long they are eligible to stay in the United States. Students in F-1 or J-1 status are usually allowed to remain in the U.S. for the duration of status (D/S). The actual end date of their D/S is the completion date listed on the student or scholar's I-20 or DS-2019 form. I-94 numbers change every time a student re-enters the United States.

Visa

Visas to enter the United States are issued by an American Consulate abroad (usually in the student or scholar's home country) and are stamped in the student/scholar's passport. It is not possible to obtain a visa stamp inside the United States. A visa allows the holder to apply for entry into the United States at the Port of Entry. In issuing a Form I-94 at the Port of Entry, the Department of Homeland Security gives the student/scholar permission to enter the United States. The following information is listed on the visa: date issued, date the visa expires, type of visa, where it was issued, and how often the visa can be used (multiple or single).

Form I-20 or Form DS-2019

This certificate is an immigration document that indicates a particular immigration status. Form I-20 is used for students holding F-1 visas and their dependents (F-2 visa status), while form DS-2019 is used for exchange visitors holding J-1 visas and their dependents (J-2 visa holders). Even after students have left the United States, they should retain these documents as they serve as an official record of immigration history. They can also be useful for tax purposes. Please **do not discard** old certificates. The OIP only retains student records for a limited number of years and former I-20's and DS-2019's cannot be retrieved from SEVIS.

Visitors and students must:

- Notify the OIP in advance if they terminate their study, employment, or affiliation with Kettering University earlier than the date indicated on their form I-20 or form DS-2019.
- Consult with the OIP before traveling internationally to make sure their documents are signed.
- Obtain approval from the OIP before accepting work at other institutions or off campus.
- Apply with the OIP in a timely manner, if a program extension becomes necessary.

SEVIS and Immigration Regulations

SEVIS (Student & Exchange Visitor Information System) is an internet based system in which DHS (Department of Homeland Security) maintains information on non-immigrant visitors holding visas.

Services Provided for International Students and Scholars on Campus

The OIP provides services and programs that promote the success and well-being of international students and visitors at Kettering University. Our staff is available to assist all international students, scholars, and faculty.

Visa Issuance and Maintenance

- Assist international students, scholars and visitors in complying with federal, state and local regulations pertaining to immigration.
- Maintain immigration records on all international students and scholars holding F-1 and J-1 visas currently enrolled at Kettering University.
- Verify change of status and lawful presence.

Required Orientation

Orientation is required of all incoming students and scholars on F-1 and J-1 visas through the OIP. Orientation sessions are held during the week prior to the start of every term. Individual orientation can be provided to scholars who begin their program at Kettering University throughout the term. Workers on H-1B status should work with Human Resources ("HR") to engage in HR's orientation process. Orientation with the OIP includes:

- Check-in and visa registration.
- Evaluation of English proficiency and placement into ESL Program, as needed or requested.
- Information on immigration regulations and academic issues (scheduling, help with transfer credit evaluation).
- Intercultural communication and adjustment support.
- Guidance for international students as they negotiate the University system.

Enrollment

International students must engage in a full course of study during academic terms. If you will not be enrolled full-time, you must receive **prior approval** from the OIP. The OIP is required to report under-enrollment to DHS through SEVIS within 30 days of the end of the registration period. Please visit the OIP for more information.

If you have any questions regarding visa regulations or immigration laws, please contact the OIP.

Arrangement of Cultural Activities

Excursions are intended to promote intercultural understanding and present a broader experience of US American culture. The OIP, in conjunction with other departments on campus, provides cultural activities for international students and scholars throughout the year.

Required Medical Insurance Coverage

All international visitors (J-1 or F-1 principle visa holders and their dependents) are required to have medical insurance and medical evacuation and repatriation insurance for the entire duration of stay in the United States. All international students, including F-1 visa holders and exchange students holding J-1 visas are required to purchase Kettering University's student health insurance plan. The purchase of the Kettering University Health Plan is mandatory and cannot be waived.

English as a Second Language Program

The English as a Second Language Program (ESLP) was established in 2016 and offers four types of programs to speakers of English as an Additional Language throughout the year: (1) traditional, intensive English program on campus; (2) short-term English programs on campus; (3) Technical English classes for IEP programs on campus and online; and (4) online English classes. A brief description of each program is provided below.

Intensive English Program

The following courses are offered on campus each term depending on need. Each course is 20 hours of direct instruction per week for the length of the term. Placement tests are conducted in orientation week, the week prior to the start of class each term. ESLP provides qualified applicants with acceptance letters into Kettering's ESLP, I-20s, orientation, academic and visa counseling services. Students who successfully complete this program also fulfill English language requirements for admission into Kettering's degree programs. For more information about the Intensive English Program please see kettering.edu/esl. For more information on each course, please follow the links provided below.

ESL-096 Intermediate 1 (0 Credits)

ESL-097 Intermediate 2 (0 credits)

ESL-098 Advanced 1 (0 credits)

ESL-099 Advanced 2 (0 credits)

Short-term English Programs

Since the summer of 2018, the ESLP began offering on campus, short-term programs for students from partner universities. These short-term programs are typically offered in January, July, and August. For the list of upcoming programs, dates, and registration, please go to kettering.edu/ESL-ShortPrograms.

Technical English Classes

Technical English classes are term length English classes provided either on campus or virtually as a part of International Education Programs (IEP) to participants (delegates) from partner companies.

ESL-091 Technical English for IEP (0 credits)

Online English Classes

Since April 2020, the ESLP has developed and ran online English courses. These online courses run for 10 weeks and provide 40 hours of live instruction to participants. Students who successfully meet the class requirements are awarded a certificate of completion. For the list of upcoming online classes, dates, and registration, please go to kettering.edu/ESL-ShortPrograms.

Study Abroad Programs

The study abroad programs at Kettering University prepare students for global leadership. Globalization and increased cooperation will require those entering the 21st-Century job market to be able to function internationally. Studying abroad provides students with knowledge and experience that will give them a competitive edge to excel in the world market. Employers recognize that applicants who have international experience are more likely to possess the qualities in demand by our global economy.

Kettering University currently offers several study abroad programs. Most programs are offered in English. New study abroad programs are continually developed, so please visit our Study Abroad website for current active programs and new opportunities in your academic areas.

Current Study Abroad Programs, by Major, at Exchange Partner Institutions

Business

- **Germany** at Reutlingen University (fall term)
- **South Korea** at Ajou University (Winter/Spring & Summer/Fall term - Traditional Semester)

Chemical Engineering/Biochemistry, Biology & Chemistry

- **Germany** at Reutlingen University (fall term)

Computer Science

- **Germany** at Hochschule Ulm (spring term)
- **South Korea** at Ajou University (Winter/Spring & Summer/Fall term - Traditional Semester)

Electrical and Computer Engineering

- **Germany - CE** at Hochschule Ulm (spring term)
- **Germany - EE** at Reutlingen University (fall term)
- **Germany - EE** at Hochschule Ulm (spring term)
- **South Korea** at Ajou University (Winter/Spring & Summer/Fall term - Traditional Semester)

Industrial & Manufacturing Engineering

- **Germany** at Reutlingen University (fall term)
- **Spain** at University of Navarra (UPNA) (Winter/Spring & Summer/Fall term - Traditional Semester)

Mechanical Engineering

- **Germany** at Hochschule Esslingen (spring and fall)
- **Germany** at Hochschule Konstanz (spring term)
- **Germany** at Hochschule Ulm(fall term)
- **Germany** at Reutlingen University (fall term)

Short Term Programs

Short, 5- to 15-day educational based programs abroad are being regularly offered. Please visit our Study Abroad website for current details and opportunities.

Course Work

The coursework taken through a Kettering University Study Abroad Program is fully applicable toward credits in the student's degree program for up to 20 credit hours, ***as long as the courses taken while abroad are approved for credit prior to taking the course.*** Courses that are not already pre-approved to come back for credit may be reviewed to come back to Kettering for credit. This process should be initiated with the OIP prior to taking the course, ideally more than 3 months prior to departure for the study abroad program. Please visit the Study Abroad website for details on the course approval process and appeals process. Coursework taken on a study abroad program will appear on a student's transcript as Credit or No Credit.

Required Courses

The study abroad curriculum requires participants to register for a 4-credit Advanced Social Science elective (SSCI-398) and a 4-credit Free Elective Language Course (LANG-297) as two of the five classes taken abroad, whenever approved classes are offered by the partner institution.

Course Credit and Grading for Laboratory Courses Taken at German Partner Universities:

Students enrolled in our German partner universities receive a grade of P (Pass) or F (Fail) for *laboratory* courses. In the German system, a P grade is equivalent to a D grade or higher (may be dependent upon individual university policy). Kettering University students enrolled in laboratory courses at our partner German universities who receive a P grade will be granted credit for the course upon receipt of an official record.

Courses Offered at International Universities (and Kettering University Equivalent Course):

Courses currently approved to come back for credit toward a specific Kettering University course may be found on the Study Abroad Website. Please note that this list is subject to change based on the availability of resources at the international universities and as stated above, additional courses and programs may be reviewed to come back for credit based on the student requesting a course review in a timely and appropriate manner.

Academic Requirements

Students applying for a study abroad program must be in good academic standing, maintain a GPA of 2.5 or higher, have passing grades in all courses taken in the past two academic terms, must meet specific degree program requirements for study abroad and have degree department approval. Students who may not meet this criteria may appeal for an exemption in order to be eligible to go abroad. The appeal process is outlined on the Study Abroad website.

Financial Considerations

To encourage undergraduate students to participate in the study abroad programs, Kettering University has agreed to provide these terms as "cost neutral" as possible when compared to the expenses for tuition, room, board and transportation during a typical term on campus. Some variation should be expected. All students who opt for an academic term abroad will register for a study abroad term at Kettering University and pay the regular Kettering University tuition. Pilot programs (new programs

not listed in this catalog) may have additional/different cost structure. The OIP can assist students as they consider pilot program options.

Study Abroad Stipends

Kettering University provides up to $1,500 per student as a stipend for study abroad programs at each degree level. Participants may use the stipend funding on multiple programs (short-term and semester length), but amounts applied to the program will vary based on the individual program length and cost. Students participating in term and semester length programs will be eligible for the $1,500 amount. Students must receive class credit during the study abroad experience or be participating in an OIP approved short-term study abroad program to be awarded a stipend.

Students are able to borrow against this stipend up to three months in advance for a small fee. This loan is intended to provide students with funds necessary for purchasing round-trip airline tickets, passports, and any other expense that needs to be covered prior to departure. Several universities abroad require either partial or total housing payment prior to arrival. This payment will be made by wire transfer and will reduce the amount available.

Please note that the stipend may be revoked if the student awarded decides to cancel their study abroad trip, does not complete required study abroad pre-departure and arrival requirements for both Kettering University and the host institution, if the study abroad experience is canceled, and/or if the student is dismissed from the study abroad program for violations of the Student Code of Conduct (for either host or Kettering University), violations of the Study Abroad agreements and policies, and/or for acts that cause the termination of a student's visa or deportation from the host country. For more information on this policy and the appeals process, please visit the Study Abroad website or contact the OIP.

Application

Application materials may be found on the Study Abroad website. Students are encouraged to make an appointment with the OIP by calling (810) 762-9533 or e-mailing studyabroad@kettering.edu to find out more about completing academic advising for study abroad. It is advisable to apply for a program 5 terms in advance of the term a student wishes to study abroad.

Orientation

Students enrolled in a study abroad program are required to attend orientation and complete all online orientation components. The orientation will provide practical, logistical, and cultural information to prepare for studying and living overseas.

Oswald International Student Fellows Program

The Oswald Fellowships at Kettering University sponsor international travel, teaching, and research opportunities for students, faculty, and staff members and are made possible by a gift from Kettering alumnus and trustee Bob Oswald '64 and his wife Marcy. Oswald International Student Fellows Program provides financial grants for travel and living expenses for Kettering students involved in the international exchange program and other approved study abroad programs. Grants are awarded multiple times each academic year on a competitive basis. In general, consideration is given to the financial need and merit of the student. Selected students will receive grants between $100 and $2,500 in addition to the Kettering Study Abroad stipend provided for study abroad students.

To be eligible to become an Oswald International Student Fellow a candidate must:

- Be in good standing at Kettering University and have been approved for study abroad by the academic department.
- Plan to participate in a study abroad program during the upcoming study abroad term. Any students approved for a study abroad program that is eligible for the Oswald Student Fellows Program will be given access to the appropriate Oswald application on the Study Abroad website.
- Demonstrate a financial need.
- Demonstrate merit in academics, leadership, and service.
- Complete an application including an essay and letters of recommendation by the specified deadlines. Application information will become available to students after the study abroad application deadline for a specific term.

Oswald International Faculty Fellowships

The Oswald Fellowships at Kettering University sponsor international travel, teaching, and research opportunities for faculty members and are made possible by a gift from Kettering alumnus and trustee Bob Oswald '64 and his wife Marcy.

The purpose of the Oswald International Scholars Program is to increase mutual understanding as well as educational and cultural exchange involving Kettering faculty members and scholars from international institutions. Applicants are encouraged to reach out to any international institution, however, preference will be given to applications indicating collaboration with existing Kettering partners as listed: **China** at Xi'an Polytechnic University, Hubei University of Automotive Technology, Guangxi University of Science and Technology, Wuhan University of Technology, and Qingdao Hengxing University; **Germany** at Reutlingen, Esslingen, Konstanz, and Ulm; **Singapore** at Singapore Institute of Technology; **Spain** at the Public University of Navarre; **South Korea** at Ajou University and Kookmin University; and **Vietnam** at Ho Chi Minh University of Technology and Education.

Through the Oswald International Scholars Program, Kettering University will assist with the costs for Kettering faculty members to work abroad during their off terms with the expectation that the international partner/host would provide support for their faculty members to spend time working on the Kettering University campus. The application process for the Faculty Fellowship may be found here.

For more information on our programs and services please contact the OIP in the following ways:

Visiting: Room 3-340, Academic Building

Website: https://my.kettering.edu/page/office-international-programs

OIP Phone: (810) 762-9869

ESLP Phone: (810) 762-9801

General email: international@kettering.edu

Study Abroad email: studyabroad@kettering.edu

ESLP Email: eslp@kettering.edu

Administration and Faculty

Senior Administration

Dr. Robert K. McMahan, Jr., President
Dr. James Z. Zhang, Senior Vice President for Academic Affairs and Provost
Mr. Thomas W. Ayers, Vice President for Administration and Finance
Ms. Susan L. Davies, Vice President for University Advancement and External Relations
Ms. Tracie Jones, Vice President for Enrollment and Co-operative Services (Interim)
Dr. LB McCune, Vice President for Student Life and Dean of Students
Mr. Geoffrey Marsh, Acting Director for Instructional, Administrative and Information Technology
Dr. Christine M. Wallace, Vice President for Kettering Global
Mr. Donald G. Rockwell, University Counsel

Academic Deans

Dr. Haseeb Ahmed, Dean, School of Management (Interim), Professor of Finance
Dr. Craig J. Hoff, Dean, College of Engineering, Professor of Mechanical Engineering
Dr. Scott W. Reeve, Dean, Graduate School and Sponsored Research, Professor of Chemistry
Dr. Kathryn Svinarich, Associate Provost for Assessment & Academic Support, Dean, College of Sciences and Liberal Arts, Associate Professor of Physics

Academic Department Heads

Dr. Babak Elahi, Department of Liberal Studies
Dr. Susan Farhat, Department of Chemical Engineering (Acting)
Dr. Michael Farmer, Department of Computer Science
Dr. Scott Grasman, Department of Industrial & Manufacturing Engineering
Dr. Daniel Ludwigsen, Department of Natural Sciences (Interim)
Dr. Matthew O'Toole, Department of Mathematics (Acting)
Dr. Bassem Ramadan, Department of Mechanical Engineering
Dr. Mark Thompson, Department of Electrical & Computer Engineering

Faculty

(Listed by Department)

Department of Natural Sciences

Hiba Assi, Lecturer of Physics
B.S. 2010, Washington and Lee University; M.S. 2013, Virginia Polytechnic Institute and State University; Ph.D. 2016, Virginia Polytechnic Institute and State University

Christopher Dewberry, Assistant Professor of Chemistry
B.S. 2006, University of North Texas; Ph.D. 2011, University of North Texas

Lisandro Hernández de la Peña, Associate Professor of Chemistry
B.S. 1995, M.S. 1997, Institute for Nuclear Sciences & Technology, Cuba; Ph.D. 2004, Dalhousie University

Ronald E. Kumon, Associate Professor of Physics
B.S. 1992, Michigan State University; Ph.D. 1999, The University of Texas at Austin

Daniel Ludwigsen, Interim Department Head, Associate Professor of Physics and Acoustics
B.A. 1992, Beloit College; Ph.D. 2001, Brigham Young University

Robert K. McMahan, President, Professor of Physics
B.S., A.B. 1982, Duke University; Ph.D. 1986, Dartmouth College

Veronica Moorman, Associate Professor of Biochemistry
B.A. 2006, Coe College; Ph.D. 2012, University of Pennsylvania

Michael Obsniuk, Lecturer of Physics
B.S. 2012, The University of Michigan-Dearborn; M.S. 2015, Michigan State University; Ph.D. 2020, Michigan State University

Andrzej Przyjazny, Professor of Chemistry
M.Sc. 1971, Technical University of Gdansk; Ph.D. 1977, Southern Illinois University; 1986, Technical University of Gdansk

Montserrat Rabago-Smith, Associate Professor of Chemistry
B.A. 1998, Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey, Mexico; Ph.D. 2002, Michigan State University

Corneliu I. Rablau, Professor of Physics
B.S. 1989, University of Bucharest, Romania; M.S. 1998, West Virginia University; Ph.D. 1999, West Virginia University

Uma Ramabadran, Professor of Physics
Ph.D. 1990, University of Cincinnati

Scott W. Reeve, Founding Dean, Graduate School and Sponsored Research, Professor of Chemistry
B.A. 1987, Augsburg College; Ph.D. 1992, University of Minnesota

Stacy Seeley, Professor of Chemistry
B.S. 1989, Central Michigan University; Ph.D. 1995, University of Massachusetts

Timothy Stiles, Assistant Professor of Physics
B.A. 1998, Grinnel College; Ph.D. 2005, University of Wisconsin-Madison

Kathryn Svinarich, Associate Provost for Assessment & Academic Support, Dean, College of Sciences and Liberal Arts, Associate Professor of Physics
B.S. 1983, University of Michigan; Ph.D. 1991, Wayne State University

Ronald Tackett, Associate Professor of Physics
B.S. 2003, Eastern Michigan University, M.S. 2007, Wayne State University, Ph.D. 2008, Wayne State University

Demet Usanmaz, Assistant Professor of Physics
B.S. 2003, Ondokuz Mayis University, Turkey; M.Sc. 2005, Gazi University, Turkey; Ph.D. 2009, Gazi University, Turkey

Lihua Wang, Professor of Chemistry
B.S. 1984, Fudan University, China; Ph.D. 1991, Purdue University

Ali R. Zand, Professor of Chemistry
B.S. 1989, Saginaw Valley State University; M.S. 1992, Central Michigan University; Ph.D. 1996, Michigan State University

Department of Computer Science

Jamal Alhiyafi, Assistant Professor of Computer Science
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B.S. 1982, Columbia University; M.S. 1984, University of Michigan; M.S. 1994, University of Minnesota; Ph.D. 2004, Michigan State University

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Saroja Kanchi, Professor of Computer Science
B.S. 1983, M.S. 1985, Indian Institute of Technology, Delhi, India; M.S. 1987, M.S. 1989, University of Toledo; Ph.D. 1993, Texas A & M University

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Department of Electrical and Computer Engineering

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Department of Liberal Studies

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Department of Mechanical Engineering

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School of Management

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B.B.A. 1981, University of Michigan; M.B.A. 1986, Wayne State University; Ph.D. 2016, Northcentral University

Endowed Chairs

Endowed chairs are among the traditional hallmarks of the best institutions of higher education and Kettering University is particularly proud to have been singled out for five such chairs since its independence. Outstanding teacher/scholars are named to hold these distinguished positions--to the benefit of students throughout the University.

The **Frances Willson Thompson Chair of Leadership Studies** was established by Mrs. Thompson of Flint, Michigan. It memorializes the role that members of her family have played in the development of American industry, particularly William C. Durant and Governor Henry Howland Crapo.

The **Eugene W. Kettering Chair of Power Engineering** was endowed by the Kettering Fund of Dayton, Ohio, in honor of Eugene W. Kettering who had a distinguished career in the field of diesel locomotion and was a prominent philanthropist.

The **F. James McDonald Chairs of Entrepreneurial and Intrapreneurial Leadership and the F. James McDonald Supply Chain Operations Professorship** were endowed by nearly 700 GM dealers throughout the United States in honor of Mr. McDonald's many contributions to the automotive industry. A 1944 graduate of GMI/Kettering, Mr. McDonald is retired president of General Motors Corporation.

The **Alfred Grava Chair in Manufacturing Management** was endowed by Dr. and Mrs. Martin (Skip) Walker to honor the late Al Grava. Walker, a 1954 GMI graduate and former chairman/CEO of the M.A. Hanna Company, and Grava, a 1957 GMI graduate and former president of Masco-Tech Automotive Systems Group, were classmates at GMI and lifelong friends.

The **Robert and Claire Reiss Chair of Industrial Engineering** was established by Robert E. Reiss and his wife Claire. Bob is a 1960 Industrial Engineering graduate and former member of the university's Board of Trustees. He was President and CEO of Interventional Technologies, a company he founded and later sold to Boston Scientific. The chair focuses on both teaching and research within an area of concentration relating to industrial engineering.

The **Robert Bosch Centennial Professorship** was established with a gift from the Robert Bosch Corporation of Stuttgart, West Germany, and its American units in honor of the company's 100th anniversary. The fund supports research of distinguished professors in electrical and mechanical engineering on a two-year, rotating basis.

The **Losh Family Business and Engineering Management Endowed Professorship** focuses on engineering, STEM, and business. The selected professor will develop business programs coupled with technical management skills and operation management along with entrepreneurial skills to uniquely prepare the next generation of business leaders.

Emeritus Faculty

John L. Blondin, Professor Emeritus of Industrial Engineering
B.S., M.S., U.S. Naval Postgraduate School

Richard W. Bolander, Professor Emeritus of Applied Physics & Mathematics
B.S., University of Missouri Schools of Mines & Metallurgy; M.S., Texas Christian University; Ph.D., University of Missouri at Rolla; P.E., Missouri

Evan F. Bornholtz, Professor Emeritus of Accounting and Finance
B.A., B.S.E.E., M.B.A., University of Iowa

David R. Clark, Professor Emeritus of Industrial Engineering
B.M.E. 1973, General Motors Institute; M.S.I.O.E. 1981, Ph.D. 1988, University of Michigan; P.E., Michigan

Stephen R. Davis, Professor Emeritus of Power Engineering
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Boyan N. Dimitrov, Professor Emeritus of Applied Mathematics
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David Green, Jr. Professor Emeritus of Mathematics
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Roger P. Grobe, Associate Professor Emeritus of Mathematics

Gary C. Hammond, Professor Emeritus of Mechanical Engineering
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Eugene Hynes, Professor Emeritus of Social Science
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Lucy Siu-Bik King, Professor Emeritus of Manufacturing Engineering
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Dale L. Meinhold, Associate Professor Emeritus of Mathematics
B.S., M.A.T., Michigan State University

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Non-Discrimination

Non-Discrimination Policy Statement

Kettering University, as an equal opportunity/affirmative action employer, complies with all applicable federal and state laws regarding nondiscrimination and affirmative action.

Kettering University is deeply committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, national origin, age, marital status, sex, sexual orientation including gender identity or expression, disability, religion, height, weight, genetic information, or veteran status in employment, educational programs and activities, and admissions except where religion, sex, or age are bona fide job related employment requirements.

Discrimination on the basis of race/ethnicity, color, ancestry, religion, national origin, sex, including marital status, age, disability, or status as a Vietnam-era veteran, special disabled veteran, recently separated veteran or other protected veteran is prohibited by federal and state statutes as amended, including Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Sections 503 and 504 of the Rehabilitation Act of 1973, the Pregnancy Discrimination Act of 1978, the Age Discrimination in Employment Act of 1978, the Vietnam Era Veteran's Readjustment Assistance Act of 1974, the Americans with Disabilities Act of 1990, and the Civil Rights Act of 1991.

Inquiries or grievances may be addressed to the Director of Human Resources, Office of Human Resources, 1700 University Avenue, Flint, MI 48504, 810-762-9500.

Title IX Statement

It is the policy of Kettering University to comply with Title IX of the Education Amendments of 1972, which prohibits discrimination (including sexual harassment and sexual violence) based on sex in the University's educational programs and activities. Title IX also prohibits retaliation for asserting or otherwise participating in claims of sex discrimination. The Title IX coordinator and the deputy coordinator have been designated to oversee Kettering's compliance with Title IX and to respond to reports of violations. For more information about Title IX, go to Kettering's Title IX website. A person may also file a complaint with the Department of Education's Office for Civil Rights regarding an alleged violation of Title IX by visiting the U.S. Department of Education's website or calling 800-421-3481.

Undergraduate A-Z

Bioinformatics (BINF)

BINF-310 Introduction to Bioinformatics 4 Credits
Prerequisites: CS-102 and BIOL-241 and BIOL-242
Bioinformatics will introduce students to the analysis of genetic sequences. Genetic information derived from the human genome project and other model systems will be presented. Lectures will discuss basic algorithmic techniques using available computational tools for extracting biological information from nucleotide and protein sequences. Bioinformatics software will be used to demonstrate how to manage, search and analyze genetic sequences.
Lecture: 4, Lab 2, Other 0

BINF-490 Bioinformatics Capstone 4 Credits
Prerequisites: BINF-310 and CHEM-351 and CHEM-352 and CS-465
Minimum Class Standing: Senior
This course involves a comprehensive design experience focusing on a project in computational biology. As part of the course, students will work in groups to design, build, implement, and test software packages to solve relevant computational problems in biological systems.
Lecture: 2, Lab 4, Other 0

Biology (BIOL)

BIOL-141 General Biology 3 Credits
Corequisites: BIOL-142
Prerequisites: None
This course serves as a general biology course. It will cover topics including basic biochemistry, cells, cell division, classification of organisms, populations, communities, and biomes. The life cycles and biology of single-cell and multicellular organisms will also be covered.
Lecture: 3, Lab 0, Other 0

BIOL-142 General Biology Lab 1 Credits
Corequisites: BIOL-141
Prerequisites: None
This course serves as a general biology laboratory. It will provide hands-on experience with areas of basic biology including basic biochemistry, cells, cell division, classification of organisms, populations, communities, biomes, and single-cell and multicellular organisms.
Lecture: 0, Lab 2, Other 0

BIOL-143 Biology in Modern Society 4 Credits
Prerequisites: None
Biology is the science of life, and the science permeates all aspects of our lives, ranging from the food we eat and the air we breathe to the interactions we have with others and the environments in which we live. Because of this, as well as new and developing methods on biological topics, it is important as humans in today's society that we understand the myriad of manners in which biology fits into our lives and society as a whole. To this end, we will focus on exploring our natural environment and various ways in which we, as humans, interact with the environment, historically and presently, and discuss biological, social, and environmental impacts of these interactions on the environmental and human society.
Lecture: 4, Lab 0, Other 0

BIOL-191 Biology Special Topics 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

BIOL-241 Human Biology 3 Credits
Corequisites: BIOL-242
Prerequisites: (CHEM-135 and CHEM-136) or (CHEM-136 and CHEM-137)
Minimum Class Standing: Freshman 2
This course serves as the second general biology course and focuses on humans. It will cover topics including basic biochemistry, cells, cell division, the organization and regulation of biological systems, human genetics and chromosomal inheritance, biotechnology, and various human organ systems.
Lecture: 3, Lab 0, Other 1

BIOL-242 Human Biology Lab 1 Credits
Corequisites: BIOL-241
Prerequisites: (CHEM-135 and CHEM-136) or (CHEM-136 and CHEM-137)
Minimum Class Standing: Freshman 2
This course serves as the second general biology laboratory. It will cover topics including basic biochemistry, cells, cell division, the organization and regulation of biological systems, human genetics and chromosomal inheritance, biotechnology, and various human organ systems.
Lecture: 0, Lab 2, Other 0

BIOL-311 Ecology 4 Credits
Prerequisites: BIOL-141
An introductory ecology course that will examine human interactions and the resulting effects of these actions on plant communities, animal communities, and the physical environment. Areas such as water, energy, agriculture, industry, recreation, and demographics are considered. Emphasis will be placed on conservation, pollution, energy, and other contemporary concerns.
Lecture: 4, Lab 0, Other 0

BIOL-321 Biological Techniques I 4 Credits
Prerequisites: BIOL-241
An introductory laboratory course that will cover some of the most widely used experimental procedures used in the biological and biotechnological fields. Basic laboratory techniques, sterile technique, electrophoretic techniques, nucleic acid isolation, manipulation, amplification, and cloning will be covered. You will also gain familiarity with types of equipment frequently used in the biological laboratory.
Lecture: 1, Lab 3, Other 0

BIOL-331 Biological Techniques II 4 Credits
Prerequisites: BIOL-321
This course is the second of the introductory laboratory courses that will cover some of the most widely used experimental procedures used in the biological and biotechnological fields. Basic equipment/instrumentation, laboratory techniques, and sterile techniques will be reviewed. Protein/enzyme assays, purification, and analysis will be covered in detail. The student will also gain familiarity with the design of experiments.
Lecture: 1, Lab 3, Other 0

BIOL-341 Anatomy and Physiology 4 Credits
Prerequisites: (BIOL-241 and BIOL-242) or MECH-350
Minimum Class Standing: Sophomore
An introduction to Human Anatomy and Physiology. This course will cover topics including the organization and regulation of biological tissues, organs and organ systems as well as human development.
Lecture: 4, Lab 0, Other 0

BIOL-351 Genetics 4 Credits
Prerequisites: None
Minimum Class Standing: Sophomore
An introduction in the study of inheritance in all of its manifestations. Specifically, it introduces theory and problem solving in the three areas of Genetics: Classical Genetics, Molecular Genetics, and Population Genetics. Topics include Mendelian Genetics, sex-linkage and pedigree analysis, non-Mendelian patterns of inheritance, the molecular basis of inheritance and gene expression, the theory of methodology of modern DNA technologies, and population genetics and evolution.
Lecture: 4, Lab 0, Other 0

BIOL-361 Microbiology 4 Credits
Corequisites: BIOL-362
Prerequisites: BIOL-242
An introductory microbiology course comprised of topics including microbial cell structure and function, metabolism, growth and regulation, diversity, genetics, host-microbe interactions, disease and microbial ecology. This course will cover viruses, archaea, fungi, and protists but the main focus of the course will be on bacteria.
Lecture: 4, Lab 0, Other 0

BIOL-362 Microbiology Lab 3 Credits
Corequisites: BIOL-361
Prerequisites: BIOL-242
A laboratory course which covers a number of microbiological procedures and topics including microbial cultivation, isolation, and identification utilizing sterile technique. This course will cover microbial pathogenesis, sensitivity to antimicrobial agents, immunity, and the interaction of microbes with their environment.
Lecture: 0, Lab 3, Other 0

BIOL-381 Molecular Biology 4 Credits
Corequisites: BIOL-382
Prerequisites: BIOL-141 and BIOL-142
The basic theory and methodology of Molecular Biology is covered. Concepts to be examined include how biological structure determines function, mechanisms and regulation of replication, transcription, and translation, processing of mRNA transcripts and proteins, and mechanisms underlying basic cellular activities.
Lecture: 4, Lab 0, Other 0

BIOL-382 Molecular Biology Lab 3 Credits
Corequisites: BIOL-381
Prerequisites: BIOL-241 and BIOL-242
This laboratory course serves as an introduction to methods utilized to study molecular biology. Laboratory techniques will include molecular cloning, RNA isolation, extraction, purification, and quantification, site-directed mutagenesis, and data interpretation. The course is designed for the junior level and is meant to be taken simultaneously with BIOL 381.
Lecture: 0, Lab 3, Other 0

BIOL-441 Cellular Biology 4 Credits
Corequisites: BIOL-442
Prerequisites: CHEM-351
Minimum Class Standing: Junior
An introduction to the structure and function of cells. Topics include cell motility, intracellular transport, cellular chemistry, membranes, organelles, metabolism, reproduction, and signaling.
Lecture: 4, Lab 0, Other 0

BIOL-442 Cellular Biology Lab 3 Credits
Corequisites: BIOL-441
Prerequisites: CHEM-351
Minimum Class Standing: Junior
An introduction laboratory utilizing methods to study cell biology and physiology. Laboratory techniques will include microscopy, yeast transformation, cellular assays (luminescence or ELISA), cell fractionation, Western Blotting, tissue culture, DNA transfection, and assays specific to assessment of drug activity or induction of chemical pathways. The course is designed for the senior level and is meant to be taken simultaneously with BIOL 441.
Lecture: 0, Lab 3, Other 0

BIOL-491 Adv. Special Topics in Biology 6 Credits
Prerequisites: None
Advanced Topics in Biology & Lab. Usually 6 credits. Offered for Applied Biology Majors as part of the core program.
Lecture: 4, Lab 2, Other 0

BIOL-494 Research Methods 4 Credits
Prerequisites: BIOL-381 and BIOL-382
A capstone course where students design, execute, analyze and report the results of original research in collaboration with a faculty member. Students are required to give a formal presentation of their findings.
Lecture: 0, Lab 4, Other 0

BIOL-499 Biology Independent Study 4 Credits
Prerequisites: None
Advanced Biology Independent Study. Can be 1-4 credits.
Lecture: 4, Lab 2, Other 0

Business (BUSN)

BUSN-103 Introduction to Marketing 4 Credits
Prerequisites: None
An overview of marketing's role in connecting business to consumers will be provided. Emphasis is placed on analyzing the external marketing environment and customers' needs as a basis for developing a firm's marketing strategy. Topics include: marketing research, identifying opportunities, market segmentation, targeting customers, consumer behavior, the business-to-business market, business-to-business buying behavior, product and service planning of existing and new offerings, integrated promotion planning, logistics and channel development, and price planning. SAP exercises may be used in this course to illustrate marketing processes.
Lecture: 4, Lab 0, Other 0

BUSN-134 Personal Financial Management 4 Credits
Prerequisites: None
The course covers the basic principles needed for effective personal financial management; including creating, organizing, implementing, monitoring, and revising a personal plan to achieve financial objectives and goals. The topics covered include cash management and budgeting; establishing and maintaining good credit; managing consumer credit and student loans; investing in stocks, bonds, and mutual funds, and income tax planning. The course also covers long-term financial planning topics such as housing decisions, insurance, retirement planning, charitable giving, and estate planning. The course covers strategies to avoid financial scams, fraud, and identity theft.
Lecture: 4, Lab 0, Other 0

BUSN-152 Information Systems 4 Credits
Prerequisites: None
This course focuses on how organizations use information systems to effectively compete in the global economy. Topics include: information systems and their use in today's global businesses, enterprise applications, the role of information systems in organizational strategy, e-commerce, digital markets and digital goods, IT infrastructure and emerging technologies, database and information management, systems design, telecommunications, the internet, and wireless technology.
Lecture: 4, Lab 0, Other 0

BUSN-191 Business Special Topics 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

BUSN-221 Financial Accounting 4 Credits
Prerequisites: MATH-100 or MATH-191 or MATH-101 or MATH-101X
The principles, practices and procedures used by accountants in processing business data are covered in this course. Units of study include the elements of the accounting cycle plus accounting for cash, accounts receivables, inventory, plant and equipment, investments, intangibles, liabilities, and corporate ownership. Ethical issues are addressed with research into various accounting scandals.
Lecture: 4, Lab 0, Other 0

BUSN-222 Managerial Accounting 4 Credits
Prerequisites: None
Minimum Class Standing: Sophomore
The use of financial information in the making of managerial decisions is the focus of this course. Subject areas include the calculation of the costs of products and services, budgeting, performance analysis, cost-volume- profit analysis, and assessing relevant costs. This course also addresses the ethical issues in managerial accounting. It is highly recommended that students take BUSN-221 prior to taking this course.
Lecture: 4, Lab 0, Other 0

BUSN-271 Statistics for Business 4 Credits
Prerequisites: MATH-100 or MATH-191 or MATH-101 or MATH-101X
Introduction to statistical methods to support quantitative decision analysis for solving business problems. Topics covered include probability, sampling, estimation, hypothesis testing, analysis of variance, and linear regression.
Lecture: 4, Lab 0, Other 0

BUSN-303 New Venture Creation: Entrepreneurship 4 Credits
Prerequisites: None
Minimum Class Standing: Sophomore
The development of an innovative product, service or delivery method into a feasible business model will be the focus of this course. Students will identify a particular customer need that can be met with a novel approach using a combination of resources, including technology, marketing or financial acumen. Student teams will develop a business plan and stakeholder/investor presentation suitable for actual funding in one of the following areas: New Venture Entrepreneurship, Social Entrepreneurship or Intrapreneurship.
Lecture: 4, Lab 0, Other 0

BUSN-304 Intrapreneurship and Innovation Development 4 Credits
Prerequisites: None
Minimum Class Standing: Junior
Intrapreneurship, the activity of value creation within an existing enterprise, is presented to prepare students to be innovators in their employing organizations. Strategies are introduced to innovation development as practiced by exemplary innovators. Structures are presented that support a successful innovation development environment. Processes utilized for innovation development are contrasted and a general approach is presented with specific application to a course project. Tools and techniques are presented and practiced by students during the completion of the project requirements.
Lecture: 4, Lab 0, Other 0

BUSN-312 Business Process Improvement 4 Credits
Prerequisites: BUSN-271 or MATH-258
Minimum Class Standing: Junior
Methods of process analysis and quantitative modeling are synthesized to evaluate and propose solutions to improve business processes. This course introduces decision situations that managers face in the workplace and applies problem solving methods to formulate decisions and implement solutions. Methods applied include problem solving frameworks, data visualization, descriptive analytics, predictive models, optimization models, and simulation analysis. The development of spreadsheet modeling skills is a primary learning objective.
Lecture: 4, Lab 0, Other 0

BUSN-321 Entrepreneurial Thinking 4 Credits
Prerequisites: ECON-201 and MGMT-101
This course is designed to help students gain both intellectual and practical understanding of the role of the entrepreneur in value creation and wealth generation, the attributes and mindsets of successful entrepreneurs, tools for problem/opportunity recognition including resource identification, value proposition design, and risk assessment and management. Instruction will consist of lectures, in-class exercises and discussions.
Lecture: 4, Lab 0, Other 0

BUSN-331 Financial Management 4 Credits
Prerequisites: BUSN-221 and (ECON-201 or MATH-350)
Minimum Class Standing: Junior
The role financial management plays in the successful operation of a business enterprise will be identified and discussed. Subject areas include financial statement analysis, risk and return, debt and equity valuation, capital structure management, capital budgeting, and working capital management. Ethical issues facing managers are also emphasized.
Lecture: 4, Lab 0, Other 0

BUSN-332 Financial Markets 4 Credits
Prerequisites: BUSN-222
Students will be provided with (1) the theoretical models that underlie the value of stocks and bonds and how these instruments are purchased, (2) an understanding of various financial securities and the financial institutions that create and trade them, (3) investment alternatives such as derivative products, mutual funds, foreign exchange, and commodities.
Lecture: 4, Lab 0, Other 0

BUSN-342 Product Marketing Management 4 Credits
Prerequisites: BUSN-103
A foundation of knowledge and skills necessary to be an effective Product Marketing Manager will be provided. Students will learn how to effectively manage products throughout their entire life cycle. The class will cover the critical aspects, both on the strategic and tactical levels that are necessary so that product marketing is an ongoing learning experience to ensure continuous improvement.
Lecture: 4, Lab 0, Other 0

BUSN-361 Lean Operations Management 4 Credits
Prerequisites: MGMT-104
Minimum Class Standing: Junior
Students will be provided with an overall understanding of the management of operations activities for both services and manufacturing enterprises. Operations strategies are introduced which identify competitive priorities to support enterprise strategies. Process analysis and quality control tools are introduced within a framework of the principles of Total Quality Management. Methods for the planning and management of operational resources are outlined with applications in services, manufacturing and distribution. The philosophy and techniques of Lean Systems are developed including applications in lean manufacturing and service industries. Lean methods are contrasted with Traditional Operations Management approaches common to many businesses. ERP simulation instruction is utilized to develop skills in resource planning and understand the importance of enterprise systems in managing businesses.
Lecture: 4, Lab 0, Other 0

BUSN-362 Lean Supply Chain Management 4 Credits
Prerequisites: BUSN-361
Students will be provided with an overall understanding of the management of operations activities of Supply Chain Management (SCM). The course covers concepts, trends and technologies that enable global SCM. Students will learn how customer needs, competitive advantage, operational measures and financial performance support successful implementation of SCM. They will also learn how operational activities including information systems, procurement, demand planning and forecasting, inventory management, and logistics support organizational goals. The philosophy and techniques of Lean Systems are applied to SCM. Lean methods are contrasted with Traditional Operations Management approaches common to many businesses. ERP simulation instruction is utilized to develop skills in logistics and demonstrate the importance of enterprise systems in managing the supply chain.
Lecture: 4, Lab 0, Other 0

BUSN-371 Business Analytics 4 Credits
Prerequisites: BUSN-271 or MATH-258
This course introduces students to an important business trend in the utilization of "Big Data" for business intelligence. The course will include coverage of data mining techniques, and the data infrastructure required to support business analytics. Software tools will be applied at an introductory level to provide students with hands-on experience in data mining. Assigned projects will require students to apply their knowledge to develop and critically evaluate actionable initiatives for business analytics.
Lecture: 4, Lab 0, Other 0

BUSN-402 Business Law 4 Credits
Prerequisites: None
Minimum Class Standing: Junior
An introduction to the law and legal institutions in society, with emphasis on areas of law relevant to business. This class is open to both business and non-business students. Course topics include the fundamentals of business law and all of the major components.
Lecture: 4, Lab 0, Other 0

BUSN-429 Entrepreneurial Finance 4 Credits
Prerequisites: BUSN-222 and BUSN-303 and BUSN-304 and MGMT-314
This is a course on financing startups and other small businesses. The objective is to provide students with an understanding of how financing from venture capital and private equity funds, as well as angel investors, finds its way to entrepreneurial ventures. The course follows a basic framework for study and analysis via the life cycle of an entrepreneurial venture consisting of (a) opportunity recognition, (b) valuation and terms of financing, (c) growing the entrepreneurial venture, and (d) harvesting the venture to create profits through Initial Public Offerings (IPOs) or a sale of the business. Students will examine the financial concepts, tools, and techniques for a successful entrepreneurial venture, with an emphasis on the financial management practices needed to secure financing and using business valuation models.
Lecture: 4, Lab 0, Other 0

BUSN-433 Strategic Investment Mgmt 4 Credits
Prerequisites: BUSN-331
An in-depth understanding of investments is provided. Students develop an understanding of debt and equity securities as well as derivatives. Theories of investment strategies and techniques are applied through course assignments and case analyses. Topics include the relationship between risk and return, portfolio management theories, behavioral finance, equilibrium arbitrage theories, market efficiency, and security analysis.
Lecture: 4, Lab 0, Other 0

BUSN-456 Database Management Systems 4 Credits
Prerequisites: BUSN-152
Minimum Class Standing: Junior
Introduction to the concepts, principles, issues and techniques for managing corporate data resources. Techniques for managing the design and development of large database systems including logical data models, concurrent processing, data distribution, database administration, data warehousing, data cleansing, and data mining will be covered.
Lecture: 4, Lab 0, Other 0

BUSN-459 International Business 4 Credits
Prerequisites: None
The course introduces students to international business and management by studying cultural differences, various governmental regulations, and business structures in a global economy. Other topics include legal and labor agreements, international finance, trade relations, production operations, information technology, global marketing, and human resources planning & development for MNC's.
Lecture: 4, Lab 0, Other 0

BUSN-522 Business Statistics 4 Credits
Prerequisites: None
Solving complicated business programs in today's increasingly competitive global marketplace demands new thinking and new skills. This course is designed to provide insight for learners about how to collect, analyze and interpret data in order to make sound business decisions. Probability analysis, sampling, hypothesis testing, descriptive and inferential statistics along with additional tools and techniques used by business professionals in market research, business forecasting and risk mitigation are employed.
Lecture: 4, Lab 0, Other 0

Computer Engineering (CE)

CE-210 Digital Systems I 4 Credits
Prerequisites: ECE-101 or CS-101 or IME-211
Design and analysis techniques for combinational and sequential logic circuits are studied. Topics include binary number systems and binary addition/subtraction, combination logic minimization, frequently used combinational logic circuits, finite state machines, shift registers and counters. VHDL will be used for description, simulation and FPGA synthesis of digital circuits.
Lecture: 3, Lab 2, Other 0

CE-320 Microcomputers I 4 Credits
Prerequisites: CE-210
Principles of microcomputer hardware and software are presented. Topics include instruction sets and addressing modes, structured assembly language programming, topdown design, introductory machine architecture and its relationship to programming, introduction to hardware in typical microcontrollers, and an introduction to programming microcontrollers in C.
Lecture: 3, Lab 2, Other 0

CE-412 Digital Systems II 4 Credits
Prerequisites: CE-210
Minimum Class Standing: Junior
The principles and practices used in the design of modern complex combinational and sequential digital systems is covered. Digital logic design, analysis, simulation, and implementation techniques are provided. Fundamental algorithms underlying computer-aided design (CAD) tools are studied. Schematic diagrams and hardware description languages (HDL) are used to specify designs targeted for implementation in technologies ranging from discrete ICs to programmable logic devices and ASICs. The course has a laboratory component that allows students to exercise the principles and practices learned.
Lecture: 3, Lab 2, Other 0

CE-420 Microcomputers II 4 Credits
Prerequisites: CE-320
Minimum Class Standing: Junior
This advanced course in Microcomputer Systems covers the architectural features, design principles, development tools and techniques of advanced embedded microcomputers. The topics include architectures of contemporary 16-bit and 32-bit RISC microcontrollers (considering Microchip PIC24 and PIC32 as example cases for the practical development experiences), instruction set, addressing modes, software development & debugging, parallel and serial interfacing, interrupts, timer module, ADC module, etc. The course has a strong laboratory component, which will be carried out on a microcomputer development kit with the latest family of 16-bit and 32-bit microcontrollers.
Lecture: 3, Lab 2, Other 0

CE-422 Computer Architecture and Organization 4 Credits
Prerequisites: CE-320
Minimum Class Standing: Junior
The fundamental concepts in computer architecture and organization are presented. Laboratory assignments using VHDL simulation are a major portion of the course. Topics include fixed point and floating point computer arithmetic; assessing and understanding performance; control unit design; microprogramming; memory organization; cache design; a 32-bit instruction-set architecture; single-cycle, multicycle and pipelined CPU architectures; RISC architecture; examples of commercial computer architectures.
Lecture: 3, Lab 2, Other 0

CE-424 VLSI Design 4 Credits
Prerequisites: CE-320 and EE-210
Minimum Class Standing: Junior
Design techniques and basic theory of integrated circuit design are discussed. Topics include review of the semiconductor physics associated with NMOS and PMOS transistors; fabrication process; CMOS combinational circuits; memory cells; stick diagrams; layout techniques using CAD tools; circuit extraction and analysis. A project is completed.
Lecture: 3, Lab 2, Other 0

CE-426 Real-Time Embedded Systems 4 Credits
Prerequisites: CE-320
Implementation and applications of real-time embedded computers are studied. Topics include the case study of an embedded real-time operating system, typical applications of embedded computers, real-time hardware and software interfacing, and real-time scheduling algorithms. This course includes a lab component with several short design projects and a final directed design project.
Lecture: 3, Lab 2, Other 0

CE-442 Introduction to Mobile Robotics 4 Credits
Prerequisites: CE-320
Minimum Class Standing: Junior
The fundamentals of robotics are covered with an emphasis on mobile robots, which are intelligent integrated mechanical, electrical and computational systems functioning in the physical world. Topics include state-of-the-art technologies in mobile robotics, such as locomotion, sensing, control, communication, localization, mapping, navigation, etc. Advanced topics such as coordination of multiple mobile robots will also be introduced. The course aims to provide both theoretical and practical experience to students through lectures and hands-on experience with real robots and simulation software.
Lecture: 3, Lab 2, Other 0

CE-450 App Dvelpmt for Mobile Devices 4 Credits
Prerequisites: CS-101 or ECE-101
This course is an overview of how to get started in developing mobile apps for Android and iOS platforms. These two app development platforms share similar challenges but have different approaches to addressing them. Both platforms will be taught to encourage students to see how the two different approaches can be used to solve similar issues. Students will choose one platform for their final design project. Topics include user interface design, network, communication, and sensor interfacing. This course includes lab components with design projects and final directed design project.
Lecture: 3, Lab 2, Other 0

CE-451 Introduction to Autonomous Driving 4 Credits
Prerequisites: CS-101 or ECE-101 or IME-211 or MECH-330
This course provides an overview of theoretical and practical background regarding the design and development of autonomous vehicles. Topics include an overview of autonomous vehicle systems, autonomous vehicle localization technologies, perception in autonomous driving, decision and planning, and control for autonomous driving. This course aims to cover the basics of autonomous driving through lectures, lab assignments, a term project, and readings on current related topics.
Lecture: 3, Lab 2, Other 0

CE-452 Artificial Intelligence for Autonomous Driving 4 Credits
Prerequisites: CS-101 or ECE-101
Minimum Class Standing: Junior
This course will provide introductory theories and technologies in artificial intelligence focusing on machine learning for autonomous driving. Machine learning studies algorithms that learn from large quantities of data, identify patterns and make predictions on a new data set. Students will study the concepts that underlie intelligent systems and investigate the advanced topics in intelligent systems. The first half of this course will focus on fundamental models and algorithms in intelligent systems. In the second half of the course, students will learn machine learning applications and programming skills by implementing the intelligent systems. Especially students will learn deep neural networks for identifying and classifying objects (vehicles and pedestrians) using data obtained from automotive sensors.
Lecture: 3, Lab 2, Other 0

CE-454 Computer Vision for Autonomous Driving 4 Credits
Prerequisites: CS-101 or ECE-101
This course will cover introductory theories and modern technologies in computer vision systems for autonomous driving. Data from visual sensors play crucial roles in many fields such as autonomous driving, surveillance camera, and robotics. The computer vision system seeks to automate tasks that the human visual system can do. The goal of this course is to learn technologies that enable a computer automatically to understand the content of visual sensors for autonomous driving. The first half of this course will focus on fundamental models and algorithms in computer vision and in the second half of the course students can learn about computer vision applications and programming skills to accomplish computer vision tasks.
Lecture: 3, Lab 1, Other 0

CE-472 VR Systems: Modeling & Control 4 Credits
Prerequisites: ECE-101 or CS-101 or IME-211
This course provides the required theoretical and practical background to design and development of multimodal virtual reality (VR) systems. Particularly, the main focus is on VR-based human-in-the-loop systems that enable users to interact and/or manipulate virtual objects in simulated environments. This course aims to cover basics of these systems through lectures, homework, lab assignments, a term project, and readings on current related topics. Through lab assignments, students acquire hands-on skills to create a multimodal virtual environment. Topics include multimodal virtual reality, current VR technology and devices, human-centered simulation: human perception and psychophysics, basic control and stability analysis of VR systems, and human factors in the design of VR displays.
Lecture: 3, Lab 2, Other 0

CE-480 Computer Networks 4 Credits
Prerequisites: CE-320 and (MATH-258 or MATH-408)
Minimum Class Standing: Junior
Organization, analysis, and design of interconnected systems of computers are studied. Topics include the Open System Interconnection model and the Internet TCP/IP reference architecture. Standard protocols and technologies at each network layer will be covered, such as HTTP and a socket programming API at the application layer, TCP and UDP at the transport layer, and IPv4 and IPv6 along with fundamentals of routing at the network layer. Ethernet and Wi-Fi with their related physical mediums are discussed. The course will also introduce error detection and correction methods, basic network security principles and mobile technologies.Students may not receive credit for both CE-480 and CE-680.
Lecture: 3, Lab 2, Other 0

CE-484 Internet of Things (IoT) 4 Credits
Prerequisites: CE-320
The most important topics of the Internet of Things and its applications will be addressed. Topics include an introduction to network stacks and embedded operating systems, IoT architecture models, smart devices, connections and access technologies, the IoT network layer, application layer protocols relevant to IoT, and IoT security practices. Various IoT application areas will be discussed, such as industrial, home automation, manufacturing, energy, utilities, vehicles, smart cities, agriculture and health care. Students complete a term project to develop a complete IoT application. Students may not receive credit for both CE-484 and CE-684.
Lecture: 3, Lab 2, Other 0

CE-490 Senior CE Design Project 4 Credits
Corequisites: CE-422, CE-426
Prerequisites: ECE-101 and CE-420 and CE-480 and EE-320 and EE-321 and CS-102
Minimum Class Standing: Senior
Students are prepared for engineering practice through a major design experience based on knowledge and skills acquired in earlier course work. They work in teams to design and develop a prototype embedded-computer or other complex digital system to meet a given specification. The specification requires the design to incorporate relevant engineering standards and to address most of the following: manufacturability, sustainability, and economic, environmental, ethical, health and safety, social, and political considerations. Designs are documented in a professional manner and presented publicly.
Lecture: 2, Lab 4, Other 0

Chemistry (CHEM)

CHEM-135 Principles of Chemistry 3 Credits
Corequisites: CHEM-136
Prerequisites: None
This course introduces fundamental concepts and applications of chemistry, including atomic structure, the Periodic Table, chemical bonding, reaction stoichiometry, thermochemistry, ideal gas laws, and electrochemistry. Applied topics include batteries, fuel cells and corrosion, and a description of the chemistry and uses of metals and nonmetals are included.
Lecture: 3, Lab 0, Other 0

CHEM-136 Principles of Chemistry Lab 1 Credits
Corequisites: CHEM-135
Prerequisites: None
The laboratory introduces and/or illustrates chemical concepts and principles, and teaches the skills of data collection and evaluation. The SI system is emphasized.
Lecture: 0, Lab 2, Other 0

CHEM-137 General Chemistry I 3 Credits
Corequisites: CHEM-136
Prerequisites: None
An introduction to fundamental concepts of chemistry, including the Periodic Table, chemical nomenclature, reactions and reaction stoichiometry, atomic structure and chemical bonding. The course is open to all science majors, and is required for Chemistry majors. Non-science majors require permission of Chemistry Discipline Chair.
Lecture: 3, Lab 0, Other 1

CHEM-223 Introduction to Polymer Science 4 Credits
Prerequisites: CHEM-135 or CHEM-137
Minimum Class Standing: Sophomore
An introduction to the fundamental principles of Polymer Science. Topics include the relationship between polymer structure and engineering properties with discussions of the most widely used polymeric materials and processes in terms of their relative costs, design parameters, and applications - thermal, mechanical, and rheological testing is discussed as well as the environmental impact of polymeric materials. Each lecture is augmented by displays of fabricated parts which illustrate general plastic selection principles. Each student makes an oral and written presentation which illustrates the application of polymer science to a specific material, design and/or process.
Lecture: 4, Lab 0, Other 0

CHEM-237 General Chemistry II 3 Credits
Corequisites: CHEM-238
Prerequisites: CHEM-135 or CHEM-137
Minimum Class Standing: Freshman 2
General Chemistry II, is a continuation of CHEM-137, General Chemistry I. Topics covered include: properties of gases, thermochemistry, chemical thermodynamics, ideal and non-ideal solutions, chemical equilibrium, chemical kinetics, nuclear chemistry, and electrochemistry.
Lecture: 3, Lab 0, Other 1

CHEM-238 General Chemistry II Lab 1 Credits
Corequisites: CHEM-237
Prerequisites: CHEM-135 or CHEM-137
Minimum Class Standing: Freshman 2
This laboratory course, taken concurrently with CHEM-237, is designed to continue exploring the experimental principles of chemistry not covered in CHEM-136. Topics covered include empirical formulas of hydrates, gas laws, heats of reactions, freezing point depression, iodine clock, acid dissociation constant determination, buffers, solubility product constant determination, electrolysis of water, and the determination of thermodynamic properties.
Lecture: 0, Lab 3, Other 0

CHEM-345 Organic Chemistry I 4 Credits
Prerequisites: CHEM-237
Minimum Class Standing: Sophomore
Terms Offered: Summer, Fall
A thorough coverage of the chemistry of hydrocarbons will be provided. Topics include: valence theory, stereochemistry, structure, addition polymerization, reaction mechanisms and spectroscopy. This course is appropriate for science majors and environmental Chemistry minors.
Lecture: 6, Lab 0, Other 0

CHEM-346 Organic Chemistry I Lab 2 Credits
Corequisites: CHEM-345
Prerequisites: CHEM-237 and CHEM-238
Minimum Class Standing: Sophomore
This laboratory develops the basic skills needed for the separation, identification and synthesis of organic compounds. Instrumental techniques introduced will include FTIR, UV-VIS, GC and GC/MS. One four-hour laboratory per week.
Lecture: 0, Lab 4, Other 0

CHEM-347 Organic Chemistry II 4 Credits
Prerequisites: CHEM-345
Minimum Class Standing: Sophomore 2
A continuation of CHEM-345 with an emphasis on the chemistry of the organic functional groups and the synthesis of polyfunctional molecules will be provided. Appropriate for science majors.
Lecture: 4, Lab 0, Other 0

CHEM-348 Organic Chemistry II Lab 2 Credits
Corequisites: CHEM-347
Prerequisites: CHEM-345 and CHEM-346
Minimum Class Standing: Sophomore 2
A continuation of CHEM-346 with an emphasis on the advanced techniques used to synthesize multifunctional organic compounds will be provided. Instrumental methods will be intensively utilized to characterize complex chemical structures.
Lecture: 0, Lab 4, Other 0

CHEM-351 Biochemistry I 4 Credits
Corequisites: CHEM-352
Prerequisites: CHEM-345 and CHEM-346
Minimum Class Standing: Sophomore
The basic principles of biochemistry will be the focus of this course. Coverage includes a thorough description of the biochemical framework - amino acids, proteins, enzymes, lipids, membranes, carbohydrates, nucleic acids, DNA, and RNA. In addition, the energetics and metabolism of a number of biological processes will be introduced.
Lecture: 4, Lab 0, Other 0

CHEM-352 Biochemistry Lab 3 Credits
Corequisites: CHEM-351
Prerequisites: CHEM-345 and CHEM-346
Minimum Class Standing: Sophomore
An introduction to biochemistry laboratory procedures for the separation and analysis of biologically important molecules. This course also covers techniques and methodology important in the biotechnology field.
Lecture: 0, Lab 3, Other 0

CHEM-361 Physical Chemistry I 4 Credits
Corequisites: CHEM-362
Prerequisites: CHEM-237 and CHEM-238 and PHYS-224 and PHYS-225
Minimum Class Standing: Junior
A first course in physical chemistry, covering the topics of chemical thermodynamics, gas laws, solutions, transport properties, phases and phase diagrams, electrochemistry, colligative properties and the physical chemistry of macromolecules.
Lecture: 4, Lab 0, Other 0

CHEM-362 Physical Chemistry I Lab 3 Credits
Corequisites: CHEM-361
Prerequisites: None
Minimum Class Standing: Junior
This laboratory will illustrate principles covered in the CHEM-361 lecture and introduce the student to methods used in determining physical relationships in nature. Topics include equilibrium, phase diagrams, solutions, thermodynamics, gases, transport properties and error analysis.
Lecture: 0, Lab 3, Other 0

CHEM-363 Physical Chemistry II 4 Credits
Corequisites: CHEM-364
Prerequisites: CHEM-237 and PHYS-224 and PHYS-225 and (MATH-203 or MATH-203H or MATH-203X)
Minimum Class Standing: Junior 2
The second course in the physical sequence, continuing topics introduced in CHEM-361, Physical Chemistry I. Topics covered will include kinetic molecular theory, kinetics, quantum mechanics, solids and surfaces, photochemistry, atomic and molecular structure theory, spectroscopy, statistical mechanics.
Lecture: 4, Lab 0, Other 0

CHEM-364 Physical Chemistry II Lab 3 Credits
Corequisites: CHEM-363
Prerequisites: None
Minimum Class Standing: Junior 2
This laboratory will illustrate principles covered in the CHEM-363 lecture and introduce the student to methods used in determining physical relationships in nature. Topics include kinetics, quantum mechanics, solids, surface chemistry, electrochemistry, photochemistry, and spectroscopic techniques.
Lecture: 0, Lab 3, Other 0

CHEM-373 Analytical Chemistry 4 Credits
Corequisites: CHEM-374
Prerequisites: CHEM-237 and CHEM-238 and CHEM-345 and CHEM-346
Minimum Class Standing: Junior 2
Introduction to classical and modern instrumental analytical chemistry. The fundamentals of analytical statistics, acid/base calculations, titrations, basic chemical equilibrium, atomic and molecular spectroscopic, chromatographic, and electroanalytical methods of analysis will be covered.
Lecture: 4, Lab 0, Other 0

CHEM-374 Analytical Chemistry Lab 3 Credits
Corequisites: CHEM-373
Prerequisites: CHEM-345 and CHEM-346
Minimum Class Standing: Junior 2
This laboratory course covers the qualitative and quantitative analysis of chemical compounds including gravimetric, volumetric, and spectrophotometric methods.
Lecture: 0, Lab 3, Other 0

CHEM-381 Scientific 3D Printing 4 Credits
Prerequisites: None
This is a project based course designed to give you an understanding of 3D printing and how it can be used in both scientific and mechanical applications. This course begins with learning to design parts on a computer. Using these CAD skills, students will explore ergonomic and effective problem solving using best printing practices to make a better final product and minimize limitations of the printers. Students are expected to complete fairly open ended projects that demonstrate mastery over different functionalities of prints that are often used in larger projects. Students will have the flexibility to incorporate the requirements of the small functionality projects into a larger project for Co-Op, research, or personal use. The course will also explore how 3D printing is currently being used in industry and research.
Lecture: 0, Lab 0, Other 4

CHEM-437 Inorganic Chemistry 4 Credits
Corequisites: CHEM-438
Prerequisites: CHEM-345
Minimum Class Standing: Junior
In-depth coverage of the fundamentals of inorganic and bioinorganic chemistry, including structure and bonding of inorganic compounds, as well as their chemical periodicity and reactions. The descriptive chemistry of metals, non-metals and coordination compounds will also be discussed.
Lecture: 4, Lab 0, Other 0

CHEM-438 Inorganic Chemistry Lab 3 Credits
Corequisites: CHEM-437
Prerequisites: CHEM-346
Minimum Class Standing: Junior
This laboratory component is an introduction to the techniques used in the synthesis and characterization of metal complexes and organometallic compounds, including bioinorganic compounds. This course is open to all science majors and is required for chemistry majors. One three-hour laboratory per week.
Lecture: 0, Lab 3, Other 0

CHEM-451 Biochemistry II 4 Credits
Corequisites: CHEM-452
Prerequisites: CHEM-351 and CHEM-352
Minimum Class Standing: Junior 2
A comprehensive advanced Biochemistry lecture course. It will cover topics related to the biochemistry of the human body, including the breakdown and synthesis of glucose, fatty acids, amino acids, and nucleotides.
Lecture: 4, Lab 0, Other 0

CHEM-452 Biochemistry II Lab 3 Credits
Corequisites: CHEM-451
Prerequisites: CHEM-351 and CHEM-352
Minimum Class Standing: Junior 2
A comprehensive advanced Biochemistry laboratory. Topics related to the isolation and manipulation of DNA and proteins will be covered. Including techniques such as PCR, Western blotting, mutagenesis, DNA Fingerprinting, and molecular modeling.
Lecture: 0, Lab 3, Other 0

CHEM-477 Advanced Organic Chemistry 4 Credits
Corequisites: CHEM-478
Prerequisites: CHEM-347 and CHEM-348
Minimum Class Standing: Senior
A senior level chemistry elective. This course will cover topics including the principles of structure/reactivity, reaction mechanisms, kinetic and thermodynamic control of reactions, radical and photochemistry, organometallic chemistry and total organic synthesis.
Lecture: 4, Lab 0, Other 0

CHEM-478 Advanced Organic Chemistry Lab 2 Credits
Corequisites: CHEM-477
Prerequisites: CHEM-347 and CHEM-348
Minimum Class Standing: Senior
A senior level chemistry elective course. The laboratory develops the skills needed to perform variety of organic reactions including photochemistry and organometallic chemistry. It also allows the student to use the knowledge developed to design and carry out a total synthesis for a target compound. Student will employ the separation, purification and identification techniques learned in CHEM-348 to perform the labs. One four-hour laboratory per week.
Lecture: 0, Lab 4, Other 0

CHEM-491 CHEM Special Topics 4 Credits
Prerequisites: None
Advanced Chemistry Elective & Lab
Lecture: 4, Lab 0, Other 0

CHEM-492 CHEM Special Topics Lab 3 Credits
Prerequisites: None
Lecture: 0, Lab 3, Other 0

CHEM-494 Research Methods 4 Credits
Prerequisites: BIOL-242 or CHEM-238
Minimum Class Standing: Junior 2
Topics will include research ethics, study design and implementation, and results communications. Students will learn about these topics through readings, discussions, and practical application.
Lecture: 0, Lab 4, Other 0

CHEM-496 Senior Research/Seminar II 2 Credits
Prerequisites: CHEM-494
Minimum Class Standing: Senior
Seniors will conclude a senior research project with a faculty member, and prepare and present a seminar dealing with progress achieved during the research period. Guest seminar lectures by visiting faculty, industry or government scientists will also be scheduled. This course may be repeated twice for a total of six credits.
Lecture: 0, Lab 6, Other 0

CHEM-499 Chemistry Independent Study 4 Credits
Prerequisites: None
Terms Offered: As needed
Advanced Chemistry Independent Study
Lecture: 4, Lab 0, Other 0

Chemical Engineering (CHME)

CHME-100 Introduction to Chemical Engineering 4 Credits
Prerequisites: None
Students will be introduced to the discipline of chemical engineering. Class topics include discussion of what chemical engineers do in practice, basic calculations related to chemical engineering, hands-on experiences to improve the understanding of how basic chemical processes work, experiments to demonstrate core concepts, team work skills, time management, spreadsheet and process flow diagram development, and student research opportunities.
Lecture: 4, Lab 0, Other 0

CHME-200 Mass & Energy Balance 4 Credits
Prerequisites: (MATH-101 or MATH-101X) and CHEM-137
Minimum Class Standing: Sophomore
An introduction to the study of mass and energy balance for small and large scale industrial plants. The application of mass balances for individual species for steady state operation of systems with chemical reactions is discussed. The energy balances for components and systems will be analyzed to find the energy requirements for operations at industrial scale.
Lecture: 4, Lab 0, Other 0

CHME-210 Chemical Engineering Thermodynamics 4 Credits
Corequisites: MATH-203
Prerequisites: CHME-200
Minimum Class Standing: Sophomore
An introduction to chemical engineering thermodynamics. This course will focus on developing the theory of thermodynamics and its applications to chemical engineering. Energy and entropy balances will be utilized for analyzing small and large scale processes with multiple streams to compute workloads, energy exchange, and energy efficiency. Beginning with small unit operations, including pumps, compressors, turbines, and heat exchangers, larger systems will be developed and analyzed including power cycles and refrigeration cycles. Computation of thermodynamic properties for ideal and non-ideal systems will be discussed using charts, tables, and equations of state. The course is designed for the sophomore level and will continue with a secondary thermodynamics course during the junior year.
Lecture: 4, Lab 0, Other 0

CHME-225 Computing in Chemical Engineering 2 Credits
Corequisites: MATH-102
Prerequisites: CHME-200
This course introduces the basics of computer programming and its applications to the solution of chemical engineering problems. The student learns about advanced spreadsheet applications and useful computer programs for chemical engineers like Matlab, Polymath, and the Aspen process simulator. The student develops a basic toolset to tackle common tasks like numerical integration, curve fitting, ODE solutions, and data graphics.
Lecture: 2, Lab 0, Other 2

CHME-291 CHME Special Topics 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

CHME-300 Fluid Dynamics and Heat Transfer 3 Credits
Corequisites: CHME-200, CHME-301, MATH-204
Prerequisites: None
Minimum Class Standing: Junior
The application of fluid mechanics, phase transitions, and heat transfer in chemical engineering is demonstrated. Fluid studies including statistics, dynamics, friction losses, Newtonian and non-fluids, pumps, and metering of flows will be discussed. Mixing and agitation processes will be presented. Heat transfer processes, heat exchangers, evaporation and other heat transfer applications involving phase change will be discussed.
Lecture: 3, Lab 0, Other 1

CHME-301 Fluid Dynamics and Heat Transfer Lab 1 Credits
Corequisites: CHME-200, CHME-300, MATH-204
Prerequisites: None
Minimum Class Standing: Junior
This laboratory course demonstrates the application of fluid mechanics, heat and mass transfer in chemical engineering. Process measurement and the importance of accuracy and precision in industrial measurement applications are covered. Fluid static, dynamics, and metering of flows will be demonstrated. Agitation and mixing process are covered. Different modes of heat transfer with phase change in chemical engineering processes will be presented.
Lecture: 0, Lab 2, Other 0

CHME-310 Fluid Dynamics and Heat Transfer 4 Credits
Corequisites: CHME-200, CHME-325, MATH-203
Prerequisites: None
The application of fluid mechanics, phase transitions, and heat transfer in chemical engineering is demonstrated. Fluid studies including statistics, dynamics, friction losses, Newtonian and non-fluids, pumps, and metering of flows will be discussed. Mixing and agitation processes will be presented. Heat transfer processes, heat exchangers, evaporation and other heat transfer applications involving phase change will be discussed.
Lecture: 4, Lab 0, Other 0

CHME-325 Fluid Dynamics and Heat Transfer Lab 2 Credits
Corequisites: CHME-310
Prerequisites: None
This laboratory course demonstrates concepts in fluid mechanics and heat transfer as they relate to chemical engineering. Process measurements and the concepts of accuracy and precision are covered. Fluid static, dynamics, and metering of flows are explored. Experiments on heat conduction and convection are performed. Heat exchanger design and analysis are introduced. Computational topics include feed loop design and solutions of boundary value problems in momentum and heat transport. Finite element simulations are briefly explored.
Lecture: 0, Lab 2, Other 0

CHME-330 Mass Transfer and Separations 4 Credits
Prerequisites: CHME-210
An introduction to the applications of chemical engineering separation processes. Binary separations and multi-component separations including distillation, absorption, adsorption, leaching, drying, evaporation, extraction, membranes, filtration, and crystallization will be covered. Design of gas/liquid, liquid-liquid and liquid-solid separation processes will be discussed; methods covered include McCabe-Thiele methods, short-cut methods, sizing plate columns and packed columns, plate and column efficiencies, and mass transfer coefficient. Practical applications of mass transfer rates will be covered. Special topics including separation of azeotropes and combined separation units may be included.
Lecture: 4, Lab 0, Other 0

CHME-350 Reaction Engineering 4 Credits
Corequisites: CHME-210, MATH-204
Prerequisites: None
Concepts of reaction rates, stoichiometry and equilibrium will be applied to the analysis of chemical reacting systems, derivation of rate expressions from reaction mechanisms and equilibrium or steady state assumptions, design of chemical reactors via synthesis of chemical kinetics, transport phenomena, and mass energy balances. Topics covered include: batch, plug flow and continuously stirred reactors for chemical reactions and heterogeneous catalysis; and heat and mass transport in reactors.
Lecture: 4, Lab 0, Other 0

CHME-360 Applications of Chemical Engineering 4 Credits
Prerequisites: CHME-200
This is a project-based course around developing solutions for real-world problems and needs in industry and society. Each group will work on a unique project over the course of the term that encompasses the chemical engineering field. The projects are open-ended in nature and generally originate from our partnerships in industry. The projects could be focused on a process or a product with goals around process improvement and optimization, failure analysis, troubleshooting, scale-up, product design and development, proof-of-concept, prototyping, and more. Project management tools are used for planning, tracking progress, and reporting. Student groups present their projects at the end of the term to an audience consisting of students, faculty, and industry partners. A final written report on the project is due at the end of the term.
Lecture: 0, Lab 0, Other 4

CHME-400 Mass Transfer and Separations 3 Credits
Corequisites: CHME-401
Prerequisites: CHME-300
Minimum Class Standing: Junior
An introduction to the applications of chemical engineering separation processes. Binary separations and multi-component separations including distillation, absorption, adsorption, leaching, drying, evaporation, extraction, membranes, filtration, and crystallization will be covered. Design of gas/liquid, liquid-liquid and liquid-solid separation processes will be discussed; methods covered include McCabe-Thiele methods, short-cut methods, sizing plate columns and packed columns, plate and column efficiencies, and mass transfer coefficient. Practical applications of mass transfer rates will be covered. Special topics including separation of azeotropes and combined separation units may be included.
Lecture: 3, Lab 0, Other 1

CHME-401 Mass Transfer and Separations Lab 1 Credits
Corequisites: CHME-400
Prerequisites: CHME-300
Minimum Class Standing: Junior
This laboratory course will apply the principles learned in Mass Transfer and Separations (CHME-400). Experiments will include binary separations and multi-component separations including distillation, diffusion, absorption, adsorption, filtration, drying, evaporation, extraction, and crystallization. Simulated experiments will be conducted using ASPEN software.
Lecture: 0, Lab 2, Other 0

CHME-410 Chemical Engineering Thermodynamics 4 Credits
Prerequisites: CHME-210
Minimum Class Standing: Junior
An advanced chemical engineering thermodynamics course designed to follow CHME-210. The course will focus on developing relationships for vapor/liquid equilibrium (VLE) for both ideal and non-ideal systems, with focus on equations of state and activity models. Additionally, topics such as liquid-liquid equilibrium (LLE) will be analyzed for ideal and non-ideal systems. Solution theory including fugacity, partial properties, excess properties, and heat effects of mixing processes will be discussed. Other topics introduced through this course include chemical reaction equilibria – reaction coordinates, effects of temperature on equilibrium constants, and relationships between equilibrium constants and composition.
Lecture: 4, Lab 0, Other 0

CHME-420 Applied Transport Phenomena 3 Credits
Corequisites: CHME-421
Prerequisites: CHME-300 and (MATH-204 or MATH-204H)
Minimum Class Standing: Senior
An advanced chemical engineering course focusing heavily on mathematical interpretations of the principles of heat and mass transfer, steady and transient conduction and diffusion, and radiative heat transfer. Convective transport of heat and mass in both laminar and turbulent flows will also be discussed. The course also provides an emphasis on the development of the physical understanding of the underlying phenomena and on the ability to solve real heat and mass transfer problems of engineering significance.
Lecture: 3, Lab 0, Other 1

CHME-421 Applied Transprt Phenomena Lab 1 Credits
Corequisites: CHME-420
Prerequisites: CHME-300 and (MATH-204 or MATH-204H)
Minimum Class Standing: Senior
This laboratory course will introduce concepts of laminar and turbulent fluid flow. Heat and momentum transfer will be studied. Overall heat transfer and overall mass transfer coefficients will be examined. Experiments related to reactor start-up, transient behavior and steady state operation will be evaluated. Analysis of boiling, condensing, evaporation and filtration will be performed.
Lecture: 0, Lab 2, Other 0

CHME-425 Separations, Reactions, and Prototyping Lab 3 Credits
Prerequisites: CHME-330 and CHME-350
This laboratory applies principles of reaction engineering and separations to the fabrication of a student-designed process. Topics covered include literature reviews, process safety, application and optimization of separation processes and reactors, process simulation, and design and fabrication of reactive and separation processes. Binary and multicomponent separation experiments include distillation, absorption, adsorption, filtration, and drying. Reaction engineering experiences include design of experiments to collect and regress reaction kinetic data and operation of batch and flow chemical reactors. This course will culminate in the demonstration of a student designed and built chemical engineering process.
Lecture: 0, Lab 3, Other 1

CHME-430 Process Controls 4 Credits
Prerequisites: CHME-330 and CHME-350
An understanding of the basic principles and methods underlying the steady state and dynamic characterization of chemical process control will be provided. This course introduces dynamic processes and the engineering tasks of process operations and control. Subject covers modeling the static and dynamic behavior of processes; control strategies; fundamentals and design of PID feedback, feed forward, cascade, and other control structures; controls equipment and instrumentation; statistical design of experiment; and process monitoring and statistical process control.
Lecture: 4, Lab 0, Other 0

CHME-435 Process Controls 3 Credits
Corequisites: CHME-436
Prerequisites: CHME-400 and CHME-450
Minimum Class Standing: Senior
An understanding of the basic principles and methods underlying the steady state and dynamic characterization of chemical process control will be provided. This course introduces dynamic processes and the engineering tasks of process operations and control. Subject covers modeling the static and dynamic behavior of processes; control strategies; fundamentals and design of PID feedback, feed forward, cascade, and other control structures; controls equipment and instrumentation; statistical design of experiment; and process monitoring and statistical process control.
Lecture: 3, Lab 0, Other 1

CHME-436 Process Controls Laboratory 1 Credits
Corequisites: CHME-435
Prerequisites: CHME-400 and CHME-450
Minimum Class Standing: Senior
This laboratory course will apply the principles and methods of steady state dynamic characterization of chemical process control. Modeling the static and dynamic behavior of processes will be performed using software. Heat exchange, reactors, distillation and separation experiments will be performed to evaluate the effect of process control strategies. The design of feedback, feed forward, and other control strategies will be applied to process equipment.
Lecture: 0, Lab 2, Other 0

CHME-440 Senior Chemical Engineering Design I 4 Credits
Prerequisites: ECON-201 and CHME-400 and CHME-450
Minimum Class Standing: Senior
This is the first of two advanced design courses incorporating core chemical engineering principles into the design of a plant. Topics related to plant design include optimization, plant economics and profitability, safety and environmental considerations, and ethics. Computer simulation tools will be used to aid in the designs. Three to four major designs will be completed in the form of design reports and oral presentations. Contemporary topics will be incorporated into the design projects.
Lecture: 4, Lab 0, Other 0

CHME-450 Reaction Engineering 3 Credits
Corequisites: CHME-210, CHME-451
Prerequisites: MATH-204
Minimum Class Standing: Junior
Concepts of reaction rates, stoichiometry and equilibrium will be applied to the analysis of chemical reacting systems, derivation of rate expressions from reaction mechanisms and equilibrium or steady state assumptions, design of chemical reactors via synthesis of chemical kinetics, transport phenomena, and mass energy balances. Topics covered include: batch, plug flow and continuously stirred reactors for chemical reactions and heterogeneous catalysis; and heat and mass transport in reactors.
Lecture: 3, Lab 0, Other 1

CHME-451 Reaction Engineering Laboratory 1 Credits
Corequisites: CHME-210, CHME-450
Prerequisites: MATH-204
Minimum Class Standing: Junior
The concepts of reaction rate, stoichiometry and equilibrium will be applied to the design and operation of chemical reactors. Plus flow, batch and continuously stirred tank reactors will be run at various conditions. Reactor analysis will allow for the determination of kinetics, catalyst activity, and temperature, and concentration dependence of reactions.
Lecture: 0, Lab 2, Other 0

CHME-480 Chemical Engineering Capstone 4 Credits
Prerequisites: CHME-440
Minimum Class Standing: Senior
This is the second of two advanced courses incorporating ore chemical engineering principles into the design of a plant. Concepts built through the first semester course will be strengthened and applied to new design projects. Additional design topics including debottlenecking and troubleshooting will be introduced. Optimization to improve process performance and energy savings will be utilized and applied to course projects. Green engineering and environmental standards will be discussed as related to chemical engineering design. Students will complete large-scale industrial design projects in teams throughout the course. Finally, chemical product design concepts and strategies will be discussed.
Lecture: 4, Lab 0, Other 0

CHME-491 Advanced Chemical Engineering Elective 4 Credits
Prerequisites: None
An interdisciplinary advanced course focusing on a specific Chemical Engineering topic. This course is a one-time offering whose content is determined by current faculty interest, and provides a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under different topics.
Lecture: 4, Lab 4, Other 0

Chinese Language (CHN)

CHN-101 Beginning Chinese I 4 Credits
Prerequisites: None
An introduction to speaking, reading and writing Chinese is provided. Students develop listening and conversational skills and learn to write and read Chinese characters. It covers basic Chinese grammatical structures and its usage. It also includes some discussion of Chinese culture as needed to understand the relationship between the language and the culture. Students are eligible to take this course only if they have less than one year of high school Chinese or less than one term of college Chinese (or by consent of the head of the Department of Liberal Studies). This course counts for Free Elective credit and cannot be substituted for any of the general education courses required of all students.
Lecture: 4, Lab 0, Other 0

CHN-102 Beginning Chinese II 4 Credits
Prerequisites: CHN-101
This course is the second in a three-part introduction to speaking, reading and writing Chinese. Students develop listening and conversational skills and learn to write and read Chinese characters. It covers basic Chinese grammatical structures and its usage. It also includes some discussion of Chinese culture as needed to understand the relationship between the language and the culture. Students are eligible to take this course only if they have less than two years of high school Chinese or less than two terms of college Chinese (or by consent of the head of the Department of Liberal Studies). This course counts for Free Elective credit and cannot be substituted for any of the general education courses required of all students.
Lecture: 4, Lab 0, Other 0

Integrated Learning Exp (CILE)

CILE-101 First Year Foundations 1 Credits
Prerequisites: None
Critical information will be provided on personal, academic and professional development for first-year students. Class discussions will support student engagement in the Kettering community, help make important connections for students to develop a sense of self-governance, and set a foundation for both critical thinking and reflective learning mindset. Students will learn to interact in the academic and cooperative work environments successfully. Mentoring and interaction with the instructors will provide support and guidance for students to be fully integrated into Kettering University. Discussions and assignments will enhance student transition and acclimation to Kettering University.
Lecture: 1, Lab 0, Other 0

CILE-400 Culminating Undergraduate Experience: Thesis 4 Credits
Prerequisites: None
The Kettering University senior thesis is an individual culminating project (or portion of a project) completed and documented by the Kettering undergraduate student, providing an opportunity for the student to apply academic and experiential learning to a real-world issue. The thesis is guided by the student's co-op employer or a university research faculty member. This project is completed over a two to three term period at the co-op workplace and/or on campus.
Lecture: 0, Lab 0, Other 0

CILE-490 Multidisciplinary Capstone 4 Credits
Prerequisites: None
Minimum Class Standing: Senior 1
This course challenges multidisciplinary teams of students to integrate and synthesize general engineering and/pr science knowledge in a comprehensive design experience focusing on a project with direct application to a real world, open-ended problem. This course fulfills the requirement of a student's degree department Senior (Engineering) Design/Capstone, Technical Elective or Free Elective.
Lecture: 4, Lab 0, Other 0

CILE-499 On-Campus Experiential Learning 1 Credits
Prerequisites: None
The purpose of this one-credit course is to allow a student to earn credit for extraordinary and outstanding contribution to an on-campus experiential learning opportunity through an extracurricular activity. The following requirements/limitations apply: 1) This course is not to be used as an independent/self-directed study for an individual student; credit may be given for outstanding contribution to an extra-curricular endeavor that involve an established (or emerging) student group/ organization operating under the supervision of a project/activity advisor; 2) Registration is by an application form approved by the project/activity advisor and their respective department supervisor (e.g. faculty advisor and their department head); 3)Application should state the desired course title (default: On-Campus Experiential Learning), the designated course instructor (i.e. project advisor), a description of the activity, and a set of criteria that establish the standard for outstanding contribution; 4) A student may apply for a maximum of one (1) CILE-499 credit per term; 5) A maximum of four (4) CILE-499 credits may be counted as "free-elective" credits toward graduation requirements; 6) Grading is based on S/U as assigned by the project/activity advisor in accordance with the criteria stated on the application form.
Lecture: 0, Lab 0, Other 0

Communications (COMM)

COMM-101 Rhetoric & Writing 4 Credits
Prerequisites: None
This course prepares novice students to succeed at Kettering by introducing them to the expectations of college-level and professional communication. The primary goal of this course is for students to develop transferable knowledge of rhetorical composing practices. To achieve this goal, the course focuses on helping students acquire strategies for reading and writing critically, composing across genres and media, choosing appropriate research methodologies, and engaging in informed reflective practice. Assignments will focus on familiarizing students with rhetorical concepts such as genre, audience, purpose, occasion, and persuasive appeals, and asking them to apply these concepts through analyzing or composing for a variety of rhetorical situations.
Lecture: 4, Lab 0, Other 0

COMM-311 Rhetorical Principles of Persuasion 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
Theories of persuasion, techniques of argumentation, and the analysis of persuasive texts are covered. Topics include political speeches and campaign messages, rhetorical interpretation of advertising and business communication, and persuasive elements of popular culture. Verbal and visual elements of persuasion will be addressed. Students will apply these concepts by written analyses of persuasive texts and by composing and delivering persuasive speeches.
Lecture: 4, Lab 0, Other 0

COMM-313 Rhetorical Principles of Public Speaking 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
Understanding the processes and contexts of public speaking, including audience adaptation, principles of clear organization, development of ideas, and techniques of effective persuasive and informative speaking. Although the focus of the course is on analysis of great speeches throughout history, the course provides an opportunity for students to practice speaking about topics of current interests.
Lecture: 4, Lab 0, Other 0

COMM-391 Communications Special Topics 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
An interdisciplinary advanced course focusing on a specific topic. This course is a one-time offering whose content is determined by current faculty interest, and provides a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under different topics.
Lecture: 4, Lab 0, Other 0

COMM-397 Liberal Studies Free Elective 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

COMM-401 Communicating about Data 4 Credits
Prerequisites: LS-201
Visualizations are powerful. Theories of visual rhetoric and design teach us that good visualization is not only clear and accurate but appealing as well. When executed well, visualizations enhance oral or written communication, by supporting arguments and claims, b providing insight into complex issues, and by supporting recall and decision-making in audiences. This relationship goes both ways, however, even well-crafted visualizations must be supported by effective oral and written communication. In this course, students explore both sides of this relationship, becoming familiar with common genres of visualization and with techniques both for designing them effectively and ethically, and for presenting visualizations orally and in prose.
Lecture: 4, Lab 0, Other 0

COMM-435 Written & Oral Communication for Overseas Students 4 Credits
Prerequisites: None
This course, intended for overseas students, seeks to heighten their awareness of American business communication practices. It will help develop a systematic approach to written and oral communication in the workplace. Topics include the nature of organizational communication and business writing, including techniques for writing letters, memoranda, proposals, and reports. Electronic communication practices are examined. Emphasis is also placed on professional communication skills in multicultural environments and relevant current events. This course does not receive credit in any Kettering University degree program.
Lecture: 4, Lab 0, Other 0

Computer Science (CS)

CS-101 Computing & Algorithms I 4 Credits
Prerequisites: None
An introduction to algorithmic problem solving, with emphasis on elementary program and software engineering techniques. Syntax and semantics of a modern programming language; programming and debugging at the file level; true object-orientation; Strings, arrays, sorting, and inheritance.
Lecture: 0, Lab 0, Other 6

CS-102 Computing & Algorithms II 4 Credits
Prerequisites: CS-101
A second course in algorithmic problem solving. Recursion, abstract data types, dynamic data structures, comparison-based sorting, elementary algorithm analysis, design of software projects of moderate size, and continuing development of programming skills.
Lecture: 3, Lab 2, Other 0

CS-203 Computing & Algorithms III 4 Credits
Prerequisites: CS-102 and CS-211
Minimum Class Standing: Sophomore
The design and analysis of advanced data structures and algorithms are covered. Topics include: algorithm design and analysis techniques, advanced data structures, advanced sorting, and applications to various problem domains.
Lecture: 3, Lab 2, Other 0

CS-211 Discrete Mathematics 4 Credits
Corequisites: MATH-101
Prerequisites: None
Propositional and first-order logic; logical equivalence and inference are covered. Course topics include: proof techniques, mathematical induction and principle of diagonalization; set operations, relations, functions; introduction to graphs and trees and their applications to computer science; lattice structures and Boolean algebras; and truth tables and minimization of Boolean expressions.
Lecture: 4, Lab 0, Other 0

CS-231 Programming Language Paradigms 4 Credits
Prerequisites: CS-102
This course examines imperative and functional programming paradigms. Imperative paradigm topics include: data representation, dynamic structures, parameter passing, memory management, and I/O. Functional paradigm topics include: lists, first class and higher order functions, lazy evaluations, and infinite data structures.
Lecture: 3, Lab 2, Other 0

CS-300 The Computing Professional 4 Credits
Prerequisites: COMM-101 and (CS-102 or CE-210)
Minimum Class Standing: Sophomore
An examination of the profession of computing from historical and ethical perspectives. Overview of the history of computing, from the earliest computational devices and theoretical foundations to modern developments. Discussion of the social impact of computing on society and the ethical implications for computing professionals, including analysis of case studies.
Lecture: 4, Lab 0, Other 0

CS-312 Theory of Computation 4 Credits
Prerequisites: CS-102 and CS-211
Minimum Class Standing: Sophomore
Topics covered in this course include: regular languages and grammars; finite-state machines and transducers; relationships between finite-state automata and regular languages; context-free languages and grammars; language recognition with stack machines and parsers; properties of formal languages; computability and undecidability; introduction to computational complexity.
Lecture: 4, Lab 0, Other 0

CS-320 Computer Graphics 4 Credits
Prerequisites: (MATH-101 or MATH-101X) and CS-102
Minimum Class Standing: Sophomore
An introduction to computer graphics. Topics include: rendering and curve drawing techniques; clipping algorithms; light and reflection models; object transformations; and introduction to three-dimensional graphics.
Lecture: 4, Lab 0, Other 0

CS-341 Web Software Tools 4 Credits
Prerequisites: CS-102
Terms Offered: Winter/Spring, alternate years
The skills and tools needed to create dynamic web-based applications using World Wide Web programming tools are covered in this course. Topics include: various markup languages, several scripting languages, web services, web servers and relational databases.
Lecture: 4, Lab 0, Other 0

CS-351 Cloud Computing 4 Credits
Prerequisites: CS-102
This course focuses on the foundations of modern networking, including: network architecture and routing protocols, mobile and wireless networks, distributed computing and virtualization, cloud computing platforms, services,architecture and security.
Lecture: 3, Lab 2, Other 0

CS-385 Introduction to Game Design 4 Credits
Prerequisites: CS-102
The technology, science, and art involved in the creation and design of computer games is studied. The course will emphasize hands-on development of games and consider a variety of software technologies relevant to games.
Lecture: 4, Lab 0, Other 0

CS-415 Cryptography 4 Credits
Prerequisites: CS-203
Minimum Class Standing: Junior
A study of modern data security. Mathematical foundations of cryptography. Classical cryptographic systems and computer attacks on these systems. Cryptographic security over unsecure communication paths: cryptographic protocols, oblivious transfers, proofs of identity, signature schemes. Modern cryptographic systems: data encryption standards, public-key systems, key generation and management. External considerations are presented and discussed: security organizations role in security, privacy considerations, import/export issues.
Lecture: 4, Lab 0, Other 0

CS-420 Introduction to Virtual Reality 4 Credits
Prerequisites: CS-320
An introduction to the basics of multimedia design and development. Topics include 3D mesh modeling, animation, video editing, audio editing, and the development of interactive virtual environments.
Lecture: 3, Lab 2, Other 0

CS-425 Parallel Programming and Algorithms 4 Credits
Prerequisites: CS-231
Parallel computing has long played a vital role in addressing the performance demands of high-end engineering and scientific applications. Over the last decade, parallel computing has become important to a much broader audience as nearly all computer systems are being built using chips with multiple processor cores. The goal of CS-425 is to introduce students to the foundations of parallel computing including the principles of parallel algorithm design, analytical modeling of parallel programs, programming models for shared - and distributed - memory systems, parallel computer architectures, along with numerical and non-numerical algorithms for parallel systems. The course will include material on emerging multicore hardware, shared-memory programming models, message passing programming models used for cluster computing, data-parallel programming models for GPUs, and problem-solving on large-scale clusters using MapReduce. A key aim of the course is for students to gain a hands-on knowledge of the fundamentals of parallel programming by writing efficient parallel programs using some of the programming models learned in class. There will be different projects in CS-425 and CS-625. Students may not receive credit for both CS-425 and CS-625.
Lecture: 4, Lab 0, Other 0

CS-431 Compiler Design and Construction 4 Credits
Prerequisites: CS-102
Minimum Class Standing: Junior
A study of compiler design techniques; scanning, parsing, error recovery and intermediate code generation and optimization; tools for compiler construction, including scanner generators and compiler-compilers. Construction of a working compiler front-end.
Lecture: 4, Lab 0, Other 0

CS-441 Foundations of Data Science 4 Credits
Prerequisites: CS-102
The concepts, principles, issues and techniques for big data and cloud computing are introduced in this course. This course will provide a foundation in data science based on data curation and statistical analysis. The primary goal of this course is to introduce data analysis concepts and techniques that facilitate making decisions from a rich data set. Students will investigate big data concepts, metadata creation, interpretation, and basics of information visualization.
Lecture: 4, Lab 0, Other 0

CS-451 Operating Systems 4 Credits
Prerequisites: (CS-202 or CS-231)
Operating system function and services; architectural elements of operating systems; process management and synchronization; CPU scheduling; real and virtual memory management; case studies of historical and modern operating systems.
Lecture: 3, Lab 2, Other 0

CS-455 Computer and Network Security 4 Credits
Prerequisites: CS-102
Minimum Class Standing: Junior
A study of security in computing systems, including policies, audit, and protection. Physical and personnel security, security of network services, firewall construction and evaluation. Incident response.
Lecture: 3, Lab 2, Other 0

CS-457 Wireless and Mobile Security 4 Credits
Prerequisites: CS-102
Terms Offered: Summer/Fall, alternate years
Topics for this course encompass information and network security in wireless and mobile environments, including wireless ad-hoc, mesh and sensor networks, smartphones, and mobile communication systems.
Lecture: 4, Lab 0, Other 0

CS-458 Computer and Network Forensics 4 Credits
Prerequisites: CS-102
Forensic analysis, evidence collection and data reconstruction for computing systems and networks. Document preparation for use in the legal system.
Lecture: 3, Lab 2, Other 0

CS-461 Database Systems 4 Credits
Prerequisites: CS-102
Minimum Class Standing: Junior
Database design and implementation, entity-relationship model, relational model, object-oriented model, logical rules, relational algebra and logic, relational query languages, physical data organization, design theory for databases, distributed and Web-based databases.
Lecture: 4, Lab 0, Other 0

CS-465 Information Retrieval and Data Mining 4 Credits
Prerequisites: CS-102
Minimum Class Standing: Junior
Information retrieval and data mining topics, including information storage and retrieval, file structures, precision and recall, probabilistic retrieval, search strategies, automatic classification, automatic text analysis, decision trees, genetic algorithms, nearest neighbor method, and rule induction.
Lecture: 4, Lab 0, Other 0

CS-471 Software Engineering 4 Credits
Prerequisites: CS-102
Minimum Class Standing: Junior
Approaches and techniques for designing and developing large software systems. Software life cycles -- object-oriented and agile design techniques are emphasized. Requirements, specification, design, and documentation through design patterns and modeling languages. Software quality assurance, validation and verification. Security features designed into system. Project team organization and management. Students will work in teams on a substantial software project.
Lecture: 4, Lab 0, Other 0

CS-481 Artificial Intelligence 4 Credits
Prerequisites: CS-102
Topics covered include: Types of intelligence, knowledge representation, cognitive models. Heuristic and algorithmic techniques in problem solving, knowledge representation. Selected topics from natural language processing, vision processing, game playing, pattern recognition, speech recognition, robots, and other current topics in artificial intelligence. There will be different projects in CS-481 and CS-681. Students may not receive credit for both CS-481 and CS-681.
Lecture: 4, Lab 0, Other 0

CS-482 Machine Learning 4 Credits
Prerequisites: CS-102
Minimum Class Standing: Junior
This course provides an introduction to machine learning. Topics include: supervised learning including generative, discriminative learning, parametric and non-parametric learning, neural networks, support vector machines; unsupervised learning including clustering, dimensionality reduction, kernel methods, learning theory bias/variance trade-offs, VC theory, large margins, reinforcement learning. The course will also include applications of machine learning to big data.
Lecture: 4, Lab 0, Other 0

CS-485 Advanced Game Development 4 Credits
Prerequisites: CS-385
This course covers essentials of developing a large size game and its delivery. The contents include game agent design and its delivery using a game engine. The game engine will be programmed to deliver GUI elements, sound, terrains, events and thus render the end game.
Lecture: 3, Lab 2, Other 0

CS-498 Computer Science Study Abroad 4 Credits
Prerequisites: None
Advanced Topics in the Computer Science. This is a transfer course taken as part of Kettering's Study Abroad Program.
Lecture: 4, Lab 0, Other 0

Elect. & Computer Engrg (ECE)

ECE-100 Principles of Electrical and Computer Engineering 4 Credits
Prerequisites: None
This is an introductory course that presents the basic principles of electrical and computer engineering. The topics include: basic circuit theory, electrical/electronic components, basic circuit laws and circuit analysis techniques; digital logic concepts, microcomputers, programming, and interfacing to digital & analog sensors and actuators. The course has a significant practical component that gives students the opportunity to apply tools for circuit design and simulation, printed circuit board (PCB) layout, and PCB soldering/assembly. Students will also work on mobile robots by interfacing sensors and developing programs for intelligent control of robots. At the end of the term students are expected to complete a comprehensive final project and write a report to demonstrate innovative application of the course material.
Lecture: 2, Lab 2, Other 0

ECE-101 MATLAB and C Programming 4 Credits
Prerequisites: None
The fundamentals of the MATLAB and C programming languages are covered. Special emphasis will be placed on using the tools acquired in this class to solve problems faced by electrical and computer engineers.
Lecture: 4, Lab 0, Other 0

ECE-291 ECE Special Topics 4 Credits
Prerequisites: None
Lecture: 0, Lab 0, Other 0

Economics (ECON)

ECON-201 Economic Principles 4 Credits
Prerequisites: None
Students are introduced to the economic way of thinking. Learn how individuals, firms, and societies make choices among alternative uses of scarce resources. A survey course, it covers both introductory microeconomics and introductory macroeconomics. The course combines applied theory and policy, and equips the student with the necessary tools to analyze and interpret the market economy.
Lecture: 4, Lab 0, Other 0

ECON-342 Intermediate Microeconomics: Managerial Economics 4 Credits
Prerequisites: ECON-201
Minimum Class Standing: Sophomore
Microeconomic theory will be combined with quantitative analysis to bring out essential features of managerial decision making. Microeconomic topics to be covered include demand and supply, elasticities, consumer behavior, production analysis, costs of production in the short-run and long-run, market structures, pricing practices, government regulation of business, and decision making under uncertainty. The course is application oriented and focuses on the relevance of microeconomic theory to solve business problems of the real world. Regression analysis and optimization methods are used to estimate and optimize microeconomic relations relevant to the revenue and cost structure of the firm such as demand, production, and cost functions. Statistical estimation and inference is facilitated by suitable statistical software.
Lecture: 4, Lab 0, Other 0

ECON-344 Intermediate Macroeconomics: Economic Growth and Fluctuation 4 Credits
Prerequisites: ECON-201
Minimum Class Standing: Sophomore
Macroeconomic theory and policy will be coved at the intermediate level. The determinants of GDP, inflation, unemployment, interest rates, and exchange rates are modeled. The sources of long run economic growth and business cycles are investigated. The effectiveness of government monetary and fiscal policy is evaluated. The course provides students with an understanding of the macroeconomic environment in which business and government decisions are made.
Lecture: 4, Lab 0, Other 0

ECON-348 History of Economic Thought 4 Credits
Prerequisites: ECON-201
Minimum Class Standing: Sophomore
The development of economic thinking will be analyzed by studying the work of preeminent economists and their schools of economic thought. The course helps the student understand contemporary economics and economic issues by studying how past thinkers viewed similar problems. Relevance of the great economic thinkers to contemporary economic issues is emphasized.
Lecture: 4, Lab 0, Other 0

ECON-352 International Economics 4 Credits
Prerequisites: ECON-201
Minimum Class Standing: Sophomore
This course offers the non-major in economics both the micro and macro components of international economics. It covers the theories and policies, as well as the institutional and historical contexts of the increasingly integrated international economy. By the end of the course, the student should be able to intelligently follow international economic issues and their impacts on national economies of various sizes. The student should also be able to explain patterns of a country's trade, analyze trade data of any country, and predict the consequences of alternative trade policies and of movement in the values of major international currencies. Topics covered include absolute and comparative advantage, relative factor endowments, intra-industry trade, tariffs and quotas, factor movements, balance of payments, exchange rates and foreign exchange markets, and international monetary arrangements.
Lecture: 4, Lab 0, Other 0

ECON-354 Money and Banking 4 Credits
Prerequisites: ECON-201
The course aims to provide the student with an introduction to the role of money, financial markets, financial institutions, and monetary policy in the economy. It will focus on the changing nature of money and the payments system as technology changes, the measurement of money, the role of the banking system in the creation of money and influencing the level of economic activity; the role of the central bank in regulating the banking system and pursuing monetary policy. The role of the financial system in linking investors and savers, providing information and reducing risk in the financing market will be emphasized.
Lecture: 4, Lab 0, Other 0

ECON-391 Economics Special Topics 4 Credits
Prerequisites: ECON-201
An interdisciplinary advanced course focusing on a specific topic. This course is a one-time offering whose content is determined by current faculty interest, and provides a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under different topic
Lecture: 4, Lab 0, Other 0

ECON-499 Economics Independent Study 4 Credits
Prerequisites: None
Advanced Level Economics Independent Study
Lecture: 4, Lab 0, Other 0

Electrical Engineering (EE)

EE-210 Circuits I 3 Credits
Corequisites: EE-211
Prerequisites: PHYS-224 and PHYS-225 and (MATH-102 or MATH-102H or MATH-102X)
Fundamental DC and AC circuit analysis techniques are covered in this introductory course. Topics include circuit variables and elements; resistors, inductors, and capacitors; and sinusoidal steady-state analysis with power calculations.
Lecture: 3, Lab 0, Other 0

EE-211 Circuits I Lab 1 Credits
Corequisites: EE-210
Prerequisites: None
An introductory laboratory course designed to reinforce the fundamental analysis techniques discussed in EE-210, Circuits I. Topics include: safe use of laboratory equipment and experimental verification of analysis techniques.
Lecture: 0, Lab 2, Other 0

EE-212 Applied Electrical Circuits 3 Credits
Corequisites: MATH-204, MECH-231L
Prerequisites: PHYS-224 and PHYS-225
Application of electrical circuit components are covered in this course. Topics include: Ohm's law and Kirchhoff's laws; series and parallel circuits; voltage and current division rules; node-voltage and mesh-current methods; superposition; Thevenin's, and Norton's theorems; first- and second-order R-L-C circuits; steady-state analysis and power calculations for sinusoidally-varying (ac) sources; operational amplifiers; and diodes. This course will not satisfy the requirements of an Electrical or Computer Engineering degree.
Lecture: 3, Lab 0, Other 1

EE-240 Electromagnetic Fields and Applications 4 Credits
Prerequisites: PHYS-224 and PHYS-225
Basics of electromagnetic fields and applications are studied. Topics include: vector analysis; gradient, divergence, and curl; electrostatic fields; electrostatic boundary-value problems; magnetostatic fields; magnetic circuits; and Maxwell's equations for time-varying fields.
Lecture: 4, Lab 0, Other 0

EE-310 Circuits II 4 Credits
Prerequisites: EE-210 and (MATH-204 or MATH-204H)
A second course in circuit analysis. Topics include: first-order and second-order transient circuit analysis, the Fourier series, three-phase circuits, resonance, filters, Bode plots and magnetically coupled circuits.
Lecture: 4, Lab 0, Other 0

EE-320 Electronics I 3 Credits
Corequisites: EE-321
Prerequisites: EE-210 and EE-211
The basic building blocks used in electronic engineering are studied. Topics include: operational amplifiers; diodes; MOS and bipolar devices; basic transistor amplifier configurations; and MOSFET digital logic circuits.
Lecture: 3, Lab 0, Other 0

EE-321 Electronics I Laboratory 1 Credits
Corequisites: EE-320
Prerequisites: EE-210 and EE-211
An introductory laboratory course designed to reinforce the topics in EE-320, Electronics I. Experiments include: PSPICE simulation, operational amplifiers; diodes; MOS and bipolar transistor configurations; MOSFET digital circuits.
Lecture: 0, Lab 2, Other 0

EE-325 Principles of Microelectronics Processing 4 Credits
Prerequisites: EE-320 and EE-321
The principles of semiconductor processing for modern integrated circuits are covered in this introductory course. Topics include a brief review of semiconductor devices and semiconductor circuit families, modern CMOS technology and process flow, crystal growth, semiconductor processing, thin film deposition oxidation, etching, lithography and an introduction to clean room principles. Principles of manufacturing process control and modeling for manufacturability will be presented. Computed simulation will be extensively used where appropriate.
Lecture: 4, Lab 0, Other 0

EE-336 Continuous-Time Signals and Systems 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and EE-210
Minimum Class Standing: Sophomore
Introductory continuous-time signals and systems are studied. Topics include: definitions and properties of signals and systems, convolution, differential equations, Laplace transform with applications, Fourier series, and Fourier transform of continuous-time signals with applications.
Lecture: 4, Lab 0, Other 0

EE-338 Discrete-Time Signals and Systems 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and EE-210
Minimum Class Standing: Sophomore
Introductory discrete-time signals and systems are studied. Topics include: definitions and properties of signals and systems, sampling, convolution, difference equations, Z transform with applications, and the Fourier transform of discrete-time signals with applications.
Lecture: 4, Lab 0, Other 0

EE-340 Electromagnetic Wave Propagation 4 Credits
Prerequisites: EE-240
Advanced concepts of electromagnetic fields are studied. Topics include: propagation of uniform plane waves in various material media; transmission line analysis; electromagnetic wave propagation in waveguides; and antennas.
Lecture: 4, Lab 0, Other 0

EE-342 Electrical Machines 4 Credits
Corequisites: EE-310
Prerequisites: EE-210 and EE-211 and EE-240
Operating principles and design concepts of various types of electrical machines are studied. Topics include: magnetic circuits, single-phase and three-phase transformers; dc motors and generators; three-phase alternators; synchronous motors, induction motors and single-phase motors.
Lecture: 3, Lab 2, Other 0

EE-344 Fundamentals of Power Systems 4 Credits
Prerequisites: EE-210 and EE-211
Basic structure of electrical power systems and characteristics of power transmission lines, transformers and generators are studied. Topics include: representation of power systems; symmetrical three-phase fault analysis; symmetrical components; unsymmetrical fault computations; and network analyzers.
Lecture: 3, Lab 2, Other 0

EE-346 High Voltage Generation and Measurement Techniques 4 Credits
Prerequisites: EE-210 and EE-211 and EE-240
Insulation overvoltage-tests are studied. Topics include: generation of high, direct, alternating, and impulse voltages; voltage multiplier circuits; resonant test circuits; resistive, capacitive and mixed high-voltage dividers; sphere gaps; electrostatic voltmeters, Kerr Cell; and electrostatic coupling, interference, and grounding and safety.
Lecture: 3, Lab 2, Other 0

EE-348 Electromagnetic Compatibility 4 Credits
Prerequisites: EE-210 and EE-240
Issues involved in designing electrical and electronic systems to achieve electromagnetic compatibility are studied. Topics include: interference sources; government regulations limiting conducted and radiated omissions; electric and magnetic field noise coupling; grounding; filtering; shielding; electrostatic discharge; spectral analysis of electromagnetic interference; design methods for minimizing radiated emissions from digital circuits; and measurements of system emissions and susceptibility.
Lecture: 4, Lab 0, Other 0

EE-391 EE Special Topics 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

EE-399 EE Independent Study 4 Credits
Prerequisites: None
Lecture: 0, Lab 0, Other 0

EE-420 Electronics II 4 Credits
Prerequisites: EE-310 and EE-320 and EE-321
Advanced concepts of electronic engineering are studied. Topics include: nonlinear circuits; active filters; differential and multistage amplifiers; pulse and switching circuits; integrated circuits; and electronic system design.
Lecture: 3, Lab 2, Other 0

EE-421 Energy Storage Sys w/ EV App 4 Credits
Prerequisites: EE-210 or EE-212
The purpose of this course is to introduce the basics of energy storage systems. We will look at several competing energy storage concepts and management systems. The emphasis is on rechargeable Li-ion batteries for EV applications. The course will focus on the fundamentals of Li-ion batteries with respect to the physical principles of operation, design, manufacturing, modeling and state estimation. Students are required to complete research projects and independent review of research topics with approval of the instructor.
Lecture: 4, Lab 0, Other 0

EE-424 Power Electronics and Applications 4 Credits
Prerequisites: EE-310 and EE-320 and EE-321
Speed control and dynamic representation of electric motors are studied. Topics include: characteristics of iodes; diacs; thyristors; and MOSFET's; thyristor gate firing circuits; operating principles of AC/DC, DC/DC and DC/AC converter circuits; and computer-aided state-space analysis of the dynamic response of the converter circuits.
Lecture: 3, Lab 2, Other 0

EE-427 Semiconductor Device Fundamentals 4 Credits
Prerequisites: EE-320
Basic semiconductor theory for solid-state devices, diode theory, and applications of theory for transistors are studied. Topics include: energy bands, carrier statistics, equilibrium carrier concentrations, carrier transport, electrostatic devices, diode I-V characteristics, optical device applications, microwave device effects, and BJT, JFET, MESFET and MOSFET transistor models.
Lecture: 4, Lab 0, Other 0

EE-430 Communication Systems 4 Credits
Prerequisites: EE-310 and EE-320 and (MATH-258 or MATH-408) and (EE-336 or EE-338)
The study of methods used in electronic communication systems. Topics include: Fourier Transforms; analysis of distortion over a communication channel; autocorrelation of deterministic and random signals; energy and power spectral density; amplitude modulation; frequency modulation; phase modulation; digital line coding and modulation; communication circuitry.
Lecture: 4, Lab 0, Other 0

EE-432 Feedback Control Systems 4 Credits
Prerequisites: EE-310 and EE-336
Time and frequency domain representations of control systems are studied. Topics include: stability criteria; root locus methods; frequency response techniques, s-plane design methods. Design and evaluation of control systems are supplemented with computer aided control system design software.
Lecture: 3, Lab 2, Other 0

EE-433 Digital Control Systems 4 Credits
Prerequisites: EE-338 and EE-432
Minimum Class Standing: Senior 1
Control of continuous-time processes using computer-based controllers is studied. Topics include design of control algorithms for implementation, modeling of discrete time systems, application of z-transforms, stability analysis, root locus analysis, controller design via conventional techniques, state-space analysis and modeling, and design and implementation of digital controller. Implementation of real-time digital controllers is performed in the laboratory.
Lecture: 3, Lab 2, Other 0

EE-434 Digital Signal Processing 4 Credits
Prerequisites: ECE-101 and EE-338
Basic principles, design and applications of digital signal processing systems are presented. Topics include: review of discrete-time signals and systems, the z-transform, discrete-time Fourier analysis, the Discrete Fourier Transform, the Fast Fourier Transform, digital filter structures, FIR filters, and IIR filters. This course includes extensive use of MATLAB and experimental design projects using real-time signal processors.
Lecture: 3, Lab 2, Other 0

EE-444 Computational Methods in Power Systems 4 Credits
Prerequisites: EE-344
Matrix analysis of power system networks is studied. Topics include: power flow study of large scale interconnected power systems using Gauss-Seidel and Newton-Raphson methods; computer-aided short circuit analysis of large systems; economic operation of power networks; transient stability analysis; overvoltage calculations; and fundamentals of power system protection.
Lecture: 4, Lab 0, Other 0

EE-446 Vector Control of AC Electric Machines 4 Credits
Prerequisites: EE-240 and EE-310 and EE-320 and EE-321
Methods of controlling electric machines and their applications in electric vehicles are discussed. Topics include the theory of permanent-magnet and induction machines; coordinate-frame transformations; analysis and tuning of torque and speed control systems; modeling and dynamics of electric drives and vehicles, power-electronic devices, power-electronic circuits and switching schemes; rotor-flux oriented vector control; regenerative braking; and rotor-flux position-sensing methods. Machine and vehicle models will be developed using MATLAB Simulink. A low-voltage permanent-magnet machine and power-electronic inverter will be analyzed and tested.
Lecture: 3, Lab 2, Other 0

EE-482 Robot Dynamics and Control 4 Credits
Corequisites: EE-432
Prerequisites: None
Review of mathematical principle for robotics including matrix operations and their concepts. Principles of robot analysis, design, and operation are presented. Topics include review of historical robotics evolutions and applications, robot coordinate system placement rules, kinematic model development, kinematic solutions and analysis, trajectory planning and movement optimization, collision avoidance and path planning, feedback control system for robotics, feedforward, study of sensors for robotics applications, vision system types and application for robotics and mobile robots.
Lecture: 4, Lab 0, Other 0

EE-490 Senior Electrical Engineering Design Project 4 Credits
Corequisites: EE-432
Prerequisites: CE-320 and EE-240 and EE-310 and EE-320 and EE-321 and EE-336 and EE-338
Minimum Class Standing: Senior
Students will design, implement, document, and present a device or system as a significant capstone project. The project will emphasize electrical engineering, but will be multidisciplinary.
Lecture: 2, Lab 4, Other 0

Engineering Physics (EP)

EP-235 Computers in Physics 4 Credits
Prerequisites: PHYS-224 and PHYS-225
Minimum Class Standing: Sophomore
The multiple ways computers are used by professionals in industry, academia, and government laboratories are provided. Problems in physics will be solved through analytical or symbolic software tools, numerical approaches implemented in spreadsheets and basic scripts written in a structured style, and experimental tools for control and data acquisition. This combination of symbolic, numerical and experimental work will give students a practical toolbox of techniques to solve new problems and meet challenges in upper level classes, graduate school, and/or postgraduate positions.
Lecture: 2, Lab 4, Other 0

EP-335 Computational Physics 4 Credits
Prerequisites: PHYS-224 and PHYS-225
Minimum Class Standing: Sophomore
Computational physics is widely regarded as a third branch of physics, complementing both experimental and theoretical approaches. This course introduces the mindset and selected methods of computational physics, in the context of problems from a variety of subfields in physics. Examples include finite difference methods for differential equations, relaxation methods, and stochastic methods such as random walks and/or the Ising model. Tools of programming will be used, though prior knowledge or experience is not required.
Lecture: 4, Lab 0, Other 0

EP-342 Introduction to Materials Science and Engineering 4 Credits
Prerequisites: PHYS-224 and PHYS-225 and (CHEM-135 or CHEM-137)
Minimum Class Standing: Sophomore
The course presents a general introduction to the relationship of structure and function in metals, ceramics, polymers, and semiconductors. Course content includes key elements relating to material structures, processes, and properties and the interrelation of these components. In addition, common materials characterization methods such as x-ray diffraction (XRD), optical microscopy, scanning electron microscopy (SEM), transmission of electron microscopy (TEM), scanning probe microscopy (SPM), and other applications in nanotechnology are introduced.
Lecture: 4, Lab 0, Other 0

EP-446 Solid State Physics 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and PHYS-362
Minimum Class Standing: Junior
Advanced course in physics of solids will be provided. Topics include: crystal lattices, reciprocal lattice vectors and momentum space, concept of the Brillouin zones, elastic waves in crystals, phonons, phonon heat capacity, density of states, free electron gas model, energy band gap and Bloch functions, Kronig-Penney model for periodic well and reciprocal space, effective mass, Fermi surfaces, semiconductors & semiconductor devices – pn junctions, LEDs and Lasers.
Lecture: 4, Lab 0, Other 0

EP-485 Acoustic Testing and Modeling 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and PHYS-302
This course combines testing and measurement in the Acoustics Laboratory, modeling approaches including the finite element method, and exposure to textbook and journal literature to explore basic phenomena in acoustics. Each time the course is offered, students and the instructor will select two modules from a larger set, so that the course may be tailored to meet the needs and interests of students and faculty. Module topics include acoustics oscillators, structural vibration, source models, three-dimensional wave propagation, impedance and intensity, and transducers. Additional modules may be offered. Students in this course will collaborate to develop understanding through lab work, modeling, and theory. Each module will culminate in a presentation.
Lecture: 2, Lab 4, Other 0

English as 2nd Language (ESL)

ESL-091 Technical English I 0 Credits
Prerequisites: None
This course is NOT available to Kettering degree seeking students. This course meets for 10 contact hours a week and is comprised of five classes: Listening/Speaking, Grammar, Reading, Writing and a special topics class. The course is designed to meet the needs of IEP delegates in their specific programs and therefore is only open to individuals participating in IEP.
Lecture: 0, Lab 0, Other 0

ESL-096 Intermediate I 0 Credits
Prerequisites: None
In the Intermediate 1 level, students meet for 20 contact hours and 2 lab/practice hours every week. The 20 contact hours are equally divided among four classes: Listening/Speaking, Grammar, Reading, and Writing. Students will begin to develop the proficiency, confidence and skills necessary to understand and engage in regular academic and professional communication on a variety of STEM and business related topics through the use of the assigned textbook material, authentic lectures and coursework. Placement into this course requires an average CEFR rating of A2 or completion of at least two years of high school English (or equivalent). Students who successfully complete ESL 096 with a 75% or higher will move on to ESL 097 in the following term. NOTE: This course meets for 20 lecture hours and 2 lab/practice hours every week.
Lecture: 0, Lab 0, Other 0

ESL-097 Intermediate 2 0 Credits
Prerequisites: ESL-096
In the Intermediate 2 level, students meet for 20 contact hours every week. The 20 contact hours are equally divided among four classes: Listening/Speaking, Grammar, Reading and Writing. Student continue to develop the proficiency, confidence and skills necessary to understand and engage in regular academic and professional communication on a variety of STEM and business related topics through the use of the assigned textbook material, authentic lectures and readings, and daily coursework. Placement into this course requires an average CEFR rating of B1 or completion of ESL-096. Students who successfully complete ESL-097 with an average grade of 77% (C+) or higher will be able to take ESL-098 Intermediate 2 in the following term.
Lecture: 0, Lab 0, Other 0

ESL-098 Advanced 1 0 Credits
Prerequisites: ESL-097
In the Advanced 1 level, students meet for 20 contact hours every week. The 20 contact hours are equally divided among four classes: Listening/Speaking, Grammar, Reading and Writing. Students continue to develop the proficiency, confidence and skills necessary to understand and engage in regular academic and professional communication on a variety of STEM and business related topics through the use of the assigned textbook material, authentic readings and lectures, and daily coursework. Placement into this course requires an average CEFR rating of B1+ or completion of ESL-097 Intermediate 2. Students who successfully complete ESL-098 with an average grade of 77% (C+) or higher will be able to take ESL-099 Advanced 2 in the following term.
Lecture: 0, Lab 0, Other 0

ESL-099 Advanced 2 0 Credits
Prerequisites: ESL-098
In the Advanced 2 level, students meet for 20 contact hours every week. The 20 contact hours are equally divided among four classes: Listening/Speaking, Grammar, Reading and Writing. Students continue to develop the proficiency, confidence, and skills necessary to understand and engage in regular academic and professional communication on a variety of STEM and business related topics through the use of the assigned textbook material, authentic readings and lectures, and daily coursework. Placement into this course requires an average CEFR rating of B2 or completion of ESL-098. Students who successfully complete ESL-099 with an average grade of 77% (C+) or higher will complete the ESL Program and be awarded a certificate of completion.
Lecture: 0, Lab 0, Other 0

German Language (GER)

GER-101 Beginning German I 4 Credits
Prerequisites: None
The first couse in a three-part sequence providing an introduction to speaking, reading, listening and writing German. To that end, its focus is on the grammar, vocabulary, and syntax of the German language. Students are eligible to take this course only if they have less than one year of high school German, or less than one term of college German or by consent of the Head of the Department of Liberal Studies. A basic skills course, it counts for free elective credit and cannot substitute for any of the general education courses required of all students.
Lecture: 4, Lab 0, Other 0

GER-102 Beginning German II 4 Credits
Prerequisites: None
The second course in a three-part sequence providing an introduction to speaking, reading, and writing German. It develops the grammar, vocabulary, and syntax of the German language based on the foundation established in Beginning German I. Students are eligible to take this course only if they have less than two years of high school German, or less than two terms of college German or by consent of the Head of the Department of Liberal Studies. A basic skills course, it counts for free elective credit and cannot substitute for any of the general education courses required of all students.
Lecture: 4, Lab 0, Other 0

GER-103 Beginning German III 4 Credits
Prerequisites: None
This course is the third in a three-part sequence providing an introduction to speaking, reading, and writing German. It develops the grammar, vocabulary, and syntax of the German language based on the foundation established in Beginning German I and II. Students are eligible to take this course only if they have less than three years of high school German, or less than three terms of college German or by consent of the Head of the Department of Liberal Studies. A basic skills course, it counts for free elective credit and cannot substitute for any of the general education courses required of all students.
Lecture: 4, Lab 0, Other 0

History (HIST)

HIST-306 International Relations 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
A study of the central issues and problems in the history of modern international relations. This course will explore such issues as the connection between the First World War and the Second World War, the impact of the policies of great powers on conflicts in the non-western world, and the causes and consequences of the Cold War. This course will also examine the rise of international organization, the expansion of Western power, and the acceleration of global interdependence.
Lecture: 4, Lab 0, Other 0

HIST-308 America and the World 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
A study of the central issues and problems in the history of America's relations with the larger world. This course will examine such topics as American independence and expansion, the Civil War and the "new empire", the Spanish-American War, American involvement in the First World War, U.S. foreign relations in the interwar period, American involvement in the Second World War in the Pacific and Europe, The Cold War, the impact of the U.S. in Latin America, Asia and Africa, and American foreign relations since 1989.
Lecture: 4, Lab 0, Other 0

HIST-319 The Rise of the Global Community 4 Credits
Prerequisites: (SSCI-201 and HUMN-201) or LS-201
A study of the central issues and problems in the history of international organizations and the rise of the modern global community. This course will give particular attention to the past, present, and future of the United Nations in world politics. It will explore such topics as the legacy of the League of Nations, the development of international law, and the nature of human conflict and conflict resolution. Using case students, the primary and secondary sources, as well as simulations of the activities of international organizations, students will examine and debate such contemporary issues as arms control, human rights, war crimes, international terrorism, collective security and peacekeeping, humanitarian intervention, global threats to human health and the environment, and the use of science and technology fro human development.
Lecture: 4, Lab 0, Other 0

HIST-320 Modern Middle East 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
The history of the Middle East from World War I to the Gulf War of 1991 will be surveyed. It focuses on the Arabic-speaking areas of the former Ottoman empire, Turkey, Iran, and Israel. Thematically, the course explores major themes in Middle East history; the rise of nationalism and formation of nation-states; economic development strategies of the new states and formation of new social classes; the impact of Israeli and Palestinian nationalism and conflicts; oil and politics; the Islamic Revolution in Iran, and the Gulf War. The course also examines the impact of outside powers on the region; problems of political, economic, and cultural decolonization; and efforts to reassert Islamic identity in an era of tightening globalization. Considerable attention will be devoted to the region since 1945 and to the problems and promises of the present day.
Lecture: 4, Lab 0, Other 0

HIST-322 Africa in the World Economy 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Africa's involvement in the changing world economy and its role in the contemporary world will be examined. Its goal is to provide students a framework for understanding Africa's contemporary economic challenges and opportunities. The course begins by examining the political, social and economic history of the continent since independence, focusing on how the lack of visible material and social progress in the post-independence period framed popular perceptions about Africa. The role of external players and ideas and the nature of local initiatives and responses in shaping Africa's place in the world economy will also be examined.
Lecture: 4, Lab 0, Other 0

HIST-329 Science, Technology, and the Modern World 4 Credits
Prerequisites: LS-201
This course will examine the political, economic, social, and cultural consequences of science and technology over the past 500 years as well as consider how science and technology have contributed to some of the most important ethical problems of the modern age. This course will explore such topics as the scientific, commercial, and industrial revolutions; the technologies of imperialism and the expansion of Western power; the roles of science and technology in the First World War and the Second World War; the influences of scientific and technological developments on the rise of modernism, consumerism, and globalization; the impact of science and technology on human health and the environment; and the changing interactions between humans, materials, and machines over time. It also aims to raise questions about the myths, promises, and perils of science and technology for contemporary society as well as the meaning of "progress" and the making of "a better world" through scientific and technological innovation.
Lecture: 4, Lab 0, Other 0

HIST-391 History Special Topics 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
An interdisciplinary advanced course focusing on a specific topic. This course is a one-time offering whose content is determined by current faculty interest, and provides a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under a different topic.
Lecture: 4, Lab 0, Other 0

HIST-499 History Independent Study 4 Credits
Prerequisites: None
This course facilitates depth and breadth of study in a particular area of History. This course may not serve as a substitute for any of the courses in the general education component, including the Social Science elective and senior seminar. Students must request and receive approval of the independent study topic with the instructor and the Liberal Studies Department Head.
Lecture: 4, Lab 0, Other 0

Humanities (HUMN)

HUMN-391 Special Topics in Humanities 4 Credits
Prerequisites: LS-201
An interdisciplinary course focusing on a specific topic. The purpose of the course is to bring to bear on one geographical area, historical era, artistic movement, or cultural phenomenon the perspectives of several disciplines within the humanities, thus providing a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under different topics.
Lecture: 4, Lab 0, Other 0

HUMN-499 Humanities Independent Study 4 Credits
Prerequisites: LS-201
Minimum Class Standing: Sophomore
This course facilitates depth and breadth of study in a particular area of the Humanities. This course may not serve as a substitute for any of the courses in the general education component, including the Humanities elective and senior seminar. Students must request and receive approval of the independent study topic with the instructor.
Lecture: 4, Lab 0, Other 0

Indust/Manufctrng Engrg (IME)

IME-100 Interdisciplinary Design and Manufacturing 4 Credits
Prerequisites: None
This introductory class exposes students to basic design principles, the materials of manufacture, their structure and properties, and methods of processing them into everyday products. A laboratory experience provides hands-on experience in many of these processes. A second laboratory provides experience in mechanical design and electrical and computer manufacturing.
Lecture: 2, Lab 4, Other 0

IME-200 Introduction to Industrial Engineering 4 Credits
Prerequisites: None
This course introduces students to industrial engineering and provides students with foundational tools used in the profession. The course is intended to prepare students for co-op experiences in industrial engineering by exposing them to tools and concepts that are often encountered in practice. The course covers specific tools and their applications, including systems design and integration. The course uses a combination of lecture and active learning. Projects and group exercises will be used to cover hands-on applications and problem solving related to topics covered in lectures.
Lecture: 4, Lab 0, Other 0

IME-211 Algorithms and Computer Programming 4 Credits
Prerequisites: None
An introduction to algorithm development and a structured programming language using VB (Visual Basic) programming language. Students use procedural and event-driven programming methodologies to design, develop, and test computer programs to solve engineering, science, and financial problems. The course incorporates VB's ActiveX controls. VB programs will be interfaced with Excel spreadsheet.
Lecture: 3, Lab 2, Other 0

IME-300 Manufacturing Processes 4 Credits
Prerequisites: IME-100
This course is designed to expand upon previous courses and allow students to demonstrate knowledge of Manufacturing Processes and Systems. Students will learn the fundamentals of conventional manufacturing processes and advanced processes such as additive manufacturing, micro/nano manufacturing, nontraditional machining processes, and automation technologies for manufacturing systems. Laboratory provides a hands-on experience for the students working in a team to use many of these processes to manufacture parts.
Lecture: 3, Lab 2, Other 0

IME-321 Operations Research I - Deterministic Models 4 Credits
Prerequisites: None
Deterministic Systems Optimization; Review of linear algebra, linear programming, sensitivity analysis, transportation problems, assignment problems, transshipment problems, network models, and integer programming.
Lecture: 4, Lab 0, Other 0

IME-332 Engineering Statistics I - Statistical Inference and Regression 4 Credits
Prerequisites: MATH-258
Minimum Class Standing: Sophomore 2
Introduction to Applied Engineering Statistics. Basic concepts in statistics, exploratory data analysis, different sampling methods, descriptive statistics, inferential statistics for one and two population cases, goodness of fit tests, regression analysis and non-parametric statistics. Statistical software such as Minitab is used throughout the course.
Lecture: 4, Lab 0, Other 0

IME-351 Engineering Economics 4 Credits
Prerequisites: MATH-101 or MATH-101X
Minimum Class Standing: Sophomore
This is an introductory course on economic and financial analysis to assist engineering managers in making fiscally sound decisions. Topics include financial measures such as Return On Investment, Break-even Analysis, Replacement Analysis, Depreciation and Taxes, and Multiple-criteria Decision Making.
Lecture: 4, Lab 0, Other 0

IME-361 Lean Work Design 4 Credits
Prerequisites: MATH-258
Minimum Class Standing: Sophomore
Teams of students design and implement a complex assembly production system. Through application of lecture concepts in the "Lego Lab", a fundamental understanding of work design and performance improvement concepts, tools, and techniques is provided. Topics covered include applied anthropometry, charting techniques, work methods and waste analysis, performance measurements and learning curves, workplace organization and visual controls, work standards, and human factors issues related to manual assembly systems.
Lecture: 3, Lab 2, Other 0

IME-403 Computer Numerical Control Machining 4 Credits
Prerequisites: MECH-307
Minimum Class Standing: Junior 2
This course introduces the fundamentals of computer numerical control (CNC) programming and computer-aided manufacturing (CAM) are introduced. The fundamental theoretical and operational concepts of machining are also presented. The course focuses on the programming of cutting operations; tool materials, selection, and uses. Significant topics include: G-code programming, Introduction to CAM software, Taylor's tool life model, Criteria for tool selection, and the Orthogonal Cutting Model. Laboratories use CNC machine tools for programming and cutting, and are designed to illustrate theoretical concepts and methods for solving practical engineering machining problems.
Lecture: 3, Lab 2, Other 0

IME-408 Industrial Robotics 4 Credits
Prerequisites: MECH-100 and IME-100
Minimum Class Standing: Junior 2
Basic concepts of robotic system theory and applications are presented. Human and robotic system interface with diverse real environments are discussed. Human and robotic safety is stressed. Advantages, limitations, business case justifications of investment and benefits of robotic systems for LEAN and quality operations are emphasized. Flexible manufacturing operations, Work cell design, cycle time, work path, end-effectors, collaborative robots are covered. Robotic computer model simulation is included in the course. Hands on Labs are included. Students may not receive credit for both IME-408 and IME-608.
Lecture: 3, Lab 2, Other 0

IME-409 Computer Integrated Manufacturing 4 Credits
Prerequisites: MECH-100
Minimum Class Standing: Junior 2
Study the current status of CIM, with definition, case studies, citing obstacles and future trends and development. Some key components of CIM and hierarchy of operation in a manufacturing facility are studied and correlated. They include CAD-CAM link, numerical control, automation, production and manufacturing control, control through proper communication and computer supervisory control, robotics control, process planning. Short summary of planning, implementation, and managing of a CIM environment will also be covered. The students will conduct experiments and projects on creating a CIM environment using computer supervisory control.
Lecture: 3, Lab 2, Other 0

IME-412 Applied Control Systems Design 4 Credits
Prerequisites: MECH-100 and (IME-211 or ECE-101 or CS-101)
Minimum Class Standing: Junior 2
A course designed to introduce students to various computer-controlled systems used for industrial automation including data collection, analysis and reporting. Various hardware, software, sensors, and human resources required to implement effective control systems will be studied. Students will be engaged in hands-on laboratory exercises requiring them to configure and write programs and design systems to solve various assigned problems through individual and/or group efforts. Modern techniques for Industry 4.0 such as data management for predictive maintenance and artificial intelligence will also be explored.
Lecture: 3, Lab 2, Other 0

IME-422 Simulation 4 Credits
Prerequisites: MATH-258
An understanding and need for simulation in practice will be developed. The course will focus on basic and advanced concepts in simulation including comparing the simulated results with analytical results, and successfully develop simulation models useful in production/ manufacturing, supply chains, transportation, and other areas related to Industrial and Manufacturing Engineering. Simulation package such as ARENA will be integrated and used throughout the course. Students may not receive credit for both IME-422 and IME-622.
Lecture: 4, Lab 0, Other 0

IME-423 Operations Research II - Stochastic Models 4 Credits
Prerequisites: IME-321
Minimum Class Standing: Junior 2
Topics include: Stochastic models in operations research; review of basic probability, discrete time Markov chains; continuous time Markov chains; discrete and continuous phase type distributions; birth-and-death processes; elementary queuing models involving Poisson arrivals and exponential service times; advance queuing models; basic concepts in simulation and simulation of various processes.
Lecture: 4, Lab 0, Other 0

IME-452 Production System Design 4 Credits
Prerequisites: IME-321 and IME-351 and (MATH-258 or MATH-330)
Minimum Class Standing: Junior
Students gain an understanding of the decision-making tools necessary to design value in the global supply chain from concept to customer. Quantitative methods are employed to aid the decision-making process of demand forecasting and enterprise planning for the purpose of increased profit and value to stakeholders. Basic concepts in strategy, forecasting, demand planning, inventory control and value stream mapping will be taught and utilized to enable the decision-making process to be based on quantitative metrics.
Lecture: 4, Lab 0, Other 0

IME-453 Tools for Managing the Supply Chain 4 Credits
Prerequisites: IME-452
Students gain an understanding of the decision-making process required to design and manage the global supply chain. This course covers basic principles of supply chain management and provides techniques used to analyze various aspects of logistics systems. Key concepts such as warehousing, distribution, facility location planning, and probabilistic project management and resource scheduling are examined as an integral part of modern business. The course address insights, concepts, and practical tools that are important for the effective management of the supply chain.
Lecture: 4, Lab 0, Other 0

IME-454 Senior Design Project 4 Credits
Prerequisites: None
Minimum Class Standing: Senior II
This course provides the student with the challenge of integrating and synthesizing general engineering knowledge particularly in industrial and manufacturing disciplines, into creatively solving real-world, open-ended problems in a team setting. This requires defining a project work plan, developing the problem statement, objectives and evaluation criteria; data collection; selection of appropriate analytical and production techniques; developing and integrating recommendations; justifications of recommended course of action; and written and oral presentation of results. The project could involve production systems or product design where the planning can extend to product realization. This course is intended to be taken in the students final term on campus.
Lecture: 2, Lab 4, Other 0

IME-462 Ergonomics 4 Credits
Prerequisites: MECH-210 and MATH-258
Human factors and ergonomics concepts for design of work. Topics include functional anatomy, bio-mechanical analysis of physical work, work physiology, manual material handling, cumulative trauma disorders, hand tool design, and human factors related to applied job design. Students may not receive credit for both IME-462 and IME-662.
Lecture: 3, Lab 2, Other 0

IME-463 Safety and Human Factors 4 Credits
Prerequisites: None
Minimum Class Standing: Junior
An introduction to occupational safety; including injury statistics, mandatory and voluntary specification and performance regulations, standards, and guidelines. Electrical, machine, fire and life safety, confined spaces, and fall hazards (among others) are discussed in the context of traditional safety and human factors engineering. Students apply systems safety analysis methods in real-world hazard analysis and control projects. Students may not receive credit for both IME-463 and IME-663.
Lecture: 4, Lab 0, Other 0

IME-465 Human-Computer Interaction and Interface Design 4 Credits
Prerequisites: None
Minimum Class Standing: Junior
New technology is increasingly being integrated into our minute-to-minute lives. This multidisciplinary course provides theoretical and practical skills that are needed to design, develop, and evaluate human interaction with computer and machine interfaces and virtual environments. Course topics are anchored around fundamentals of physical and cognitive human capabilities and their relationship to product design and testing. Example topics include human psychological and physical capabilities, cognition and models of interaction, heuristic evaluation. Rapid prototyping, usability testing, experimental evaluation of input devices and peripherals, haptics, virtual and augmented reality, and brain interfaces. Topics are reinforced through readings, guest lectures, hands-on experimentation and evaluation, current research trends, and a term design project. This course is multidisciplinary, so students from all majors are encouraged to participate and programming skills are not required. Students may not receive credit for both IME-465 and IME-665.
Lecture: 4, Lab 0, Other 0

IME-471 Quality Assurance 4 Credits
Prerequisites: MATH-258
Minimum Class Standing: Junior
The basics of modern methods of quality control and improvement that are used in the manufacturing and service industries are covered in this course. It includes quality philosophy and fundamentals, statistical methods of quality improvement, concept of variation and its reduction, statistical process control, acceptance sampling, designed experiments in quality improvements, and quality in the service sector. Deming's quality concepts will also be discussed. Students may not receive credit for both IME-471 and IME-671.
Lecture: 4, Lab 0, Other 0

IME-472 Introduction to Reliability and Maintainability 4 Credits
Prerequisites: MATH-258 or MATH-330
Minimum Class Standing: Junior II
Basic knowledge and skills of reliability techniques that can be used by practicing engineers is provided in this course. The primary emphasis is on the problem of quantifying reliability in product design and testing. The topics include reliability definition and concepts, life testing and data analysis, system reliability models, and repairable systems reliability. Accelerated life testing will also be discussed. Students may not receive credit for both IME-472 and IME-672.
Lecture: 4, Lab 0, Other 0

IME-473 Design of Experiments 4 Credits
Prerequisites: None
Minimum Class Standing: Junior
Advanced topics in Applied Engineering Statistics. Introduction to linear regression analysis, simple linear models, multiple linear models, residual analysis, indicator variables, variable selection process, ANOVA, introduction to DOE, basic designs, factorial designs, fractional factorial designs, blocking, and response surface methodology. Extensive use of statistical software such as Minitab throughout the course.
Lecture: 4, Lab 0, Other 0

IME-474 Design for Manufacture and Assembly 4 Credits
Prerequisites: MECH-307
Minimum Class Standing: Senior 2
This course develops skills needed to prepare a product functional specification for an existing product, at the product subfunctional group and individual part levels. The development and application of a function structure diagram is developed for a product. Creative concepts generation tools are learned to generate alternate mechanisms to generate the functions of a product. The PUGH concept selection method is utilized to select top ideas in each subfunctional group. New product level concepts are generated by combining the best concepts in each subfunctional group. The BDI Design for Assembly method is applied to existing products to determine a path for part consolidation. The DFA Redesign Concept Matrix is used to create novel assembly concepts. Concepts in the course are taught through lecture and facilitated practicum.
Lecture: 3, Lab 2, Other 0

IME-476 Lean Six Sigma 4 Credits
Prerequisites: MATH-258
Minimum Class Standing: Senior
This techniques to maximize production efficiency and to maintain control over each step in the process are examined in this course. The structured problem-solving methodology DMAIC (Define-Measure-Analyze-Improve-Control) will provide the framework for the course.
Lecture: 3, Lab 0, Other 1

IME-498 Industrial Engineering Study Abroad 4 Credits
Prerequisites: None
Advanced Topics in Industrial Manufacturing Engineering. This is a course taken as part of Kettering's Study Abroad Program.
Lecture: 4, Lab 0, Other 0

IME-499 Industrial Engineering Independent Study 4 Credits
Prerequisites: None
This course facilitates depth and breadth of study in a particular area of Industrial Engineering. Students must request and receive approval of the independent study topic with the instructor.
Lecture: 4, Lab 0, Other 0

IME-564 Ethics and Practice of Engineering 4 Credits
Prerequisites: None
Minimum Class Standing: Senior
The professional and ethical consideration of an engineer in contemporary society is covered in this course. Discussions include the code of ethics for engineers, case studies on conflict of interest, team, engineering/management responsibilities, environmental considerations and professional registration. This class requires live weekly discussion.
Lecture: 3, Lab 0, Other 1

Language (LANG)

LANG-297 Language Free Elective 4 Credits
Prerequisites: None
This is a Language Transfer Course recording credit for students transferring to Kettering University for a course in foreign languages (including Sign Language). The course is transfer only, and will never be listed in term course offerings.
Lecture: 4, Lab 0, Other 0

Literature (LIT)

LIT-304 American Literature and Philosophy 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Selected topics founded and expressed in literature during the philosophic and the literary development of the Republic.
Lecture: 4, Lab 0, Other 0

LIT-307 Poetry: Substance and Structure 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
An analysis of poetry written in the context of the development of intellectual concepts. Emphasis is on the philosophical content, its moral and ethical dimensions, structure, and the intellectual climate which gave rise to significant aesthetic ideals. Biography and critical interpretation are included.
Lecture: 4, Lab 0, Other 0

LIT-309 The Literature of Multicultural America 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
This course examines U.S. multicultural literatures from several critical perspectives. A study of primary texts by American writers whose themes and techniques of narration reflect the development of U.S. literary discourses of race, identity, myths of origin, gender, and cross-cultural communication. The broad array of texts includes novels, poetry, memoirs, and films from a multiplicity of cultural perspectives. Engagement in comparative work with an eye toward understanding the complexity and the demands of a multicultural society.
Lecture: 4, Lab 0, Other 0

LIT-310 African American Literature 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
This course examines the development of African American literature from its beginnings to today, and it focuses on both what makes it unique and what anchors it in an American national identity. We will read a variety of genres, including slave narratives, novels, and poetry, place them in their historical context, and address themes such as racial and cultural identity, forms of resistance, gender relations, and the role of music. Strict attendance policy. Writing is an important component of the course.
Lecture: 4, Lab 0, Other 0

LIT-311 Literatures of the African Diaspora 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
This course examines literary texts written by people of African ancestry in the Atlantic world from the 18th to the 21st centuries. We particularly focus on issues related to racial and cultural identity, national identity, social class, and gender. Attention to historical context is an essential component of the course. Two major objectives are to sharpen students' reading and interpretive skills, and to improve their ability to write clearly, coherently, and persuasively. Lectures, discussions, and writing assignments all work to exercise critical thinking, a major goal of Liberal Studies.
Lecture: 4, Lab 0, Other 0

LIT-312 Literatures of Migration 4 Credits
Prerequisites: LS-201
Migration is a fundamentally human experience. Whether legal or illegal, economic or a refuge from war or persecution, migration has been both the source of profound personal and cultural enrichment and the catalyst for intense social and political conflict. This course examines literary texts that are about the migrant's experience in various parts of the world. Students explore such themes as cultural integration, cultural hybridity, the relationship to national identity, the role of race, gender, and class in the migrant's experience, the meaning of the journey, the meaning of home, and intergenerational conflicts. Attention is paid to the historical context of each work.
Lecture: 4, Lab 0, Other 0

LIT-372 Masterpieces of Literature 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
Course concentration will be given to learning the characteristics of several literary genres as exemplified by master writers. The course may include genres such as: Epic Narrative poetry, Classical Satire, Classical Philosophy, Medieval Narrative Poetry, Realistic Novel, Modern Short Story & Novel.
Lecture: 4, Lab 0, Other 0

LIT-391 Literature Special Topics 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
An interdisciplinary advanced course focusing on a specific topic. This course is a one-time offering whose content is determined by current faculty interest, and provides a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under different topic
Lecture: 4, Lab 0, Other 0

LIT-397 Literature Free Elective 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

LIT-399 LIT Independent Study 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

Liberal Studies (LS)

LS-201 Sophomore Seminar: Exploring the Human Condition 4 Credits
Prerequisites: COMM-101
Kettering university's vision is to make a better world through technological innovation, leadership and service.This interdisciplinary seminar will provide a foundation for the vision of asking such questions as: What is the human condition? What is culture and how is it created? How do ideas and values shape our views and actions? What is the relationship between the individual and society? How is power used and abused? What does it mean to be a critical thinker? The course will include reading assignments from both the social sciences and the humanities. It is a writing and reading intensive course designed to improve students' critical thinking skills.
Lecture: 4, Lab 0, Other 0

LS-391 Liberal Studies Special Topic 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

LS-399 LS Independent Study 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

LS-489 Senior Seminar: Leadership, Ethics, and Contemporary Issues 4 Credits
Prerequisites: COMM-101 and LS-201
Minimum Class Standing: Junior
This course examines the interrelated subjects of leadership, ethics and contemporary issues. Because it is a culmination of their general education, students in this course use the methods and perspectives learned in the preceding general education courses. After examining general theoretical approaches through a common text, the course will involve three “case studies” with suitable assigned readings. One case study will focus on a corporation in order to illustrate leadership, ethics and contemporary issues; a second will focus on a person in order to illustrate leadership, ethics, and contemporary issues; the third will focus on an important modern episode, event or condition that exemplifies issues of ethics and leadership.
Lecture: 4, Lab 0, Other 0

Mathematics (MATH)

MATH-100 College Mathematics 4 Credits
Prerequisites: None
A study of functions and their algebra and graphs. Special functions of engineering and science are emphasized, including polynomial, trigonometric, and exponential functions and their inverses. Concepts and methods of algebra, trigonometry, and analytic geometry important to calculus are also emphasized. NOTE: While there are no pre-reqs for this course, enrollment is a result of Math Placement exam score. Failure to take this exam results in placement in MATH-100. Credits for MATH-100 do not apply to degree requirements. Also, placement in MATH-100 may delay entry in courses for which calculus is a prerequisite.
Lecture: 4, Lab 0, Other 1

MATH-101 Calculus I 4 Credits
Prerequisites: None
An introduction to the theory and techniques of differentiation of polynomial, trigonometric, exponential, logarithmic, hyperbolic, and inverse functions of one variable. Also included are limits, continuity, derivative applications and interpretations. Computer software will be used to aid in understanding these topics. NOTE: Students can place into 101 with a sufficient score on the Math Placement Exam, or permission of Department Head.
Lecture: 4, Lab 0, Other 0

MATH-101X Calculus I 4 Credits
Prerequisites: None
This course is for students showing a lack of proficiency in algebra and trigonometry on the Math Placement examination. The course contains the same material as MATH-101 but in addition, includes a review of algebraic expressions, trigonometic functions and their inverses, and analytic geometry. Computer software will be used to aid in understanding these topics. NOTE: Students can place into 101X with a sufficient score on the Math Placement Exam, or permission of Department Head.
Lecture: 4, Lab 0, Other 1

MATH-102 Calculus II 4 Credits
Prerequisites: MATH-101
NOTE: Students also must receive a minimum grade of C in MATH-101.
Riemann integration and the Fundamental Theorem of Calculus, including applications to area, volume, etc., and basic methods for conversion of integrals including change of variable, substitutions, partial fractions, integration by parts, improper integrals and numerical integration. Also introduced are sequences and series in one variable with emphasis on Taylor Series. Computer software will be used to aid in understanding these topics.
Lecture: 4, Lab 0, Other 0

MATH-102H Calculus II - Honors 4 Credits
Prerequisites: MATH-101
Honors Calculus II is a deeper, more conceptual, rigorous, and limit based version of Calculus II (MATH-102). It is designed for students with strong mathematical skills. Riemann integration and the Fundamental Theorem of Calculus, including applications to area, volume, etc., and basic methods for conversion of integrals including change of variable, substitutions, partial fractions, integration by parts, improper integrals and numerical integration. Also introduced are sequences and series in one variable with emphasis on Taylor Series. Computer software will be used to aid in understanding these topics.
Lecture: 4, Lab 0, Other 0

MATH-102X Calculus II 4 Credits
Prerequisites: MATH-101 or MATH-101X
This course is for students who want to improve their skills in Trigonometry and Differential Calculus. It contains the same material as MATH-102 but is taught at a slower pace and with more examples and sample problems. In addition, it includes reviews of Trigonometry and Differential Calculus.
Lecture: 4, Lab 0, Other 1

MATH-191 Mathematics Special Topics 4 Credits
Prerequisites: None
This course is often offered as Pre-Calculus for Business, and in this form, available only to those students majoring in Business Administration. Course is equivalent to MATH-100.
Lecture: 4, Lab 0, Other 0

MATH-203 Multivariate Calculus 4 Credits
Prerequisites: MATH-102 or MATH-102H
A study of polar coordinates, parametric equations, and the calculus of functions of several variables with an introduction to vector calculus. Topics include surface sketching, partial derivatives, gradients, differentials, multiple integrals, cylindrical and spherical coordinates and applications. Computer software will be used to aid in understanding these concepts.
Lecture: 4, Lab 0, Other 0

MATH-203H Multivariate Calculus - Honors 4 Credits
Prerequisites: MATH-102H or MATH-102 or MATH-102X
Honors Multivariate Calculus is an extended, deeper, more conceptual, rigorous, and limit-based version of Multivariate Calculus (MATH-203). The course is designed for students with strong mathematical skills. The topics include parametric equations, polar, Cartesian, cylindrical, and spherical coordinates, vector algebra, equations of lines, planes, and quadratic surfaces, calculus of functional of several variables, unconstrained and constrained optimization problems, multidimensional integrals, change of variables, and elements of vector calculus. Computer software will be used to aid in understanding these topics and for graphical visualization.
Lecture: 4, Lab 0, Other 0

MATH-203X Multivariate Calculus 4 Credits
Prerequisites: MATH-102 or MATH-102H or MATH-102X
A study of polar coordinates, parametric equations, and the calculus of functions of several variables with an introduction to vector calculus. Topics include surface sketching, partial derivatives, gradients, differentials, multiple integrals, cylindrical and spherical coordinates and applications. Computer software will be used to aid in understanding these concepts.
Lecture: 5, Lab 0, Other 0

MATH-204 Differential Equations & Laplace Transforms 4 Credits
Prerequisites: MATH-203 or MATH-203H or MATH-203X
Minimum Class Standing: Freshman
Terms Offered: Summer, Fall, Winter, Spring
An introduction to the principles and methods for solving first order, first degree differential equations, and higher order linear differential equations. Includes a study of the Laplace transform and its application to the solution of differential equations. Existence and uniqueness theorems for O.D.E.'s are also discussed.
Lecture: 4, Lab 0, Other 0

MATH-204H Differential Equations and Laplace Transforms - Honors 4 Credits
Prerequisites: MATH-203 or MATH-203H
Honors Differential Equations and Laplace Transform is an extended, deeper, more conceptual, rigorous version of MATH-204. The course is designed for students with strong mathematical skills. The additional topics include Cauchy-Euler Equation, the Dirac Delta Function, Linear Models: Boundary Value Problems, Systems of Linear Differential Equations, and optional advanced topics, e.g. Power Series Solution and Solutions About Singular Points.
Lecture: 4, Lab 0, Other 0

MATH-258 Probability and Statistics 4 Credits
Prerequisites: MATH-102 or MATH-102X or MATH-102H
Minimum Class Standing: Sophomore 1
This course introduces fundamentals of probability together with examples of discrete and continuous random variables, including Bernoulli, binomial, Poisson, normal, exponential and gamma random variables. Descriptive and inferential parametric statistics for one and two populations is covered. Correlation, simple and multiple linear regression, and single factor ANOVA are studied. A statistical package MINITAB or R is used throughout the course.
Lecture: 4, Lab 0, Other 0

MATH-291 Mathematics Special Topics 4 Credits
Prerequisites: None
Terms Offered: As needed
Mathematics Special Topics
Lecture: 4, Lab 0, Other 0

MATH-305 Numerical Methods and Matrices 4 Credits
Prerequisites: MATH-204 or MATH-204H
Minimum Class Standing: Sophomore
An introduction to numerical methods including the study of iterative solutions of equations, interpolation, curve fitting, numerical differentiation and integration, and the solution of ordinary differential equations. An introduction to matrices and determinants; application to the solution of linear systems.
Lecture: 4, Lab 0, Other 0

MATH-307 Matrix Algebra 4 Credits
Corequisites: MATH-102
Prerequisites: MATH-101 or MATH-101X
A study of matrix concepts including such topics as basic algebraic operations, determinants, inversion, solution of systems of linear equations, vector spaces, basis and dimension, eigenvalues, and eigenvectors.
Lecture: 4, Lab 0, Other 0

MATH-308 Abstract Algebra 4 Credits
Prerequisites: (MATH-307) or (CS-211 and MATH-101) or (CS-211 and MATH-101X)
Minimum Class Standing: Sophomore
Students will learn topics in modern algebra and will practice proof techniques. Topics will include: congruence classes, modular arithmetic, groups, subgroups, normal subgroups, Lagrange's theorem, rings, subrings, ideals, quotient rings, isomorphisms and homomorphisms, polynomial arithmetic, fields, divisors, factorization, and proofs of the main theorems. The course is required for mathematics majors and is also useful in cryptography and quantum physics.
Lecture: 4, Lab 0, Other 0

MATH-313 Boundary Value Problems 4 Credits
Prerequisites: MATH-204 or MATH-204H
Minimum Class Standing: Sophomore 2
An introduction to linear partial differential equations (PDE's) and basic techniques of applied mathematics used to solve initial, boundary value problems associated with these equations. Topics include: derivation of some of the fundamental PDE's' and boundary conditions that arise in science and engineering; Fourier Series; Sturm-Liouville Systems including eigenvalues, eigenfunctions and eigenfunction expansions; the separation of variables techniques; Fourier Transforms. Applications to problems of science and engineering will be given throughout the course.
Lecture: 4, Lab 0, Other 0

MATH-321 Real Analysis I 4 Credits
Prerequisites: MATH-203 or MATH-203H or MATH-203X
Minimum Class Standing: Junior
A more advanced study of functions in one real variable including limits, uniform continuity, differentiation, integration, and sequences and series of functions; topology of R.
Lecture: 4, Lab 0, Other 0

MATH-327 Probability & Stochastic Modeling 4 Credits
Prerequisites: MATH-203 or MATH-203H or MATH-203X
Minimum Class Standing: Sophomore
This is a calculus-based introduction to probability theory and stochastic modeling. Students will learn fundamentals of probability, discrete and continuous random variables, expectation, independence, Bayes' rule, important distributions and probability models, joint distributions, conditional distributions, distributions of functions of random variables, moment generating functions, the Central Limit Theorem, laws of large number. Programming language R will be introduced and used throughout the course.
Lecture: 4, Lab 0, Other 0

MATH-328 Methods of Applied Mathematics 4 Credits
Prerequisites: MATH-204 or MATH-204H
Minimum Class Standing: Junior
Topics from advanced calculus, dimensional analysis and scaling, perturbation and asymptotic methods, calculus of variations and integral equations. Applications of these tools to problems in engineering will be included.
Lecture: 4, Lab 0, Other 0

MATH-330 Biostatistics 4 Credits
Prerequisites: MATH-258
Minimum Class Standing: Sophomore II
This course covers topics in the design of experiments and data analysis useful in biostatistics; including screening tests, analysis of categorical data, nonparametric methods, ANOVA and ANCOVA, nested designs, multiple regression, logistic regression and its extensions, design and analysis techniques for epidemiologic studies. Computer packages such as MINITAB or R will be used for all applications and the analysis of data sets.
Lecture: 4, Lab 0, Other 0

MATH-350 Financial Mathematics 4 Credits
Prerequisites: (MATH-102 or MATH-102X or MATH-102H)
Minimum Class Standing: Junior
This course provides an understanding of the fundamental concepts of financial mathematics, and how they are applied in calculating present and accumulated values for various streams of cash flows. These concepts are later used in reserving, valuation, pricing, asset/liability management, investment income, capital budgeting, and valuing contingent cash flows. Key terms studied include inflation, rates of interest, term structure of interest rates, yield rate, equation of value, accumulation function, discount function, annuity, perpetuity, interest rate swaps and bonds. Procedures like determining equivalent measures of interest, discounting, accumulating,, amortization will be covered. Modern topics of financial analysis will be introduced, such as yield curves, spot rates, forward rates, duration, convexity and immunization.
Lecture: 4, Lab 0, Other 0

MATH-360 Life Contingencies I 4 Credits
Prerequisites: MATH-350
Minimum Class Standing: Junior
This course is an introduction to life insurance mathematics based on a stochastic approach. This course is to develop a student's knowledge of the theoretical basis of certain actuarial models and the application of those models to insurance and other financial risks. Definitions of key terms will be studied, including actuarial present value, survival model, life insurance, annuities, and benefit premiums.
Lecture: 4, Lab 0, Other 0

MATH-361 Life Contingencies II 4 Credits
Prerequisites: MATH-360
Minimum Class Standing: Junior 2
This is a continuation of Life Contingencies I. Development is based on a stochastic approach to life insurance models. Definitions of key terms will be studied, including benefit reserves, and multi-life and multiple-decrement models.
Lecture: 4, Lab 0, Other 0

MATH-412 Complex Variables 4 Credits
Prerequisites: MATH-203 or MATH-203H or MATH-203X
Minimum Class Standing: Sophomore
An introduction to the theory of complex variables. Includes basic algebra of complex numbers, analytic functions and the Cauchy-Riemann equations, elementary transformations, complex integration, the Cauchy integral formulas, Taylor and Laurent series, and the theory of residues.
Lecture: 4, Lab 0, Other 0

MATH-416 Vector Analysis 4 Credits
Prerequisites: MATH-203 or MATH-203H or MATH-203X
Minimum Class Standing: Sophomore 2
An introduction to vector algebra and calculus including vector products, vector functions, and their differentiation and integration, gradients, line and surface integrals, conservative fields and potentials functions, Green's theorem, parametric equations, curvature, and curvilinear coordinates.
Lecture: 4, Lab 0, Other 0

MATH-418 Intermediate Differential Equations 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and MATH-305
Minimum Class Standing: Junior
Systems of linear and nonlinear ordinary differential equations (ODE's) will be studied.Topic include: systems of linear ODE's, matrix methods, variation of parameters, and perturbation methods and boundary layers, phase portraits and stability of nonlinear ODE's. Numerical methods for solving systems of ODE's will be presented and used to solve physical problems of applied mathematics and engineering.
Lecture: 4, Lab 0, Other 0

MATH-421 Real Analysis II 4 Credits
Prerequisites: MATH-321
Minimum Class Standing: Junior 2
An introduction to the study of real functions including metric spaces, normed linear spaces, Hilbert Spaces, and linear operators.
Lecture: 4, Lab 0, Other 0

MATH-423 Partial Differential Equations 4 Credits
Prerequisites: MATH-305 and MATH-313
Minimum Class Standing: Junior
This course is a continuation of MATH-313. Topics include Bessel's equation and Legendre's equation, boundary value problems in curvilinear coordinate systems, Green's functions for ordinary and partial differential equations. Applications to problems of science and engineering will be given throughout the course.
Lecture: 4, Lab 0, Other 0

MATH-427 Statistical Inference & Modeling 4 Credits
Prerequisites: MATH-327
Minimum Class Standing: Sophomore I
A study of statistics including point and interval estimation, consistency and sufficiency, Minimum Variance Unbiased Estimators, Uniformly Most Powerful tests, likelihood ratio tests, goodness of fit tests, an introduction to non-parametric methods. Linear models, including regression analysis and Analysis of Variance are included. Programming in R will be introduced and used throughout the course.
Lecture: 4, Lab 0, Other 0

MATH-428 Sampling Theory 4 Credits
Prerequisites: MATH-327
Minimum Class Standing: Senior
A study of sampling theory including probability sampling, simple random sampling, sample size estimates, stratified sampling, and cluster sampling.
Lecture: 4, Lab 0, Other 0

MATH-450 Statistics for Risk Modeling 4 Credits
Prerequisites: MATH-427
Minimum Class Standing: Junior I
This course will prepare students to understand key concepts in the following categories of applied statistics: statistical learning, R programming language, construction of generalized linear models, regression-based time series models, principal components analysis, decision tree models and cluster analysis. Students will choose appropriate models, interpret model results and perform necessary calculations for statistical inference and prediction to answer the underlying business questions. Students are also assumed to have knowledge of probability and mathematical statistics.
Lecture: 4, Lab 0, Other 0

Mechanical Engineering (MECH)

MECH-100 Engineering Graphical Communication 4 Credits
Prerequisites: None
This computer aided design and drafting course is an introduction to engineering graphics and visualization with topics to include sketching, line drawing, wire-frame section development and elements of solid modeling. Also, this course will include the development and interpretation of drawings and specifications for product realization. CAD, office, and web-based software will be used in student presentations and analysis.
Lecture: 2, Lab 4, Other 0

MECH-197 MECH Free Elective 4 Credits
Prerequisites: None
This is a Mechanical Engineering course used to record credit for transfer or guest courses ONLY that are not equivalent to existing Kettering University Mechanical Engineering courses.
Lecture: 4, Lab 0, Other 0

MECH-210 Statics 4 Credits
Corequisites: MATH-102, PHYS-114, PHYS-115
Prerequisites: MATH-101 or MATH-101X
This course deals with a discussion and application of the following fundamental concepts: (1) static force analysis of particles, rigid bodies, plane trusses, frames, and machines; (2) first and second moments of area; (3) friction; (4) internal forces; and (5) stress deflection analysis of axially loaded members. Topics covered will be (1) the static force and moment equilibrium of two and three dimensional systems; (2) resultant forces and moments due to the application of concentrated and/or distributed loads; (3) couples; (4) the center of mass and the area moment of inertia of a rigid body; (5) shear force and bending moment diagrams of a rigid body; and (6) the stress and deflection analyses of axially loaded members. Free body diagrams will be formulated in a computer-aided environment in order to enhance the students' critical thinking and problem solving capabilities. Several open-ended homework and mini projects will be assigned in order to incorporate a design experience in the course.
Lecture: 4, Lab 0, Other 0

MECH-212 Mechanics of Materials 4 Credits
Prerequisites: MECH-210
The fundamental topics of this course include: normal and shear stress and strain, Hooke's law, Poisson's ratio, generalized Hooke's law, axial translation, torsion of circular bars, angle of twist, bending of beams, flexure formula, flexural shear stress, beam deflections, combined stresses, transformation of stresses, Mohr's circle, statically indeterminate problems, columns. The use of basic computational tools will be introduced at the end of several lecture modules including: axial loading, torsional loading, and flexural loading. Homework and design projects will be assigned.
Lecture: 4, Lab 0, Other 0

MECH-231L Signals for Mechanical Systems Lab 1 Credits
Corequisites: EE-212
Prerequisites: None
This lab complements the electrical engineering course, EE-212, and provides the necessary knowledge and skills of electrical engineering to non-electrical engineering majors. It teaches students how to use sensors and instruments to make meaningful measurements in mechanical and electrical engineering systems. This lab course introduces students to: (1) the laws and methods of circuit analysis (2) sensors used in measurements of displacement, temperature, strain and fuel cell systems and (3) the amplifiers and other instrumentation used to process the signals from these sensors.
Lecture: 0, Lab 2, Other 0

MECH-300 Computer Aided Engineering 4 Credits
Prerequisites: MECH-100 and MECH-212
This is a threaded continuation of MECH-100, Engineering Graphical Communication using computer graphics and computer aided design techniques. These advanced techniques use graphics primitives, construction functions, transformations, image control, dimensioning and layers. Both two-dimensional drawings and three-dimensional wireframe, surface modeling, and simulation modeling such as FEA and kinematic motion are covered.
Lecture: 4, Lab 0, Other 0

MECH-307 Materials Engineering 4 Credits
Prerequisites: (CHEM-135 or CHEM-137) and CHEM-136
This course will develop the skills of identifying appropriate materials for a given design by considering mechanical properties which are based on experimental data. The manner in which processing can be used to engineer a material for specific applications will be explored. The mechanical performance of materials will be assessed by comparing a range of properties; strength, modulus, Poisson's ration, coefficient of thermal expansion, ductility, toughness, corrosivity, and others. Students will learn which properties can and cannot be engineered to meet a specific need via alloying and/or heat treating.
Lecture: 4, Lab 0, Other 0

MECH-310 Dynamics 4 Credits
Prerequisites: MECH-210 and PHYS-114 and PHYS-115 and (MATH-102 or MATH-102X or MATH-102H)
This course deals with a discussion and application of the following fundamental concepts: (1) application and basics of Newtonian mechanics and physical laws; (2) a study of the kinematics and kinetics of a particle including relative and absolute motion, friction concepts; (3) additional analysis of particle dynamics using work-energy and impulse-momentum methods, analysis of impact events; (4) analysis of a system of particle using work-energy, impulse, linear and angular momentum; (5) kinematics and kinetics of a rigid bodies analyzed in various reference systems; (6) additional analysis of rigid body dynamics using work-energy and impulse-momentum; (7) inertia quantities. Computational techniques will be incorporated into several design projects throughout the semester to illustrate alternative solution methods.
Lecture: 4, Lab 0, Other 0

MECH-311 Introduction to Mechanical System Design 4 Credits
Corequisites: EE-212, MECH-231L
Prerequisites: MECH-100 and MECH-210
The objective of the course is to teach fundamentals of machine elements and mechatronics design, with an emphasis on product design and fabrication. Design, analysis and fabrication of prototype mechatronic systems and devices are completed. Mechanical designs concepts including transmission methods, force and torque analysis, mechanisms and simulation is covered. Formal design processes such as brainstorming and concept-tree development are utilized. Intellectual property law pertinent to design and invention is covered. The synergistic combination of sensors, actuators and controls technologies to create functionally "smart" and adaptive devices is implemented. Sensors and actuator technologies are covered. The course culminates with an open-ended project to design and fabricate a mechatronic system using basic machining equipment and a programmable controller.
Lecture: 2, Lab 4, Other 0

MECH-312 Mechanical Component Design I 4 Credits
Prerequisites: MECH-212
This course involves application of theory and techniques learned in the mechanics courses to the concepts of mechanical component design. Through lectures and class example and homework problems the student will be introduced to design methodology. This methodology requires learning to develop and set-up a mechanical component design problem, through properly understanding and solving the problem based upon the given data, design constraints, making and verifying assumptions. Selection of the proper analytical tools as required, producibility and maintainability of the design, materials selection, safety, and cost considerations. Take-home project problems will enhance and demonstrate the type of study and research required for design. Topics to be studied include strength and fatigue considerations, shaft design, threaded fasteners, lubrication and bearings, springs, and fundamentals of gear analysis, including forces, stresses and terminology.
Lecture: 4, Lab 0, Other 0

MECH-320 Thermodynamics 4 Credits
Prerequisites: PHYS-224 and PHYS-225
A study of the first and second laws of thermodynamics and their application to energy transformations during various processes. Property relations are studied for pure substances, ideal gases, mixture of ideal gases, and atmospheric air. Steam power cycles, refrigeration cycles, spark-ignition and compression-ignition engines, and turbine cycles are evaluated to determine performance parameters and energy efficiencies.
Lecture: 4, Lab 0, Other 0

MECH-322 Fluid Mechanics 4 Credits
Prerequisites: MECH-320
This is a first course in Fluid Mechanics that involves the study of fluid flow in ducts and over objects. The course introduces the fundamental aspects of fluid motion, fluid properties, flow regimes, pressure variations, fluid kinematics, and methods of flow description and analysis. Presents the conservation laws in their differential and integral forms, and their use in analyzing and solving fluid flow problems. In addition, the concept of using similitude and dimensional analysis for organizing test data and for planning experiments is introduced. The effects of fluid friction on pressure and velocity distributions are also discussed. The effects of compressibility (various density) on fluid flows are also included.
Lecture: 4, Lab 0, Other 0

MECH-330 Dynamic Systems with Vibrations 3 Credits
Corequisites: EE-212, MATH-305, MECH-331
Prerequisites: (MATH-204 or MATH-204H) and MECH-310
This is the first course in System Dynamics. The objective of this course is to provide an understanding into basic principles and methods underlying the time domain, dynamic characterization of physical systems and components. The focus is on a multi-discipline approach. Construction of mathematical models of systems using energy, power Bond-graph, and state space models is emphasized. Application of modeling techniques to understanding the behavior of free vibration (damped and undamped), forced vibration for harmonic excitation, and systems involving multi-degrees of freedom will be discussed. MECH-331 must be taken concurrently (or previously passed) with this course.
Lecture: 3, Lab 0, Other 0

MECH-331 Dynamic Sys w Vibrations Lab 1 Credits
Corequisites: EE-212, MATH-305, MECH-330
Prerequisites: (MATH-204 or MATH-204H) and MECH-310
MECH-330 with MECH-331 is the first course in System Dynamics. MECH-331 provides an understanding into basic principles and methods underlying the development and analysis of mathematical models in the time domain. Construction of mathematical models of systems using MATLAB and Simulink is emphasized. Application of modeling techniques, design characteristics and analysis of first and second order systems is stressed. MECH-330 must be taken concurrently (or previously passed) with this course.
Lecture: 0, Lab 1, Other 0

MECH-350 Introduction to Bioengineering Applications 4 Credits
Prerequisites: MECH-210
This course deals with a discussion and application of the following fundamental concepts: (1) basic anatomy and physiology of the overall human body; (2) basic anatomy and physiology of specific structures including brain, ear, eyes, heart, kidney, gastro-intestinal system, articular joints, and bones; (3) an appreciation of the engineering basis for current and developmental products designed to diagnose and replace these biological structures; (4) exposure to biochemistry, biomaterials, and biomechanics at a fundamental level; and (5) an understanding of current laws which govern bioengineering device manufacturing. A semester project will require the student to rigorously research an existing product or emerging technology of relevance to bioengineering and the human body.
Lecture: 4, Lab 0, Other 0

MECH-397 MECH Free Elective 4 Credits
Prerequisites: None
This is a Mechanical Engineering course used to record credit for transfer or guest courses ONLY that are not equivalent to existing Kettering University Mechanical Engineering courses.
Lecture: 4, Lab 0, Other 0

MECH-412 Mechanical Component Design II 4 Credits
Prerequisites: MECH-307 and MECH-312
This course is an extension of MECH-312, Mechanical Component Design I. Topics to be studied will include wear and contact stress analysis, helical and bevel gear systems, impact analysis, temperature effects in design, introduction to fracture mechanics, code based design, welded connections, and topics selected by the students. Course work will consist of lectures plus, the students will perform research on these topics and provide written and oral reports, including examples.
Lecture: 4, Lab 0, Other 0

MECH-413 Mechanical Systems Design Project 4 Credits
Prerequisites: MECH-307 and MECH-300 and MECH-312
The fundamental topics of this course include: The engineering design process, ethics, teamwork, brainstorming, conceptual designs, proposal writing, project planning, project management, product attributes, design criteria, engineering targets, physical simulation, virtual simulation, analysis techniques, design synthesis, alternative designs, bill of materials, bill of process, manufacturability, product variations, product quality, design reports and presentations. Note: Satisfies ME Senior Design Project requirement.
Lecture: 4, Lab 0, Other 0

MECH-414 Experimental Mechanics 4 Credits
Prerequisites: MECH-307 and MECH-312
The primary purpose of this course is to provide fundamental knowledge in the theory and practical experience in the application of mechanical engineering measurements. Viewed as a system, consideration is given to the performance, limitations, and cost of the detection - transducing stage, the signal conditioning stage and the final termination or readout – recording stage. Sensors such as resistive, capacitive or inductive are considered for the transducing stage. Signal conditioning stage emphasizes the use of a Wheatstone Bridge circuit, operational amplifiers and digital processing. The final readout or termination stage considers visual readouts such as analog or digital meters, charts or scopes in addition to memory devices such as computer hard drives and microprocessors. Nearly 2/3 of the time is spent on an approved team project that produces experimental measurements, which adds knowledge or understanding to some theoretical concepts or rhetorical inquiry. Course is structured so as to qualify as a capstone for cognate mechanical engineering students. Others may use it as a technical elective.
Lecture: 2, Lab 0, Other 4

MECH-416 Introduction to Finite Element Analysis with Structural Applications 4 Credits
Prerequisites: None
The main objective of this course is to introduce the theory of Finite Element Method with applications to simple and real-world structural components. Both 1-D and 2-D formulations will be presented and discussed. Commercial F.E.A. codes such as NX, ANSYS and/or other software will be integrated to enhance the understanding of the theory presented. Other engineering and math software application programs such as MATLAB/Maple will also be used. Several practical design projects will be assigned during the term of this course.
Lecture: 4, Lab 0, Other 0

MECH-420 Heat Transfer 4 Credits
Prerequisites: MECH-320 and MECH-322
This course addresses the principles of heat transfer by conduction, convection, radiation and energy conservation, fins, steady-state and transient problems, and analysis and selection of heat exchangers.
Lecture: 4, Lab 0, Other 0

MECH-421 Energy and Environmental System Design 4 Credits
Corequisites: MECH-422
Prerequisites: MECH-300 and MECH-307 and MECH-312 and MECH-420
Minimum Class Standing: Senior
The objective of this course is to provide a comprehensive capstone design experience in the engineering and design of energy systems. Students will work in design teams to complete the design of an energy efficient and environmentally friendly system for use in a residential or commercial building, a power plant, or any other system that requires energy. The course covers one or more of the following energy sources or energy conversion devices: fossil, solar, wind, tidal, hydro, wave, biomass, geothermal, alternative fuels, or fuel cells.
Lecture: 4, Lab 0, Other 0

MECH-422 Energy Systems Laboratory 4 Credits
Corequisites: MECH-420
Prerequisites: MECH-320 and MECH-322
A laboratory course dealing with the detailed application of the first and second laws of thermodynamics; continuity, momentum, and energy equations; and principles of conduction, and convection to a variety of energy systems. Topics such as internal and external flows, refrigeration, psychrometrics, aerodynamic lift and drag, pump and fan performance, compressible flow and shock waves, free and forced convection, and heat exchangers are covered. Computational fluid dynamics (CFD), automatic data acquisition, flow visualization, and a design experience are incorporated into various laboratory experiments.
Lecture: 2, Lab 4, Other 0

MECH-426 Fuel Cell Science and Engineering 4 Credits
Prerequisites: CHEM-135 and CHEM-136 and MECH-322
The objectives of this course are to introduce the students to and provide an extensive experience in the engineering and design of fuel cell devices. The course lecture will cover the five main types of fuel cells and their operational parameters and applications, efficiency and open circuit voltages. Other topics include: fuel cell systems, compressors, turbines, fans, blowers, pumps, DC voltage regulation and voltage conversion, fuels for fuel cells and methods of processing. Codes and standards of operating a fuel cell powered device will be presented as well as laws regulating the transportation of hazardous materials contained within these devices. Students will also study the design requirements for the introduction of fuel cells into various devices such as: golf-cart, bicycles, laptops, toys, road signs, etc. The lecture is supported with laboratory experiences.
Lecture: 4, Lab 0, Other 0

MECH-427 Energy and the Environment 4 Credits
Prerequisites: None
This course covers energy conversion and conservation, fossil fuels, renewable and bio-fuels, solar, geothermal and nuclear energy, alternative energy (wind, water, biomass), hydrogen as an energy carrier, historical context of the technology, the role of energy in society (economic, ethical, and environmental considerations), energy forecasts and the trend toward a hydrogen economy. Public policy, global warming and Co2 footprints and offsetting are also discussed.
Lecture: 4, Lab 0, Other 0

MECH-428 Bio and Renewable Energy 4 Credits
Prerequisites: PHYS-114 and PHYS-115
This course provides an opportunity for the students to study bio and renewable energy and their applications around the globe. The students also perform hands-on experiments in several areas of sustainable energy. The fundamental principles required will be provided prior to laboratory experimentation. Topics covered include bur are not limited to solar thermal energy and photovoltaics, wind energy, energy storage, bioenergy used for power, transportation and heating, PEM fuel cells, and alternative energy vehicles.
Lecture: 3, Lab 1, Other 0

MECH-430 Dynamic Systems with Controls 3 Credits
Corequisites: MECH-431
Prerequisites: MECH-330 and MECH-331 and MATH-305
This is the second course in System Dynamics. The objective of this course is to build upon previous knowledge of multi-discipline system modeling to understand basic principles and design methods underlying steady-state and dynamic analysis of control systems. Construction of higher-order mathematical models of systems using Bond-graphs, block diagrams and development of transfer functions and state space models are used to model the plant (system being controlled). System performance is analyzed in both time and frequency domains using computer simulation. Classical control system design with both feed-forward and feedback configurations are emphasized. Introduction to advanced topics in control systems are also provided. MECH-431 must be taken concurrently (or previously passed) with this course.
Lecture: 3, Lab 0, Other 0

MECH-431 Dynamic Systems with Controls Lab 1 Credits
Corequisites: MECH-430
Prerequisites: MECH-330 and MECH-331 and MATH-305
MECH-430 and MECH-431 combined are a second course in System Dynamics. MECH-431 provides an understanding of time and frequency domain analysis of mathematical models. Simulation and analysis of mathematical models using MATLAB and Simulink are emphasized. Mathematical model validation is explored using hardware (e.g. DC Motors). Control system design and verification are explored using simulation and hardware (e.g. DC Motors). MECH-430 must be taken concurrently (or previously passed) with this course.
Lecture: 0, Lab 1, Other 0

MECH-440 Introduction to Internal Combustion Engines 4 Credits
Prerequisites: MECH-320
This course introduces the basic fundamentals of internal combustion engines and their operation. Topics covered include thermodynamic analysis of 4-stroke and 2-stroke cycles, spark ignition and compression ignition engines, intake systems, exhaust systems, fuel injection and moisture preparation, combustion, emissions, slider crank mechanism, vibrations, engine testing, and engine design. Recent technologies such as variable valve timing and lift, variable compression ratio, gasoline direct injection, homogeneous-charge compression ignition, turbocharging and supercharging of engines are also presented.
Lecture: 4, Lab 0, Other 0

MECH-441 Advanced Automotive Power Systems 4 Credits
Prerequisites: MECH-320
This course serves to expand student's knowledge of automotive power systems. Topics covered include, detailed thermodynamic cycle analysis of various power cycles, emerging alternative fuels and power systems for automotive use (current topics include high-blend alcohol/gasoline fuels, gasoline direct injections (GDI) engines, hybrid electronic Powertrains, and fuel-cells). Students are also expected to work on design projects which are determined by the instructor. Students are expected to work on projects leading to the development of presentations and/or technical papers for professional society meetings (i.e. SAE, Global Powertrain Congress, etc.).
Lecture: 4, Lab 0, Other 0

MECH-442 Chassis Systems 4 Credits
Prerequisites: MECH-330
The objective of this course is to provide a comprehensive experience in the area of automotive chassis engineering. The course covers tires, suspensions and steering. A vehicle system approach is used for learning. Vehicle dynamics concepts and improvement approaches are integrated into the course content. Professional computer-aided engineering tools are introduced (e.g. CarSim, SuspensionSim) and applied to the areas of suspension analysis and overall vehicle dynamics performance. Students work in teams to complete a chassis design project applicable to passenger cars or light trucks.
Lecture: 4, Lab 0, Other 0

MECH-444 Introduction to Automotive Powertrains 4 Credits
Corequisites: MECH-311
Prerequisites: MECH-212
An introduction to the performance of motor vehicle and the design of automotive power transmission systems. Topics covered include, loads on the vehicle, evaluation of various engine and vehicle drive ratios on acceleration performance and fuel economy, manual transmission design, and automatic transmission design.
Lecture: 4, Lab 0, Other 0

MECH-445 Hybrid Electric Vehicle Propulsion 4 Credits
Corequisites: MECH-430, MECH-431
Prerequisites: None
An introduction to the principles of hybrid electrical vehicle propulsion systems for Mechanical and Electrical Engineering students. A major emphasis of the course will be to broaden the mechanical engineering student's knowledge of electrical engineering so that he/she can understand the fundamentals of electrical motors, electrical motor controls, and electrical energy storage systems. The course is also intended to strengthen the knowledge of electrical engineering students relative to automotive powertrain design. With this background, the integration of these hybrid electric components into the hybrid electric vehicle powertrain system will be studied, including electric energy storage (batteries, flywheels, ultra-capacitors) and electrical energy production-fuel cells. Relevant codes and standards will be emphasized.
Lecture: 4, Lab 0, Other 0

MECH-446 Vehicle Systems Dynamics 4 Credits
Prerequisites: MECH-330
This course begins with an introduction to vehicle weight distribution and tire patch forces. Acceleration, braking, ride and handling concepts follow. Mathematical models for ride and handling are derived and presented. Chassis design factors (CDF) effects on ride and handling are emphasized. Computer simulation software (e.g. CarSim) is used as an integral part of the course and for projects assigned during the term. Overview of technology and latest developments in the field of vehicle dynamics (e.g. SAE publications) are part of the course.
Lecture: 4, Lab 0, Other 0

MECH-448 Vehicle Design Project 4 Credits
Prerequisites: MECH-300 and MECH-320 and MECH-330
Minimum Class Standing: Senior
This course provides an engineering project experience that is representative of automotive industry projects, except it is scaled down such that it can be performed in one school term. The project begins with setting specific and measurable goals in a project statement. This is followed by researching and brainstorming, producing design alternatives, selecting concepts, and developing and analyzing concepts. Project updates are required throughout the course. A mid-term and final oral presentation are mandatory, along with the submission of a final written report. This course satisfies the ME Senior Design Project requirement.
Lecture: 4, Lab 0, Other 0

MECH-450 Automotive Bioengineering: Occupant Protection and Safety 4 Credits
Prerequisites: MECH-310
A discussion and application of the following fundamental concepts: (1) an overview of Federal Motor Vehicle Safety Standards; (2) basic anatomy and physiology of the overall human body; (3) introduction to injury biomechanics including rate, load, and acceleration dependent injury mechanisms; (4) overview of injury prevention strategies including a variety of air bags, multipoint restraint systems, and occupant sensing methodologies; (5) the basic structure and function of anthropomorphic test devices; (6) introduction to experimental crash simulation; (7) virtual occupant simulation using MADYMO or similar computational tools.
Lecture: 4, Lab 0, Other 0

MECH-451 Vehicular Crash Dynamics and Accident Reconstruction 4 Credits
Prerequisites: MECH-310
A discussion and application of the following fundamental concepts: (1) 2D and 3D dynamics of vehicular crash, (2) application of linear and angular momentum principles to vehicular impact, (3) application of energy principle to vehicular impact, (4) estimation of crash energy from vehicular crush profile, (5) vehicular crash pulse analysis, (6) occupant kinematics, (7) dynamics of rollover and pole collision, (8) crash data recorder (CDR) analysis, (9) and special topics in accident investigation forensics.
Lecture: 4, Lab 0, Other 0

MECH-454 Bioengineering Applications Project 4 Credits
Prerequisites: MECH-300 and MECH-307 and MECH-310 and MECH-312 and MECH-350
Minimum Class Standing: Senior
A comprehensive design experience focusing on a project with direct application to the bioengineering field. The course emphasizes the steps of a typical design process (problem identification, research, and concept generation) culminating in a documentation of the preferred embodiment of the design concept. The conceptual design will then be further developed through the application of sound engineering analysis and tools. Note: Satisfies ME Senior Design Project requirement.
Lecture: 4, Lab 0, Other 0

MECH-472 CAD/CAM/CAE & Additive Manufacturing Capstone Design 4 Credits
Prerequisites: MECH-300
Capstone design project course in which students acquire an integrating experience leading them from CAD of a part (designed using sculptured surface and solid modeling techniques), through rapid prototyping of that part (using FFF) and into mold or die design and manufacture (using CAD/CAM/CAE system such as Siemens NX). This course can be used as a ME Elective or Free Elective if another ME capstone course is completed.
Lecture: 4, Lab 0, Other 0

MECH-482 Mechanics and Design Simulation of Fiber-Reinforced Composite Materials 4 Credits
Prerequisites: MECH-300
The properties, mechanics, and design simulation aspects of fiber-reinforced composite materials are covered in this course. Topics include: constituents and interfacial bonding, microstructure and micromechanics, theory of anisotropy, classical laminate theory, material characterization, failure and damage, manufacturing techniques, composite structure design, and introduction of nanocomposite.
Lecture: 4, Lab 0, Other 0

MECH-490 Fluid Power Systems 4 Credits
Corequisites: MECH-312
Prerequisites: MECH-300
This course begins with basic hydraulics circuits followed by the sizing and control of hydraulic cylinders and motors. Prime movers are introduced and matched to system requirements. Valves are described while circuit tracing and component recognition are emphasized. The course also addresses air consumption, pneumatic component sizing and ladder logic. There will be limited consideration of hydraulic servo and two design projects.
Lecture: 4, Lab 2, Other 0

MECH-498 Mechanical Eng Study Abroad 4 Credits
Prerequisites: None
Advanced Topics in Mechanical Engineering. This is a transfer course taken a part of Kettering's Study Abroad Program.
Lecture: 4, Lab 0, Other 0

MECH-510 Analysis and Design of Machines and Mechanical Assemblies 4 Credits
Corequisites: MECH-330
Prerequisites: MECH-300 and MECH-310 and MECH-312
The main aim of this course is to integrate the concepts of kinematic & dynamic analyses to the design of machines and mechanical assemblies used in automotive, medical equipment and other applications. These include (but are not limited to) the analysis and design of reciprocating engine sub-systems such as, piston cylinder mechanism, steering linkages, window and door-lock mechanisms, over-head valve linkage system, flywheel, gears & gearboxes, universal couplings and automotive differential. Synthesis of mechanism systems used in medical equipment area will also be covered. Kinematic and dynamic characteristics such as displacement, velocity, acceleration and forces are analyzed by graphical and analytical methods. CAE tools will be used to perform kinematic, dynamic and stress analyses and fatigue design of these systems using CAE tools. Temperature effects will also be included wherever appropriate in the design. Several practical design projects will be assigned during the term of this course.
Lecture: 4, Lab 0, Other 0

MECH-515 Failure and Material Considerations in Design 4 Credits
Corequisites: MECH-412
Prerequisites: None
Designing components that are safe and reliable requires efficient use of materials and assurance that failure will not occur. Even still, components do fail. In this course, students will be introduced to the techniques of designing for life and material considerations involved in that process. In addition, students will also study how to analyze those components which do fail, and evaluate safe-life and remaining life in a design through the study of real-life component design and current failures.
Lecture: 4, Lab 0, Other 0

MECH-523 Applied Computational Fluid Dynamics 4 Credits
Prerequisites: MECH-322 and (MATH-313 or MATH-418 or MATH-423)
This course includes solution methods to the Navier-Stokes equations in a discrete domain. Grid generation, coordinate transformation, discretization, explicit, implicit, semi-implicit, a variety of algorithms, post-processing, and interpretations of results are discussed. Solution techniques for compressible and incompressible flows, their applicability, robustness, and limitations are covered. External and internal flows with and without chemical reactions are also discussed. The learning process involves hands-on experience on grid generation, setting up a CFD code, post-processing, and a thorough discussion on the results. The students will work on a final project that is a practical problem of significant magnitude and importance to industry. This work must be publishable in the student's journal or presentable in a conference.
Lecture: 4, Lab 0, Other 0

MECH-525 Introduction to Multiphysics Modeling and Simulation in Fluid Mechanics and Heat Transfer 4 Credits
Prerequisites: MECH-322 and MECH-420
This course solves a variety of engineering problems with the aid of computational software mainly in the field of fluid mechanics and heat transfer. Pipe flow, incompressible flow, laminar and turbulent flow, drag, and lift are subjects covered during the first part of the course. In the second part, topics in heat transfer are used uch as conduction in solids, fin design, convection, heat exchangers, and radiation. In a third part, selected topics in electrical conductive media and reaction engineering are also covered. This course compliments MECH-322 and MECH-420 and could be considered an extension of the two courses where problems are solved in 2D and 3D using computational software. Different types of meshes will be discussed, post-processing of data will be analyzed through graphical techniques, and graphical results will be compared to well-known analytical solutions. Students will also complete a final project where both fluid mechanics and heat transfer physics will be used to solve practical engineering problems.
Lecture: 4, Lab 0, Other 0

MECH-562 Compressible Flow/Gas Dynamics 4 Credits
Prerequisites: MECH-322
The derivation and physical interpretation of the Navier-Stokes equations for compressible flows. Analysis of one-dimensional flows with discussions on normal, oblique, and bow shocks. Sound waves and unsteady wave motion are also covered. The method of characteristic (MOC) is taught and standard JANNAF CFD codes is utilized to understand the compressible flows and shock formation and behavior. The study is then further carried out to nozzle flows and jet/shock layer interaction. The students are required to not only understand the conventional methods used to obtain solution for compressible flow problems, but also to be able to utilize CFD and experimental methods to obtain solution for complex problems.
Lecture: 3, Lab 2, Other 0

MECH-564 Aerodynamics and Wing Theory 4 Credits
Prerequisites: MECH-322 and (MATH-305 or MECH-600)
Discussions on fundamentals of inviscid and viscous incompressible flows. Important topics in fluid mechanics such as potential flow, vortices, point sources, and coupling of inviscid and boundary layer flows are covered. Two and three dimensional wings (or airfoils) and some exact solutions to such flow problems are discussed. Semi-analytical methods for disturbance distribution on wings are introduced by perturbation method. The computational Panel method for two and three dimensional aerodynamics problems is discussed. Commercial computer programs are used to solve realistic problems in a three dimensional space.
Lecture: 4, Lab 0, Other 0

MECH-595 Automotive Seminar I 4 Credits
Prerequisites: None
Kettering has a partnership with the Society of Automotive Engineers (SAE) to offer both a certificate in Automotive Systems, as well as, a graduate degree in either Automotive Systems or the Mechanical Cognate. This seminar course would be comprised of a total of four Continuing Education Units (CEU) from SAE seminars, which have been reviewed and approved by a faculty review committee, consistent with Graduate academic policy. The transfer of credit must be supported by documentation from SAE for each individual applicant seeking such transfer.
Lecture: 4, Lab 0, Other 0

MECH-596 Automotive Seminar II 4 Credits
Prerequisites: None
Kettering has a partnership with the Society of Automotive Engineers (SAE) to offer both a certificate in Automotive Systems, as well as, a graduate degree in either Automotive Systems or the Mechanical Cognate. This seminar course would be comprised of a total of four Continuing Education Units (CEU) from SAE seminars, which have been reviewed and approved by a faculty review committee, consistent with Graduate academic policy. The transfer of credit must be supported by documentation from SAE for each individual applicant seeking such transfer.
Lecture: 4, Lab 0, Other 0

Medical (MEDI)

MEDI-221 Elements of Medical Scribing 2 Credits
Prerequisites: None
An introduction to medical scribing. This course will cover topics including: the rationale for the medical scribe, the role of EMR with regard to reimbursements and the delivery of quality care. Basic aspects of the History and Physical exam for common healthcare problems will be presented as well as issues related to patient safety and confidentiality.
Lecture: 2, Lab 0, Other 0

Management (MGMT)

MGMT-101 Introduction to Applied Management 4 Credits
Prerequisites: None
Students will learn about the basic functions of management (leading, planning, organizing and monitoring) through application of team-based projects. The course serves to introduce students to focused teamwork, project management and systems analysis tools that will be revisited in later courses.
Lecture: 4, Lab 0, Other 0

MGMT-104 Management Concepts 4 Credits
Prerequisites: None
The art and science of management is introduced and examined through multiple perspectives within a global and ethical context. An examination of the functions of a manager (to plan, organize, lead, and evaluate) builds upon the elements of organizational theory and behavioral sciences, leading to topics in motivation and leadership. Principles of organizational structure and design and the importance of management in dealing with the complexity of modern organizations will be emphasized.
Lecture: 4, Lab 0, Other 0

MGMT-205 Organizational Behavior 4 Credits
Prerequisites: MGMT-104
This course provides an overview of human behavior in the organizational context. Topics will include coverage of individual behavior, behavior in organizations, diversity, organizational culture, organizing in an international context, working in teams, and working in organizations.
Lecture: 4, Lab 0, Other 0

MGMT-313 Marketing Research 4 Credits
Prerequisites: BUSN-103 and BUSN-271
Students will learn about connecting business to consumers, with an emphasis on analyzing consumer desires and needs to guide management decisions related to product design and realization. Students will also learn about researching markets, market segmentation, consumer behavior, and how these concerns relate to marketing strategy.
Lecture: 4, Lab 0, Other 0

MGMT-314 Financial Statement Analysis 4 Credits
Prerequisites: BUSN-222 and BUSN-331
This course is designed to prepare students to interpret and analyze financial statements for tasks such as risk assessment, lending and investment decisions, forecasting, and decision-making. The course will include both quantitative tools to use and qualitative factors to consider in evaluating the firm's financial statements.
Lecture: 4, Lab 0, Other 0

MGMT-315 Operations and Supply Chain Management 4 Credits
Prerequisites: BUSN-222 and BUSN-271 and MGMT-104
This course is designed to provide students with an overview of managing operations processes both within the organization and across organizational boundaries in order to create new value for the end customer of the supply chain. Course content will include inbound materials management, service procurement, production processes and outbound distribution.
Lecture: 4, Lab 0, Other 0

MGMT-391 Management Special Topics 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

MGMT-398 European Bus Law-Study Abroad 4 Credits
Prerequisites: None
Lecture: 0, Lab 0, Other 0

MGMT-419 Project Management 4 Credits
Prerequisites: None
Minimum Class Standing: Junior
This course covers managing projects within an organizational context, including the processes related to initiating, planning, executing, controlling, reporting, and closing a project. Concepts such as project integration, scope, time, cost, quality control, and risk management are highlighted. Identifying project champions, working with user teams, training, and documentation are key concepts of project management that are detailed in the course.
Lecture: 4, Lab 0, Other 0

MGMT-423 Data Analytics 4 Credits
Prerequisites: BUSN-271
Minimum Class Standing: Senior
The rise of big data and machine learning has transformed the business world. In fact, these tectonic shifts in the business landscape are labeled as the fourth industrial revolution. Data is the new oil, creating enormous wealth and opportunity for businesses. This course will introduce the strategic importance and applications of these new Artificial Intelligence (AI) technologies. This is a hands-on learning course focusing on developing skills in using the Python language for data cleaning, exploration and modeling. The overarching aim is to provide a strong start towards developing skills that will eventually lead towards becoming an accomplished data scientist, who understands and is able to apply these skills towards achieving organizational competitive advantage.
Lecture: 4, Lab 0, Other 0

MGMT-424 Data Visualization 4 Credits
Prerequisites: CS-101
Minimum Class Standing: Senior
This course encompasses the principles, techniques, aesthetics, and applications of data visualization. Starting with development of the basics of computer programming for visualization, the students learn methods to develop effective univariate, multivariate, and high dimensional data visualizations. The course also covers geographic and text-based visualization techniques. The course uses the highly demanded Python-based packages: Matplotlib, Seaborn, and Plotly. Students will also develop skills in using the grammar of graphics approach encapsulated in ggplot.
Lecture: 4, Lab 0, Other 0

MGMT-425 Digital Strategy and Competitive Advantage 4 Credits
Prerequisites: None
Minimum Class Standing: Senior
This course is the intersection of strategic management with data-science. Cases and simulations are used to examine how firms use strategy and data-science to build competitive advantage. The course explores the strategy and dynamics of Artificial Intelligence (AI) based firms. It also brings the perspectives of practicing data-scientists and expands on their roles in reshaping the competitive landscape of their industries.
Lecture: 4, Lab 0, Other 0

MGMT-465 Strategic Management 4 Credits
Prerequisites: None
Students will learn how to apply a holistic perspective to analyzing and positioning organizations and business units for competitive advantage. The focus of the course will be on a systemic approach to management decisions that foster organizational success.
Lecture: 4, Lab 0, Other 0

MGMT-479 Leadership 4 Credits
Prerequisites: None
A comprehensive examination of different leadership theories and models along with leadership development emphasizing relevant empirical evidence and application of these constructs to case studies that involve leadership and group functioning. Additionally, process of decision-making in a variety of leadership settings will be introduced, including the processes of leading independently or with direct authority. The distinction between leadership and management, crucial role of leadership when managing groups and teams, and the importance of ethical conduct and persuasion in effective leadership are covered.
Lecture: 4, Lab 0, Other 0

MGMT-484 Business Consulting Project 4 Credits
Prerequisites: MGMT-465
Minimum Class Standing: Senior
This is the capstone course for the Management Major and is designed to provide students with practical, hands-on experience consulting with organizational leadership. This course will require extensive field work. The course will revolve around a single consulting project. Working with the principals of the organization, students will be responsible for gaining a strong understanding of the issues, and related relevant factors associated with improving organizational performance. Students will be required to offer a workable plan to address the issues that are identified over the course of the project.
Lecture: 4, Lab 0, Other 0

MGMT-510 Foundations of Business 4 Credits
Prerequisites: None
This course provides the prerequisite knowledge necessary for studying management in a graduate program. Students are introduced to both a theoretical understanding, and practical application, of concepts in the disciplines of management, marketing, accounting, finance, economics, and statistics. Through readings, videos, discussion questions, and assignments, students are introduced to basic content from each topic area, as well as APA writing style, in preparation for entry into a graduate management program.
Lecture: 4, Lab 0, Other 0

MGMT-521 Statistical and Quantitative Methods for Managerial Decision 4 Credits
Prerequisites: None
Learn about the principles and techniques for collecting, analyzing, interpreting, and communicating information based on data. Data analysis emphasizes the fundamentals behind designing data collection strategies that lead to useful information for problem solving and process and product improvements. Data analysis techniques include descriptive statistics, basic hypothesis testing, experimental design, and regression analysis. Use of a statistical software will be made to illustrate important data analysis concepts with a focus on understanding the computer output. The project requirement is expected to enable students to apply the data analysis concepts learned in the class. In summary, this course will assist the students to become knowledgeable consumers of data analysis, its applications and limitations.
Lecture: 3, Lab 0, Other 1

MGMT-550 Mgmt Concepts and Applications 2 Credits
Prerequisites: None
Both the art and the science of management will be introduced and examined through multiple perspectives within a global and ethical context. An examination of the functions of a manager builds upon the elements of organizational and behavioral theory. Principles of organizational structure and design will also be discussed. The importance of management in dealing with the complexity of modern organizations will be emphasized throughout.
Lecture: 2, Lab 0, Other 0

Philosophy (PHIL)

PHIL-378 Moral and Ethical Philosophy 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
A concentrated study of the origin and nature of standards of character (ethics) and behavior (morality). The history of these concepts will be explored through reading some of the standard philosophical literature. Attention will be given to the difficulties such concepts face in a world now defined by modern ideologies and institutions.
Lecture: 4, Lab 0, Other 0

PHIL-391 Philosophy Special Topics 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
An interdisciplinary advanced course focusing on a specific topic. This course is a one-time offering whose content is determined by current faculty interest, and provides a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under different topic
Lecture: 4, Lab 0, Other 0

Physics (PHYS)

PHYS-114 Newtonian Mechanics 3 Credits
Corequisites: MATH-102, PHYS-115
Prerequisites: MATH-101 or MATH-101X
A calculus-based introduction to classical Newtonian mechanics including; vectors, translational and rotational kinematics and dynamics, work, energy, impulse, and linear and angular momentum.
Lecture: 3, Lab 0, Other 1

PHYS-115 Newtonian Mechanics Laboratory 1 Credits
Corequisites: COMM-101, MATH-102, PHYS-114
Prerequisites: MATH-101 or MATH-101X
Laboratory activities will explore position, velociy, and acceleration, force, momentum and energy, all as function of time. Applications to vehicle crash safety are incorporated. Laboratory skills, including: uncertainty, simple data acquisition and sensor instrumentation, and analysis techniques are essential.
Lecture: 0, Lab 2, Other 0

PHYS-191 Physics Special Topics 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

PHYS-224 Electricity and Magnetism 3 Credits
Corequisites: MATH-203, PHYS-225
Prerequisites: PHYS-114 and PHYS-115 and (MATH-102 or MATH-102X or MATH-102H)
An investigation of the physics of electricity and magnetism with a focus on the physics of electric and magnetic fields and their effects on electric charges. Topics will include the relationships between charges, forces, fields, potentials, and currents, as well as the physics of capacitors, resistors, and inductors.
Lecture: 3, Lab 0, Other 1

PHYS-225 Electricity and Magnetism Laboratory 1 Credits
Corequisites: MATH-203, PHYS-224
Prerequisites: PHYS-114 and PHYS-115 and (MATH-102 or MATH-102X or MATH-102H)
This laboratory investigates the physics of electricity and magnetism. It includes a practical study of electric potential and electric current, as well as the fundamental circuit elements: capacitors, resistors, and inductors.
Lecture: 0, Lab 2, Other 0

PHYS-302 Vibration, Sound and Light 4 Credits
Corequisites: MATH-204
Prerequisites: PHYS-224 and PHYS-225 and (MATH-203 or MATH-203H or MATH-203X)
Minimum Class Standing: Sophomore 2
The phenomena of vibration and waves provide a fundamental background necessary to approach a wide variety of applications in physics and engineering. The first part of this course will introduce students to the basics of vibration, including the effects of real damping, response to driving forces, nonlinear oscillation and application to several acoustical, optical, electrical, and mechanical systems. After this introduction to vibration, the course will focus on wave motion. The behavior of non-dispersive waves in solids, acoustic sound waves, electromagnetic waves, and transverse waves on a string will be discussed along with an introduction to Fourier analysis as a means of analyzing wave signals. Non-dispersive waves in non-uniform media will also be explored with applications to several different types of waves occurring in nature. Basic wave phenomena including reflection, refraction, diffraction and interference will be discussed with respect to a variety of wave types. Students successfully completing this course will be well prepared for further study in optics, acoustics, vibration, and electromagnetic wave propagation.
Lecture: 4, Lab 0, Other 0

PHYS-354 Medical Physics Principles 4 Credits
Prerequisites: PHYS-224 and PHYS-225
Minimum Class Standing: Sophomore
This course is designed to give physicists, engineers, chemists, pre-med students, and other technical majors an introduction to the application of physics in the field of medicine. Students will be introduced to the fundamental science and real-world application of diagnostic imaging, nuclear medicine, radiation therapy, and health physics. This course will cover topics such as radiation interactions with matter, the concept of radiation dose, the effect of radiation on biology, 2D x-ray imaging, computed tomography (CT) imaging, magnetic resonance imaging (MRI), ultrasound, biomedical optics, single photon emission computed tomography (SPECT), positron emission tomography (PET), and the treatment of cancer utilizing radiation therapy.
Lecture: 4, Lab 0, Other 0

PHYS-362 Modern Physics and Lab 4 Credits
Corequisites: MATH-204
Prerequisites: PHYS-224 and PHYS-225
Minimum Class Standing: Sophomore
Overview of the discoveries and applications of physics from the early 20th century on. Topics include relativity, quantum phenomena, wave-particle duality, quantum physics, solid state physics, semiconductors and superconductors, and nuclear and particle physics. Laboratory experiments will accompany topics introduced in lecture.
Lecture: 3, Lab 2, Other 0

PHYS-376 Photonics and Optoelectronics 4 Credits
Prerequisites: (MATH-203 or MATH-203H or MATH-203X) and PHYS-224 and PHYS-225
Minimum Class Standing: Sophomore
The course is intended for all those who want to find out and understand what lasers, fiber optics, and photonic devices are all about without a reliance on rigorous mathematical treatment. This course covers the fundamental aspects of optical fibers. It also provides an introduction to integrated optic devices. Various techniques for the manipulation of laser light based on electro-optic, magneto-optic and acousto-optic effects are described. The course ends with a discussion of optical detection principles and the working of a solar cell. While the level of prerequisites and mathematical sophistication is intermediate, intense independent learning and academic maturity is expected.
Lecture: 4, Lab 0, Other 0

PHYS-378 Spectroscopy and Microscopy 4 Credits
Prerequisites: PHYS-362
Minimum Class Standing: Junior
Introduction to the spectroscopy and microscopy techniques and instrumentation most widely used in the characterization and imaging of materials, with applications to materials science, chemistry and life-sciences. The topics include optical spectroscopy instrumentation (light sources, detectors, dispersive elements and instruments) and techniques (UV-VIS, Luminescence, Atomic Emission and Absorption, FTIR and Raman), electronic spectroscopy (XPS-ESCA and Auger), mass spectroscopy (SIMS), optical microscopy, scanning and transmission electron microscopy (SEM, TEM), scanning probe microscopy (AFM, STM, MFM) and combined techniques such as fluorescence microscopy.
Lecture: 4, Lab 0, Other 0

PHYS-388 Acoustics in the Human Environment 4 Credits
Prerequisites: PHYS-224 and PHYS-225
Minimum Class Standing: Junior
This course surveys elements in acoustics that involve human factors, including the physiology of hearing, psychoacoustics and sound quality metrics, and the basic signal processing needed for these metrics. Topics in architectural and room acoustics will also explore how we experience and control our acoustic environment. While the level of prerequisites and mathematical sophistication is intermediate, intense independent learning and academic maturity is expected. Computer software will be used to manipulate audio signals and understand processing that is often automated (and used carelessly). In this course, less emphasis will be placed on technical practice that may change. Instead, students will be challenged to understand why standards are written as they are, how metrics are designed, and how “rules of thumb” originated.
Lecture: 4, Lab 0, Other 0

PHYS-397 Physics Free Elective 4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

PHYS-412 Theoretical Mechanics 4 Credits
Prerequisites: PHYS-114 and (MATH-204 or MATH-204H) and (EP-235 or MATH-305)
A look at classical physics. Topics include the projectile motion with air resistance, simple harmonic and nonlinear oscillation, central force motion, Kepler's laws and planetary motion, motion in noninertial reference frames, motion of systems of particles, rigid body motion, Lagrangian mechanics, and Hamiltonian theory. Computational methods for solving advanced physics problems will also be introduced.
Lecture: 4, Lab 0, Other 0

PHYS-452 Thermodynamics and Statistical Physics 4 Credits
Corequisites: MATH-204
Prerequisites: (MATH-203 or MATH-203H or MATH-203X) and PHYS-224 and PHYS-225 and PHYS-362
Minimum Class Standing: Sophomore 2
Introduction to statistical approaches for the analysis of systems containing a large number of particles. Specific topics include the fundamentals of thermodynamics, conditions for equilibrium and stability, ensemble theory, non-interacting systems, and phase transitions.
Lecture: 4, Lab 0, Other 0

PHYS-462 Quantum Mechanics 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and (MATH-305 or MATH-307) and PHYS-362
Minimum Class Standing: Junior
Intoduction to the fundamentals of non-relativistic quantum mechanics. Topics include: photons, matter waves, the Bohr model, the time-independent Schrodinger equation (and its application to one dimensional potentials), quantization of angular momentum, spin, the hydrogen atom, multi-electron atoms, and perturbation theory.
Lecture: 4, Lab 0, Other 0

PHYS-464 Nuclear Physics: Principles and Applications 4 Credits
Prerequisites: (CHEM-135 or CHEM-137) and PHYS-362
Minimum Class Standing: Junior
This course discusses the nuclear structure, nuclear instability, and nuclear reactions. It also covers the various detectors and instruments, including gas detectors, proportional counters, Geiger counters, scintillation detectors and particle accelerators. The biological effects of radiation and its industrial applications in tracing, gauging, materials modification, sterilizations, and food preservations are also introduced. The applications of nuclear physics for diagnosis and treatment in medical sciences including Computer Tomography (CT), Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI) and Radiation Therapy (RT). The course also discusses radioactivity, nuclear fission, fusion, and nuclear reactors. While the level of prerequisites and mathematical sophistication is intermediate, intense independent learning and academic maturity is expected.
Lecture: 4, Lab 0, Other 0

PHYS-477 Optics and Lab 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and PHYS-302
Minimum Class Standing: Junior
A study of geometrical and physical optics. Topics in geometrical optics include phenomena of reflection, refraction, total internal reflection and their application to imaging systems consisting of lenses and mirrors. Physical optics will start from the electromagnetic wave nature of light and will focus on such wave-like phenomena as optical interference, diffraction, polarization, and dispersion of light. Limited topics in interaction of light with matter, crystal optics, optical properties of materials and their applications in such areas as optoelectronics, photonics and fiber optics will also be addressed. The lab investigates optical component analysis, ray tracing, interferometry, diffraction, polarization, interference, optical fibers and other special topics.
Lecture: 3, Lab 2, Other 0

PHYS-495 Scientific Research in Physics I 2 Credits
Prerequisites: None
Minimum Class Standing: Senior 2
This initial half of the senior research experience in Physics equips the student with necessary tools for a chosen project with a faculty member. Background literature will be emphasized, including searching databases to build a thorough bibliography. Planning for the research work will involve demonstrating mastery of the necessary lab or computer skills specific to the topic. Opportunities to work with faculty advisors will be coordinated by the Physics Department Head, who will collect proposals from students interested in this course. Regardless of the topic, students will develop skills in planning, executing, and communicating research through one-on-one interaction with faculty.
Lecture: 0, Lab 4, Other 2

PHYS-496 Scientific Research in Physics II 2 Credits
Prerequisites: PHYS-495
Minimum Class Standing: Senior 2
This second half of the senior research experience in Physics allows students time to conduct, reflect upon, and communicate work done under the mentorship of a Physics faculty advisor. The prerequisite course (PHYS-495) is designed for planning and background efforts. Critical thinking and clear communication of results is emphasized. Regardless of the topic, students will develop skills in planning, executing, and communicating research through one-on-one interaction with faculty.
Lecture: 0, Lab 4, Other 2

Sociology (SOC)

SOC-331 Globalization in India and China: Comparative and Cross-Cultural Perspectives 4 Credits
Prerequisites: LS-201 or (SSCI-201 and HUMN-201)
This course will provide a broad overview of the socioeconomic, political, and cultural changes occurring in India and China-the two fastest growing economies of the world-and examine their implications for the United States. It will also introduce students to theoretical and empirical issues concerning globalization. The main objective of this course is to equip students to develop a nuanced understanding of the massive changes taking place in Asia in the context of globalization and appreciate the opportunities and challenges that come in their wake.
Lecture: 4, Lab 0, Other 0

SOC-333 Global Social Movements 4 Credits
Prerequisites: LS-201 or (HUMN-201 and SSCI-201)
One of the most exciting aspects of contemporary globalization is the emergence of a variety of transnational social movements. All over the world, civil society groups are asserting their rights concerning issues such as food security, the environment, energy, land rights, education and so on. This course will explore the main theoretical and empirical approaches to the study of social movements. It will also examine the various ways in which social movements across the globe have synergized their resources and strategies to collectively vindicate their rights. Drawing insights from major social movements in different parts of the world, this course will provide a nuanced understanding of why and how they arise and the extent to which they have been successful in accomplishing their objectives.
Lecture: 4, Lab 0, Other 0

SOC-337 Religion in Society 4 Credits
Prerequisites: (SSCI-201 and HUMN-201) or LS-201
Minimum Class Standing: Sophomore
Terms Offered: As needed
A study of the relationships between religion and society. A broad range of religious practices and beliefs selected from diverse human societies will be examined using social scientific perspectives.
Lecture: 4, Lab 0, Other 0

SOC-341 Law, Politics, and Society 4 Credits
Prerequisites: LS-201 or (HUMN-201 and SSCI-201)
This course will provide a broad overview of the myriad ways in which law, politics, and society intersect and how they influence each other. It will help students understand how laws are enacted, enforced, and adjudicated. Whose interests do law and legal institutions serve? What are the strengths and limitations of law in bringing about social change? How do social structures affect legislation and enforcement? How does the justice system deal with issues of race, class, gender, and ethnicity? Why is the justice system inaccessible to the poor? These are some of the questions that will be explored in this course. In addition, it will introduce students to the different theoretical perspectives through which socio-legal issues are understood. The main aim is to equip students with nuanced socio-legal sensibilities to comprehend and analyze complex issues of law, politics, and society.
Lecture: 4, Lab 0, Other 0

SOC-391 Sociology Special Topics 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Terms Offered: As needed
An interdisciplinary advanced course focusing on a specific topic. This course is a one-time offering whose content is determined by current faculty interest, and provides a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under different topic.
Lecture: 4, Lab 0, Other 0

Social Science (SSCI)

SSCI-310 The Flint Water Crisis 4 Credits
Prerequisites: LS-201 or (SSCI-201 and HUMN-201)
This course consists of a wide-ranging case study of the Flint Water Crisis. It examines the origins and significance of the crisis from a variety of angles, exploring questions of politics, economics, culture, science, and engineering. The course places special emphasis on the role that Flint residents themselves have played in the struggle for clean water in Flint, and on how their struggle relates to broader issues of democracy and environmental justice.
Lecture: 4, Lab 0, Other 0

SSCI-314 Technology and Sustainable Development 4 Credits
Prerequisites: (HUMN-201 and SSCI-201) or LS-201
Minimum Class Standing: Sophomore
This course explores meaningful ways in which technology projects could be used to promote sustainable development in developing countries. Students will be introduced to concepts related to both development and sustainability and to a range of economic and social contexts in which development projects are implemented at the local and national levels. The course encourages interdisciplinary approaches to issues of sustainability, appropriate technology, and cultural awareness in selecting, designing, and implementing technologies for sustainable development.
Lecture: 4, Lab 0, Other 0

SSCI-391 Social Science Special Topics 4 Credits
Prerequisites: COMM-101 and (LS-201 or HUMN-201 and SSCI-201)
An interdisciplinary advanced course focusing on a specific topic. This course is a one-time offering whose content is determined by current faculty interest, and provides a comprehensive and coherent examination of the chosen topic. This course may be repeated for credit under a different topic.
Lecture: 4, Lab 0, Other 0

SSCI-398 Social Science Study Abroad Advanced Topics 4 Credits
Prerequisites: None
Advanced Topics in the Social Sciences. This is a course taken as part of Kettering's Study Abroad Program.
Lecture: 4, Lab 0, Other 0

SSCI-499 Social Science Independent Study 4 Credits
Prerequisites: COMM-101 and (LS-201 or HUMN-201 and SSCI-201)
This course facilitates depth and breadth of study in a particular area of Social Sciences. This course may not serve as a substitute for any of the courses in the general education component, including the SSCI elective and senior seminar. Students must request and receive approval of the independent study topic with the instructor.
Lecture: 4, Lab 0, Other 0

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