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This catalog was published for the 2013-2014 academic year. University Policies and Procedures are subject to change.
# Academic Calendar

All dates noted apply to both undergraduate and graduate classes – unless otherwise noted

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<td>July 11-14, THU-SUN</td>
<td>A-Section New Student Orientation</td>
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<tr>
<td>July 11, THU</td>
<td>New Student Convocation</td>
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<tr>
<td>July 15, (1st week) MON</td>
<td>Classes begin</td>
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<tr>
<td>July 15-19, (1st week) MON-FRI (5:00 pm)</td>
<td>Late registration and drop/add</td>
</tr>
<tr>
<td>August 9, (4th week) FRI (5:00 pm)</td>
<td>Last day for course withdrawal for partial refund</td>
</tr>
<tr>
<td>August 26, (7th week) MON (12:00 noon)</td>
<td>Undergraduate student midterm grades due</td>
</tr>
<tr>
<td>August 30-September 2, (7th/8th week) FRI-MON</td>
<td>Labor Day break (no classes)</td>
</tr>
<tr>
<td>September 3, (8th week) TUE (5:00 pm)</td>
<td>Last day for <em>undergraduate</em> course withdrawal – no refund</td>
</tr>
<tr>
<td>September 20, (10th week) FRI (5:00 pm)</td>
<td>Last day for <em>graduate</em> course withdrawal – no refund</td>
</tr>
<tr>
<td>September 24, (11th week) TUE</td>
<td>Last day of classes (Follow Friday schedule)</td>
</tr>
<tr>
<td>September 25, (11th week) WED</td>
<td>Reading day</td>
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<tr>
<td>September 26-28, (11th week) THU-SAT</td>
<td>Final exam period</td>
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<tr>
<td>September 28, (11th week) SAT</td>
<td>Term ends</td>
</tr>
<tr>
<td>October 4, FRI (12:00 noon)</td>
<td>Final grades due (Summer Term 2013)</td>
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<td>B-Section New Student Orientation</td>
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<td>October 3, THU</td>
<td>New Student Convocation</td>
</tr>
<tr>
<td>October 7, (1st week) MON</td>
<td>Classes begin</td>
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<tr>
<td>October 7-11, (1st week) MON-FRI (5:00 pm)</td>
<td>Late registration and drop/add</td>
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<tr>
<td>November 1, (4th week) FRI (5:00 pm)</td>
<td>Last day for course withdrawal for partial refund</td>
</tr>
<tr>
<td>November 18, (7th week) MON (12:00 noon)</td>
<td>Undergraduate student midterm grades due</td>
</tr>
<tr>
<td>November 22, (7th week) FRI (5:00 pm)</td>
<td>Last day for <em>undergraduate</em> course withdrawal – no refund</td>
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<tr>
<td>November 28-29, (8th week) THU-FRI</td>
<td>Thanksgiving break (no classes)</td>
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<tr>
<td>December 13, (10th week) FRI (5:00 pm)</td>
<td>Last day for <em>graduate</em> course withdrawal – no refund</td>
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<tr>
<td>December 16-17, (11th week) MON-TUE</td>
<td>Follow Thursday/Friday schedule</td>
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<tr>
<td>December 17, (11th week) TUE</td>
<td>Last day of classes</td>
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<td>December 18, (11th week) WED</td>
<td>Reading day</td>
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<tr>
<td>December 19-21, (11th week) THU-SAT</td>
<td>Final exam period</td>
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<tr>
<td>December 21, (11th week) SAT</td>
<td>Term ends</td>
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<tr>
<td>December 22-January 12</td>
<td>Winter break</td>
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<tr>
<td>January 6, MON (12:00 noon)</td>
<td>Final grades due (Fall Term 2013)</td>
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<td>Winter Term 2014</td>
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<tr>
<td>January 13, (1st week) MON</td>
<td>Classes begin</td>
</tr>
<tr>
<td>January 13-17, (1st week) MON-FRI (5:00 pm)</td>
<td>Late registration and drop/add</td>
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<tr>
<td>January 20, (2nd week) MON</td>
<td>Dr. Martin Luther King Jr. Day (no classes)</td>
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<tr>
<td>February 7, (4th week) FRI (5:00 pm)</td>
<td>Last day for course withdrawal for partial refund</td>
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<tr>
<td>February 24, (7th week) MON (12:00 noon)</td>
<td>Undergraduate student midterm grades due</td>
</tr>
<tr>
<td>February 28, (7th week) FRI (5:00 pm)</td>
<td>Last day for undergraduate course withdrawal – no refund</td>
</tr>
<tr>
<td>March 7, (8th week) FRI</td>
<td>No classes</td>
</tr>
<tr>
<td>March 21, (10th week) FRI (5:00 pm)</td>
<td>Last day for graduate course withdrawal – no refund</td>
</tr>
<tr>
<td>March 25, (11th week) TUE</td>
<td>Last day of classes (Follow Friday schedule)</td>
</tr>
<tr>
<td>March 26, (11th week) WED</td>
<td>Reading day</td>
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<td>March 27-29, (11th week) THU-SAT</td>
<td>Final exam period</td>
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<tr>
<td>March 29, (11th week) SAT</td>
<td>Term ends</td>
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<td>April 4, FRI (12:00 noon)</td>
<td>Final grades due (Winter Term 2014)</td>
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<td>Classes begin</td>
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<td>April 7-11, (1st week) MON-FRI (5:00 pm)</td>
<td>Late registration and drop/add</td>
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<tr>
<td>May 2, (4th week) FRI (5:00 pm)</td>
<td>Last day for course withdrawal for partial refund</td>
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<tr>
<td>May 19, (7th week) MON (12:00 noon)</td>
<td>Undergraduate student midterm grades due</td>
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<tr>
<td>May 23-26, (7th and 8th week) FRI-MON</td>
<td>Memorial Day break (no classes)</td>
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<tr>
<td>May 27, (8th week) TUE (5:00 pm)</td>
<td>Last day for undergraduate course withdrawal – no refund</td>
</tr>
<tr>
<td>June 13, (10th week) FRI (5:00 pm)</td>
<td>Last day for graduate course withdrawal – no refund</td>
</tr>
<tr>
<td>June 17, (11th week) TUE</td>
<td>Last day of classes (Follow Friday schedule)</td>
</tr>
<tr>
<td>June 18, (11th week) WED</td>
<td>Reading day</td>
</tr>
<tr>
<td>June 19-21, (11th week) THU-SAT</td>
<td>Final exam period</td>
</tr>
<tr>
<td>June 21, (11th week) SAT</td>
<td>Term ends</td>
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<tr>
<td>June 22, SUN</td>
<td>Commencement</td>
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<td>June 27, FRI (12:00 noon)</td>
<td>Final grades due (Spring Term 2014)</td>
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<td>June 22-July 13</td>
<td>Summer break</td>
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ABOUT KETTERING UNIVERSITY

Mission, Vision and Values

Mission
Kettering University prepares students for lives of extraordinary leadership and service by linking transformative experiential learning opportunities to rigorous academic programs in engineering, science, mathematics, and business.

Vision
Kettering University will be the first choice for students and all our partners seeking to make a better world through technological innovation, leadership and service.

Values
Respect: for teamwork, honesty, encouragement, diversity, partnerships with students.
Integrity: including accountability, transparency and ethics.
Creativity: fostering flexibility and innovation.
Collaboration: across disciplines and with all partners.
Excellence: in all we do.

Accreditation
Kettering University has been accredited since 1962 by The Higher Learning Commission and is a member of the North Central Association of Colleges and Schools, www.higherlearningcommission.org, 30 North LaSalle Street, Suite 2400, Chicago IL 60602-2504, (312) 263-0456.


The program in Computer Science is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org.

The Business program was accredited in 1995 by the Association of Collegiate Business Schools and Programs (ACBSP), 7007 College Boulevard, Suite 420, Overland Park, KS 66211, 913-339-9356.

History
Kettering University’s name honors Charles Kettering (1876-1958), a distinguished engineer, inventor, scientist, social philosopher and humanitarian. Charles Kettering believed that both theoretical knowledge and practical experience are necessary elements of an education. This belief made him an advocate for cooperative education in the earliest years of the twentieth century. Our founders were among those influenced by Kettering’s advocacy. From our earliest years our students have benefited from moving back and forth between the practical requirements of work experience and the disciplined reflection fostered in an academic environment.

We trace our origins to 1919 as the School of Automotive Trades, a school that provided night classes for factory workers in the growing automotive industry in Flint, Michigan. Under the leadership of Albert Sobey, the school became the Flint Institute of Technology in 1923. In 1924 Sobey created the school’s first cooperative education program permitting alternating periods of full-time academic work and full-time work in local factories in a four-year program.

Recognizing the potential of cooperative education to educate its engineers and managers, General Motors Corporation took over the institute in 1926 and changed the name to General Motors Institute. In 1945, General Motors Institute added a senior thesis requirement and became a degree-granting college while maintaining its full cooperative education program. General Motors divested itself of ownership in 1982. Though fully independent of General Motors, we maintained part of our old name until 1998, GMI Engineering and Management Institute. As an independent private college we expanded the number and types of companies employing our co-op students, added master’s degree programs, established new majors and replaced GM financial support with tuition, donations and endowment income.

In changing our name to Kettering University in 1998, we carry the name of a man whose life represents who we are. Charles Kettering was famous for his technical knowledge and inventions, was fascinated by ideas, respected human imagination and believed that service was the purpose of education. We honor his legacy with our cooperative education program, student-centered learning, faculty scholarship and preparation of students to be leaders in service to their professions and to society.
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.

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:

- **Communication** – the ability to communicate effectively both orally and in writing
- **Critical thinking** – the ability to reason logically, challenge assumptions, evaluate evidence, use evidence to support a position, and creatively apply knowledge to new situations
- **Quantitative reasoning** – the ability to use mathematical models, concepts, and skills to draw conclusions and solve problems
- **Science** – a knowledge of basic laboratory science and the principles of scientific reasoning
- **Foundation in the liberal arts** – a broad knowledge of the perspectives, content and methods of inquiry and reasoning in the humanities and social sciences
- **Depth of knowledge in a major field of study** - the content, connections to other disciplines, methods and distinctive professional requirements of a specific discipline
- **Global awareness** – a knowledge of global societies, respect for other cultures, and the ability to interact effectively across cultural boundaries
- **Teamwork** – the ability to work effectively as a member of a team
- **Leadership** – the ability to provide vision, set direction, and motivate others to follow
- **Ethics** – a knowledge of one’s ethical responsibilities as an individual, a professional, and a member of society, and a commitment to their fulfillment
- **Professionalism** – the habits, characteristics, and skills necessary to a responsible and productive career
- **Entrepreneurial Mindset** – the habits and skills necessary for creative and innovative thinking, awareness of customer needs, and opportunity recognition
- **Lifelong learning** – the habits and skills to sustain and direct lifelong learning, and an appreciation of its importance
Campus

Facilities
The seven main buildings, Academic Building, Campus Center, the Connie & Jim John Recreation Center, C. S. Mott Engineering and Science Center, Frances Willson Thompson Hall, the Innovation Center and the University Corner Building, are set off by an attractively landscaped 85-acre campus. In addition, 87 acres are available for future development.

The Academic Building is the historical “center” of the campus. It houses classrooms, science laboratories, computer laboratories, the library, the Humanities Art Center, McKinnon Theatre, and instructional and administrative offices, comprising a total floor space of nearly 400,000 square feet.

The Campus Center is the activity “center” for the campus. It houses food services, cafeteria, the Wellness Center, the campus store, television studios, Financial Aid, Admissions, Campus Safety, Recycling Center, student activities areas and administrative offices.

Kettering’s 70,000 square-foot Connie and Jim John Recreation Center, located just west of the Frances Willson Thompson Residence Hall, has a full complement of aerobic, strength, and sports amenities, in addition to student and alumni lounges, making it the likely focus of many student and alumni social and recreational activities. It houses a six-lane swimming pool, four multi-purpose regulation basketball courts, four racquetball courts, and a 1/8 mile suspended indoor track. Other areas include an aerobics/dance room, a free-weight room, and a fitness/exercise room that overlook the pool and gymnasium.

The C. S. Mott Engineering and Science Center has a total floor space of 130,000 square feet. The building houses Biochemistry, Chemistry, Mechanical Engineering, and alternative energy and automotive laboratories. Student project areas are provided, including the SAE garage. The entire building is connected to the main computer system through the campus-wide network.

Thompson Hall provides 450 individual rooms which may be interconnected to form suites. Each room is connected to the campus computer network. The rooms are furnished, including bed, desk, chairs, built-in wardrobe/bookshelf, microwave, and refrigerator. Extensive lounge, study, laundry, and storage areas are available. Design computer laboratories are available in the building for project/homework use.

The Innovation Center at Kettering University is an approximately 9,000 sf. multi-tenant laboratory facility that supports scientific and technologically-based “start-up” companies that have a need for dedicated research laboratories in the first three to four years of their existence. It consists of six laboratories that are capable of being divided into twelve intimate laboratories, private offices, a conference/training room, business center, break area and private shower facilities. The Innovation Center is the first Leadership in Energy and Environmental Design (LEED) Silver Certified building in Genesee County. It is also the first building in Kettering’s envisioned Technology Park.

In addition to the food and catering services provided from the Campus Center, students and the surrounding community have the option of eating at Einstein Bros. Bagels in the University Corner Building across the street from Campus Center. The 2,500 square-foot building also houses a Flint Police Service Station.

Kettering facilities are accessible to the handicapped. The majority of the campus buildings are inter-connected for ease of movement during inclement weather. Convenient parking is provided adjacent to all campus buildings.

Campus Village Apartments, although not Kettering-owned, are located on Kettering property, and provide suite-style housing for over 200 upper-class students. Students wishing to explore the Campus Village living option should call the Campus Village rental office at (248) 651-4190.

Harris Fields
Harris Fields, adjacent to the Recreation Center, is the 25 acre sports complex for exclusive use of Kettering students. The rectangular portion contains areas for two soccer fields or two flag football fields or two lacrosse fields. This section is lit by Musco Lighting, the premier sports lighting company in the world. Softball can be played on 4 fields, complete with backstops and crushed limestone infields. Lacrosse and soccer also utilize the outfields for club practices and games. Informal play, the popular IM Sports program and club sports all utilize Kettering Park. Students, faculty and staff are also active on the .62 mile (1K) walking/jogging path that circumscribes the sports fields.

The McKeachie picnic pavilion is a covered picnic area that features picnic tables, barbeque grilles, lighting and electrical power for student reserved or informal use. Adjacent to the pavilion are two new sand volleyball courts that are very popular with students for IM play and pick up games. A synthetic grass golf green completes the outdoor recreational opportunities for students.
Numerous trees and shrubs have been planted and the complex is fenced in and the area bordering University Avenue features faux wrought iron fencing and brick columns offering a distinctive look to one of the entrances to campus. The entire complex provides a first class venue for student recreation.

The Flint River Trail is a paved trail running along the Flint River from downtown Flint to the northern edge of Flint and on to either Bluebell Beach or Stepping Stone Falls. The trail is almost continuously asphalt and is suitable for walking, jogging, and/or biking and passes through the Kettering campus.

**The Kettering University Alumni Carillon**

Built with funds donated by GMI/Kettering Alumni and friends, the Carillon was erected as a part of the campus expansion in 1969. At the dedication, it was noted that the structure would “serve as a dynamic symbol of identity between the alumni, students, and faculty”. The carillon consists of 47 bells arranged in four octaves. The largest bass bell weighs nearly one ton while the smallest bell weighs only 20 pounds. The bells, made of 75 percent copper and 25 percent tin, were cast by the 200-year-old Petit & Fritsen Foundry of Aarle-Rixtel Netherlands. Designed by Tarapata-McMahon-Paulson Associates, the Kettering Carillon received the 1971 Honor Award for design from the Detroit Chapter of the American Institute of Architects.
ADMISSIONS

Kettering University’s Office of Undergraduate Admissions identifies individuals who are best qualified to complete a course of study in any of the STEM (science, technology, engineering, mathematics) or business disciplines offered at the university. Strong consideration is given to the applicant’s overall academic record, grades in core academic courses and scores on college entrance examinations. Consideration is also given to the student’s written personal statement, letter of recommendation, employment history, extracurricular honors and activities, and other evidence of ability, interest, and motivation. Kettering does not discriminate by reason of an individual’s race, color, sex, creed, age, physical challenge, or national origin.

Applicants to Kettering University must have a high school diploma or recognized equivalency. Applicants should have pursued a rigorous college preparatory curriculum and achieved high scholastic standing especially in the areas of science, mathematics, and English. Applicants for freshman admission must have completed sixteen credits in a college preparatory program for grades nine through twelve. Credits given in eighth grade for ninth grade algebra and recorded on the official high school transcript may be used as one credit of algebra.

Scholastic Preparation

To be eligible for admission, a student must complete the following courses prior to enrollment at Kettering University:

- **English:** Six semesters required (eight semesters recommended)
- **Mathematics:**
  - Algebra – four semesters
  - Geometry – two semesters
  - Trigonometry – one semester
- **Science:**
  - Two years of Lab Science; one must be Physics or Chemistry for all degree programs

All applicants must complete four semesters of science with lab including either two semesters of Chemistry or Physics. Both are strongly recommended.

All applicants are encouraged to complete English, science, and math courses beyond these minimum requirements. Training and/or experience in mechanical drawing, computer aided design and personal computers are encouraged.

Beyond these minimum requirements, Kettering does not have a fixed formula for determining admission decisions; however, a strong record of achievement is expected. A separate GPA will be calculated for English, mathematics, and science course work for all students. Additional review may be required for high school courses completed online.

College Entrance Examinations

Applicants for freshman admission are required to present the results of either the SAT or ACT. Scores should be sent to Kettering University from the testing agency. Students are encouraged to sit for either examination during the junior year and again in the fall of the senior year. Students for whom English is their second language are strongly encouraged to present the results of the Test of English as a Foreign Language (TOEFL). Kettering’s ACT code is 1998 and CEEB code for SAT and TOEFL is 1246.

Freshman Applications

Students are encouraged to apply online at www.kettering.edu. In August 2013 Kettering University will become a member of the Common Application. Students may choose to apply using the Common Application at www.commonapp.org. Paper application forms may be obtained by calling the Office of Admissions at 810-762-7865. Applicants must then request official transcripts and supporting information from their high school guidance offices. All post-secondary institutions attended should be listed regardless of intention to transfer credits to Kettering.

Application to Kettering University should be made as early in the senior year of high school as possible. The application, all official transcripts, test results, and supplemental materials including personal statement and recommendation letter must be received by Kettering to allow for complete processing and evaluation. All credentials submitted become part of the permanent file at Kettering University. They cannot be returned to the applicant nor forwarded to any other institution.

Early application, in the fall of senior year of high school, is encouraged to maximize the student’s visibility in the professional cooperative education employment search process. High school seniors are encouraged to apply by the November 15th Early Action date to assure a decision by December 15th. However, Kettering welcomes applications throughout the year.
December 15th Kettering will practice rolling admission and notify students of the decision shortly after all materials have been received.

Enrollment at Kettering University is also contingent upon satisfactory performance and completion of all courses in which the student is currently enrolled. Final high school and college transcripts are required to be submitted to the office of admissions for all incoming students. Failure to do so will affect your ability to register for classes. The application is valid for one year. Students applying to Kettering University, but not enrolling, will be allowed one full year to request reactivation.

**Home School Students**

Kettering University welcomes homeschooled students to apply for admission. Applicants must submit the same application materials and meet the same admission requirements as any other high school student. The Admissions Office will contact the student’s primary educator if additional information is needed.

Homeschooled students should submit a completed application, standardized test scores, personal statement, letter of recommendation, and an official transcript developed by home school association or by the primary teacher. All transcripts should include: course name, credit, and final grade for all 9-12 grade 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 setting or college, the applicant must supply an official copy of the transcript from the respective school. Courses taken online or through correspondence programs should be similarly documented. For evaluation purposes we encourage clear documentation and explanation of all English, math, and science courses.

Note that all materials sent as part of the application become property of Kettering University and will not be returned to the student. Final transcripts that show a high school graduation date and final college transcripts are required to be submitted to the Office of Admissions for all incoming students. Failure to do so will affect your ability to register for classes.

**Admission of International Students**

Kettering University welcomes students from outside of the U.S. to apply for admission. International students should apply online at www.kettering.edu or via the Common Application at www.commonapp.org. The admission decision will be based on the student’s record of achievement in secondary school or university studies. International students must also present one of the following test results: SAT, ACT, Test of English as a Foreign Language (TOEFL), or International English Language Testing System (IELTS). TOEFL or IELTS results are required from students whose native language is not English, or who did not attend school where English was the language of instruction.

Certified copies of transcripts/educational certificates and records with English translations must be filed with the application. A secondary school/university level grading scale may be requested. International students must also provide a financial plan for tuition, a personal statement, and two letters of recommendation before a final admission decision can be determined. Kettering University does offer a limited number of partial scholarships to international students.

**Immigration Information**

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

**Co-op Employment of International Students**

International students are eligible and required to participate in the cooperative education program. Students may secure co-op employment in the U.S. or in their home country. As is the case for domestic students, international students will be responsible for work term transportation, living expenses and personal expenses.

**Admission of Transfer Students**

Kettering University encourages students with prior college experience to seek admission. Students are encouraged to apply online at www.kettering.edu or via the Common Application at www.commonapp.org.

Students must submit official transcripts from all colleges and universities previously attended. Additional information, such as high school transcripts or SAT/ACT scores, may be required from students who have completed less than 30 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 has formal articulation agreements with selected colleges that provide opportunities for admission to the university and transferability of courses upon satisfactory completion of the approved program (grades and course). Students who complete the equivalent of the first two years of Kettering courses are generally able to complete their Kettering University degree and associated co-op work experiences at the university within three years.

**Scholastic Preparation for Transfer Students**

To be eligible for admission, a student must complete the following courses prior to enrollment at Kettering University:

- **English:** Six semesters required (eight semesters recommended)
- **Mathematics:**
  - Algebra – four semesters
  - Geometry – two semesters
  - Trigonometry – one semester
- **Science:** Two years of Lab Science; one must be Chemistry or Physics

Transfer students could have completed some of these requirements at the secondary school (high school) level.

**Academic Requirements for Transfer Students**

Beyond the minimum scholastic requirements, Kettering does not have a fixed formula for determining admission decisions. However, a strong record of achievement is expected. Primary consideration is given to the applicant’s overall grade point average and overall number of credit hours taken. A separate GPA will also be calculated for English, mathematics, and science coursework. Secondary consideration is given to the student’s employment history, extracurricular honors and activities, and other evidence of ability, interest, and motivation.

A typical student should be taking 14 to 16 credit hours per semester of coursework similar to what is taken by a Kettering University student. Candidates who have not pursued full-time collegiate study and/or followed a program of studies that does not include extensive study of mathematics and science will be evaluated individually on their high school and college records as well as their test scores.

Prospective students should maintain an overall grade point average of at least a “B” or better with strong math and science grades of “B” or better. A unit of lab science is considered to be one year of high school or one semester of college. Kettering University functions on a rolling admissions basis and students may apply any time during the year.

**Suggested Courses**

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

**Kettering University Course Name**

- CHEM-135/136  Principles of Chemistry/Lab
- COMM-101  Written & Oral Communication I (Composition and Speech)
- ECON-201  Economics (Micro or Macro)
- HUMN-201  Introduction to the Humanities
- MATH-101  Calculus I (Differential Calculus)
- MATH-102  Calculus II (Integral Calculus)
- PHYS-114/115  Newtonian Mechanics/Lab
- PHYS-224/225  Electricity and Magnetism/Lab
- SSCI-201  Introduction to the Social Science

History, Literature, Philosophy, etc. (must be taken at the 300 level or greater)

**Transfer Credit Evaluation**

Courses submitted for transfer credit consideration should be comparable in content and rigor to those offered at Kettering University. Applicants must provide an official transcript to Kettering. In addition, applicants may be required to provide the Registrar's Office with a college catalog, course syllabi or additional information for evaluation purposes. Applicants will be contacted with the results of the credit evaluation.

**Transfer of Professional Cooperative Education Work Experience**

Regular matriculated or transfer students entering Kettering with less than JR1 standing who have participated in other comparable college-level cooperative education work experience programs or who have significant work experience related to their Kettering University degree program may be eligible to transfer this work experience towards their degree requirements. Students wishing to pursue such action should contact the Cooperative Education Office to determine the documentation necessary to transfer a maximum of two work experience terms (only applicable toward freshman-sophomore requirements).
Admission of Non-degree Seeking Students

Non-degree Students (Guest students at Kettering University)
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. To enhance this opportunity, substantial scholarships are awarded.

Kettering University welcomes students who wish to enroll in specific courses for their own enrichment or for transfer to other degree programs. Students enrolled in other institutions may demonstrate their eligibility by presenting a certified guest application from their home institution. Students should submit the approved guest application to the Registrar’s Office at least two weeks prior to the start of the semester. Non-degree students receive transcripts and full academic credit for courses successfully completed. However, not more than 72 hours of such credit may be accepted for enrollment in a regular degree program. Non-degree enrollment is limited to two courses each term. Contact the Registrar’s Office for more information, registrar@kettering.edu or 810-762-7476.

Dual Enrollment
This program is available to qualified students in the 11th or 12th grade who meet Kettering’s registration requirements listed below. Through dual enrollment, the student’s high school pays a portion or all of the tuition. State guidelines and the high school determine the course eligibility and the amount of tuition the high school is responsible to pay. No additional fees (application fees, etc.) are charged by Kettering University. The student/parent is responsible for any additional costs not paid by the high school. Admission to this program is for fall (October - December) and winter (January - March) terms only. Two courses per term are allowed.

Early Enrollment
This program is available to any 11th and 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. No application fee is required. Two courses per term are allowed.

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 Registrar and based on available space.

Dual/Early Enrollment – Scholarship
A scholarship is awarded to a student who is admitted to Kettering University as an early or dual enrollment student.

- Scholarship awards for the 2013/2014 academic year will reflect a tuition reduction to 508/credit hour.
- Scholarship awards will not exceed four Kettering classes per student.

Dual Enrollment Worksheet
The cost of attending Kettering University for the 2013/14 academic year will be:

<table>
<thead>
<tr>
<th>Four Credits</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kettering Tuition</td>
<td>.................................................</td>
<td>$4,748</td>
</tr>
<tr>
<td>Less Scholarship</td>
<td>....................................................</td>
<td>- 2,716</td>
</tr>
<tr>
<td>Net Kettering Cost (tuition)*</td>
<td>....................................................</td>
<td>2,032</td>
</tr>
<tr>
<td>Less High School Payment .................(varies when applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Student Payment Responsibility*</td>
<td>..................................</td>
<td>$ XX</td>
</tr>
</tbody>
</table>

* Check or credit card remittance of student portion of tuition due when student certification form is submitted.

Questions about early/dual enrollment can be directed to the Office of the Registrar at registrar@kettering.edu or 810-762-7476.

Additional Requirements for Admitted Students

Professional Cooperative Education Employment Process
After academic acceptance, students complete their résumé and pay the $300 enrollment deposit to confirm their attendance. Credentials of accepted and deposited applicants are forwarded to potential co-op employers by the University starting in some situations as early as January. Careful attention is given to the student’s objectives, needs, and preferences as well as employer
criteria. While most students who obtain co-op employment are matched through the efforts of Kettering University staff, some students each year find their own co-op employment by initiating contact with companies that are appropriate to their objectives. The Kettering University Cooperative Education staff is happy to assist students with this process.

Companies choose to interview an applicant based on the student’s academic background, test scores, class rank, employment history, extracurricular activities, and honors. Factors influencing final selection include strong communication skills, leadership potential, vocational interest, desire for a career in business and 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 Office of Cooperative Education, 810-762-7865.

Math Placement Examination
The Mathematics Placement (MP) Examination is for new freshmen and new transfer students entering Kettering University. All entering students are required to take the MP Exam, unless they have received transfer credit or Advanced Placement credit for the first calculus course, MATH-101.

Details on the process and availability of the MP Exam may be found on the Kettering website at: https://www.kettering.edu/offices/registrar/information-undergraduate-students/math-placement-exam.

Enrollment Deposit
Admitted students confirm their enrollment at Kettering University by submitting a $300 enrollment deposit; $200 of the deposit will be applied to tuition and $100 applied as a housing deposit. Upon receipt of this deposit, the professional cooperative education (co-op) employment search process may begin. The full amount is applied as partial payment for the first semester’s tuition. The enrollment deposit is fully refundable until May 1.

Medical Information
Prior to enrollment, all students must submit to the Wellness Center a completed Health and Medical Information form. All medical information is treated confidentially and cannot be released without a student’s knowledge or written consent. The Wellness Center uses this information to create a continuous record of health care.

Kettering does not require a medical examination prior to admission or enrollment. Co-op employers may require such an exam as a condition of employment or because of particular working conditions.

International Baccalaureate Credit

Upon application to the University, students seeking International Baccalaureate (IB) credit should have an official IB transcript sent directly to Kettering's Office of 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.

Kettering University awards credit or IB scores of 5 or 6 or better for the following subjects when the full IB diploma has been earned: Physics, Mathematics, and Biology

<table>
<thead>
<tr>
<th>IBO Exam</th>
<th>Required Score</th>
<th>Credits Granted</th>
<th>Kettering Course Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology (HL)</td>
<td>6 or 7</td>
<td>4</td>
<td>BIOL-241 &amp; 242</td>
</tr>
<tr>
<td>Chemistry (HL)</td>
<td>5, 6 or 7</td>
<td>4</td>
<td>CHEM-135 &amp; 136</td>
</tr>
<tr>
<td>Computer Science (HL)</td>
<td>5, 6 or 7</td>
<td>8</td>
<td>CS-101 &amp; 102</td>
</tr>
<tr>
<td>Computer Science (SL)</td>
<td>5, 6 or 7</td>
<td>4</td>
<td>CS-101</td>
</tr>
<tr>
<td>English (HL) and History (HL)</td>
<td>6 or 7</td>
<td>4</td>
<td>SSCI-201</td>
</tr>
<tr>
<td>Foreign Language – Any (HL)</td>
<td>5, 6 or 7</td>
<td>4 or 8</td>
<td>LANG-297</td>
</tr>
<tr>
<td>Mathematics (HL)</td>
<td>5, 6 or 7</td>
<td>4</td>
<td>MATH-101</td>
</tr>
<tr>
<td>Physics (HL)</td>
<td>6 or 7</td>
<td>4</td>
<td>PHYS-114 &amp; 115</td>
</tr>
<tr>
<td>Sociology (HL)</td>
<td>6 or 7</td>
<td>4</td>
<td>SSCI-201</td>
</tr>
</tbody>
</table>
Advanced Placement Credit

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

<table>
<thead>
<tr>
<th>Advanced Placement Exam</th>
<th>Required Score</th>
<th>Credits Granted</th>
<th>Kettering Course Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art History and English (Literature and Composition)(^1)</td>
<td>4, 5</td>
<td>4</td>
<td>HUMN-201</td>
</tr>
<tr>
<td>Biology(^2)</td>
<td>4, 5</td>
<td>3 and 1</td>
<td>BIOL-141 &amp; 142</td>
</tr>
<tr>
<td>Calculus AB</td>
<td>3, 4, 5</td>
<td>4</td>
<td>MATH-101</td>
</tr>
<tr>
<td>Calculus AB Subgrade</td>
<td>3, 4, 5</td>
<td>4</td>
<td>MATH-101</td>
</tr>
<tr>
<td>Calculus BC</td>
<td>3</td>
<td>4</td>
<td>MATH-101</td>
</tr>
<tr>
<td>Calculus BC</td>
<td>4, 5</td>
<td>4 and 4</td>
<td>MATH-101 &amp; 102</td>
</tr>
<tr>
<td>Chemistry</td>
<td>4, 5</td>
<td>3 and 1</td>
<td>CHEM-135 &amp; 136 or CHEM-137 &amp; 136</td>
</tr>
<tr>
<td>Computer Science A</td>
<td>4, 5</td>
<td>4</td>
<td>CS-101</td>
</tr>
<tr>
<td>Computer Science AB</td>
<td>3</td>
<td>4</td>
<td>CS-101</td>
</tr>
<tr>
<td>Computer Science AB</td>
<td>4, 5</td>
<td>4 and 4</td>
<td>CS-101 &amp; 102</td>
</tr>
<tr>
<td>Environmental Science(^2)</td>
<td>4, 5</td>
<td>4</td>
<td>BIOL-297</td>
</tr>
<tr>
<td>European History</td>
<td>4, 5</td>
<td>4</td>
<td>SSCI-201</td>
</tr>
<tr>
<td>Foreign Language(^2)-Any</td>
<td>4, 5</td>
<td>4</td>
<td>LANG-297</td>
</tr>
<tr>
<td>Human Geography</td>
<td>4, 5</td>
<td>4</td>
<td>SSCI-201</td>
</tr>
<tr>
<td>Macroeconomics</td>
<td>3, 4, 5</td>
<td>4</td>
<td>ECON-201</td>
</tr>
<tr>
<td>Microeconomics</td>
<td>3, 4, 5</td>
<td>4</td>
<td>ECON-201</td>
</tr>
<tr>
<td>Physics C, Part I-Mech</td>
<td>4, 5</td>
<td>3 and 1</td>
<td>PHYS-114 &amp; 115</td>
</tr>
<tr>
<td>Physics C, Part II-E&amp;M</td>
<td>4, 5</td>
<td>3 and 1</td>
<td>PHYS-224 &amp; 225</td>
</tr>
<tr>
<td>Psychology(^2)</td>
<td>3, 4, 5</td>
<td>4</td>
<td>FREE-297</td>
</tr>
<tr>
<td>Statistics(^2)</td>
<td>3, 4, 5</td>
<td>4</td>
<td>BUSN-226</td>
</tr>
<tr>
<td>U.S. History and U.S. Government(^3)</td>
<td>3, 4, 5</td>
<td>4</td>
<td>SSCI-297</td>
</tr>
<tr>
<td>World History</td>
<td>4, 5</td>
<td>4</td>
<td>SSCI-201</td>
</tr>
</tbody>
</table>

\(^1\)Both courses must be taken and both scores must be 4 or better.
\(^2\)Seek department advisement for curriculum requirement application.
\(^3\)Both courses must be taken and both scores must be 3 or better.
FINANCIAL AID

Financial Aid Policies

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

**Deadline Dates**
- In order 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 applications will be processed, need-based grants will be credited to accounts, and FWS (Federal Work Study) will be initiated once all documents requested for verification 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 after checks are endorsed and promissory notes are signed as needed. Earnings from on-campus employment are paid on a biweekly basis.
- Students may contact the Financial Aid Office in Room 4-121 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 Financial Aid Handbook contains detailed information about these awards.

**Gift Aid**

- **Federal Pell Grant** is awarded to undergraduate students who demonstrate financial need. The amount of the award depends on the family financial situation.

- **Federal Supplemental Educational Opportunity Grant (SEOG)** may be awarded by the Kettering University Financial Aid Office to undergraduate students who demonstrate exceptional financial need.

- **Michigan Competitive Scholarship (MCS) and Michigan Tuition Grant (MTG)** are available to Michigan residents who demonstrate financial need. (MCS is also based on a qualifying ACT score.)

- **Scholarships** are available from both institutional (Kettering University) and private sources to students who are academically qualified based on merit and/or financial need. Private gifts come from various donors who establish their own guidelines and criteria for recipients. A partial list follows.

  Marsha C. Brown Alpha Sigma Alpha Sorority Scholarship  
  Richard R. Burgett Scholarship  
  Richard G. "Dickey" Deane Scholarship  
  Claire P. and Floyd E. Harris Scholarship  
  Kettering Endowed Scholarship  
  Kagle Endowed Scholarship  
  Baber Scholarship  
  Jill Faleris Scholarship  
  Barron Endowed Scholarship  

  Boyer Endowed Scholarship  
  Connie John Memorial Scholarship  
  Jack Hartzell Memorial Scholarship  
  Peterson Endowed Scholarship  
  Joseph Hudson Memorial Scholarship  
  Steinke-Seignac Scholarship  
  Reverend Leon Sullivan Scholarship  
  Herman J. Wolfe Scholarship  
  McEwan Endowed Scholarship

Additional information on scholarships is available in the Financial Aid Office, Room 4-121 CC.

**Loan Assistance**

- **Federal Direct Stafford Loan Program** provides funds to graduate and undergraduate students.
- **Federal Direct Parent Loan for Undergraduate Students** (PLUS) allows parents of dependent students to obtain a federally guaranteed loan which is not based on financial need.
• **Emergency Loans** are disbursed immediately to students who encounter unusual and unexpected circumstances and are repayable without interest within 30 days. The maximum on these loans is $150. Students must have a zero balance.

• **Alternative 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. 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** 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)

In order 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 alternative loans.

**Minimum standard requirements:**

- **Qualitative Measure** *(GPA that a student must achieve at each evaluation):* Must maintain a cumulative grade point average (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):* Students must successfully earn 67% of all credits attempted during an academic term. An "I" will be calculated as no credit until it reverts to a letter grade and is posted to the student's academic record.

  - **Credits attempted** are defined as all classes for which a student receives a passing grade ("D" or better), or an "F", "W" 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 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 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 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. Student may receive aid for one more academic term if appeal is granted.

If, at the end 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 student, house fire 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 thirty 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 aid reduced accordingly. Students are encouraged to meet with a financial aid advisor prior to 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 (E) grades or a combination of all fail (E) 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 four credit classes. 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: If a student receives only the following grades (F or W) without one passing grade. 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 school 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**

<table>
<thead>
<tr>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td></td>
<td>Traditional A</td>
</tr>
<tr>
<td>X</td>
<td></td>
<td>X</td>
<td>A/B</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>X</td>
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**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. 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.
TUITION AND FEES

Expenses

The current tuition, fees, and charges are listed below. The Student Accounts Office will send an e-mail notification one month prior to the term to your Kettering e-mail when your official bill is ready to view on Banner Web/Self Service. All tuition and fees 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.

To help you meet expenses, we have teamed with Nelnet Business Solutions (NBS, formerly known as FACTS Management Company) to enable you to more easily budget your education expenses and expanded the e-Cashier Tuition Payment Plan (hereafter, "e-Cashier"). e-Cashier gives you the option of monthly payments to help make the cost of higher education as affordable as possible.

e-Cashier offers a variety of online payment options, including payment in full or monthly budget payments over 2 to 6 months. Payments are processed via a credit card or automatic bank payments from checking or savings accounts. There is no fee on a payment in full when drawn from your checking or savings account. If, however, you elect to make payment in full using the credit card option, your full payment along with a 2.5% convenience fee is charged to the Discover, MasterCard, or American Express credit card you designate (sorry, Visa cards are not accepted).

e-Cashier gives you a convenient, interest-free way to budget education expenses. Instead of having to pay the tuition at the beginning of each term or going into debt, you may budget tuition and other expenses over 2 to 6 months per term. Because e-Cashier is not a loan program, there is no debt, no credit search, and no interest or finance charge assessed by NBS on the unpaid balance. The only cost is a $25 per term non-refundable enrollment fee to enroll in a payment plan (if, however, you elect the credit card option, your monthly payment along with a 2.5% convenience fee will be automatically charged to the credit card you designate).

Please visit e-Cashier for information on a variety of online payment options including payment in full or monthly budget payments over 2 to 6 months. The payments will be automatically deducted from whichever account you choose. A $300 late fee will be added to all accounts which have not been settled 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 section of this catalog. NOTE: International Students – Payment in full of the total balance due must be made by 4:00 p.m. third week Friday of each academic term. Students who do not comply with this policy will be dropped and separated from the university. The separated students’ visa program will be terminated in SEVIS by fourth week Wednesday.

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 and fee plan for full-time students that began with the 2012-2013 academic year. Simply put, Kettering students and their parents will be able to rely upon the tuition rate at the University remaining level for the remainder of each student’s full-time study at Kettering. And the tuition rate is inclusive of all tuition-related University fees.

Our reason for “fixing” tuition was 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. Rather than giving you a quick one year peek at college costs, we give to you the complete picture. While other universities will no doubt 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. All of us at the University are dedicated to ensuring that every element of your education here is rooted in excellence – whether that be in the classroom, the laboratories, or on the playing fields and in the gym.
The following provides you with a listing of all fees and tuition rates which will be in effect at Kettering University during the 2013-14 school year, which runs from July 2013 through June 2014:

**Tuition**

Full-time, 15-22 credit hours, per term
- Entering Class 2013-2014 ..............................................................17,800
- Returning Students, Class of 2012-2013 and prior ............................16,973

Part-time, less than 15 credit hours, or overload in excess of 22 credit hours, per credit hour
- Entering Class 2013-2014 ..............................................................1,187
- Returning Students, Class of 2012-13 and prior ..............................1,132

**Board Rate**

Meal Plan ........................................................................................................1,355

**Residence Hall**

Room Rate
- Entering Class 2013-2014 .......................................................................2,135
- Returning Students, Class of 2012-2013 and prior, per term ..............1,597

**Business-Related**

- Application ..................................................................................................................35
- Enrollment Deposit (new students) .................................................................300
- $200 applies toward tuition charges and $100 housing deposit ..................300
- Late Payment ..............................................................................................................300
- Exchange Student Enrollment, per term .........................................................250
- NSF Check Processing ............................................................................................25
- Student Identification Card Replacement ..........................................................10
- Student Health Insurance, per year* .....................................................................1,260

*The University requires students to submit proof of health insurance each academic year, or to purchase Kettering’s Accident and Sickness Insurance Plan.

**Refund Rates**

**Tuition, Room & Board, and Fees**

The following schedule of tuition and room and board refunds applies for students who separate from Kettering University before the end of an academic term. These percentages also apply to those taking individual courses when dropping classes reduces their total credit hours to part-time status (less than 15 credits), or from overload to full-time status (15-22 credits).

First Week .......................................................... 100%
Second Week .................................................... 75%
Third Week ......................................................... 50%
Fourth Week ...................................................... 25%
Fifth Week .......................................................... 0%

Refund rates are calculated through Friday of fourth week.

Enrollment Deposit is non-refundable after May 1.
STUDENT LIFE

Student Conduct: Behavioral Standards

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 Life & 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 Life & 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 Judicial Affairs’ policies and procedures.

Kettering 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 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 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.

Code of Student Conduct
Conduct for which students may be subject to judicial 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.
- 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 Rights and Responsibilities Provided by Kettering’s Judicial Affairs 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 s/he fail to appear at the established time and place.
- Opportunity to review the judicial 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 advisor present at an Administrative Hearing or University Board of Student Conduct. The advisor 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.
- All hearings will be closed. Hearing results will be held in confidence, except that the Vice President of Student Life & 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- 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). This act ensures that most communication between a student and the university is considered confidential, and that such information about a student’s experience can be shared with the parents of an individual student only under very specific circumstances as defined by federal law. Exceptions are outlined in the University’s “FERPA Announcement,” which can be found at http://www.kettering.edu/registrar/ferpa_information.asp. All rights accorded a student under this law take effect at the time of enrollment in a post-secondary educational program regardless of the student.
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 Life & Dean of Students may designate an Administrative Hearing Officer (AHO), usually the Chief Student Judicial Officer. The AHO will investigate the case and conduct a hearing with the accused. Administrative Hearings accommodate all those rights and procedures accorded to students by the University’s judicial policies. Following the hearing, the AHO will provide the student with written notification of the results of the hearing, as well as information about the appeals process.

University Board of Student Conduct
The Vice President of Student Life & Dean of Students designates a Judicial 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, the Chief Student Judicial 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 Chief Student Judicial 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 Life & Dean of Students, who may endorse, alter, or dismiss them.

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

Administrative and Judicial Board Hearings Decisions
All decisions will be based only on documents, testimony, and evidence presented at administrative and judicial board hearings.

Judicial Affairs 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 Judicial File
The University applies this sanction whenever the Chief Student Judicial 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 Chief Student Judicial Officer creates an official file detailing the student’s offense.

Judicial Warning
A Judicial 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.

Judicial Probation
Judicial probation implies a medial status between good standing at Kettering, and suspension or expulsion. A student on Judicial 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, Judicial 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. Judicial Probation serves as a final warning to the student to re-evaluate and modify his/her unacceptable behavior. Students on Judicial 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 Judicial 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 Life & 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 judicial 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 Life & 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 Life & 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.

Students’ Use of Technology
The use of any personal computational or communications devices in the classroom, not otherwise governed by 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 assistants, text pagers, and cell phones. Any use of such devices without the instructor’s approval is prohibited. The use of such devices without 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 by Judicial Affairs.

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 (http://www.kettering.edu/it/policies_and_standards.jsp).

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 Life & Dean of Students (VPSL) and/or her designate, who will meet with the faculty member to discuss the alleged incident. The VPSL will also meet with the student to determine possible judicial action after determining whether or not the student’s behavior violated the Kettering Code of Student Conduct. The VPSL will either appoint a judicial officer to adjudicate the matter or refer it for action by a University Board of Student Conduct. If the dismissal occurs by Friday of seventh week, student will receive a grade of W (withdrawal). If the dismissal occurs after Friday of seventh week, student will receive a non-passing grade.

Harassment and Discrimination Policies
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; the display, in the workplace, 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 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 was done).
- Report the discrimination to the Vice President of Student Life & Dean of Students, the Director of Human Resources, other University officials, or via our Non-Academic Grievance Form, available in the Student Life Office, Academic Services, the Wellness Center, Thompson Hall, and online at the Student Life 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 advisor, if necessary, to report sexual harassment whenever it occurs. The University pledges that all complaints of harassment will be investigated promptly and will pursue a timely resolution, which the appropriate University officials will communicate to the parties involved. We will maintain confidentiality 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, color, gender, age, religion, national origin, 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 gender, race, color, national origin, disability, age, religion, veteran status, height, weight or marital status.
- Making determinations regarding a person’s salary based on gender, race, color, national origin, disability, age, religion, veteran status, height, weight or marital status.
- Denying a person access to an educational program based on that person’s gender, race, color, national origin, disability, age, religion, veteran status, height, weight or marital status.
- Instigating or allowing an environment that is unwelcoming or hostile based on a person’s gender, race, color, national origin, disability, age, religion, veteran status, height, weight or marital status.
- Denying raises, benefits, promotions, leadership opportunities or performance evaluations on the basis of a person’s gender, race, color, national origin, disability, age, religion, veteran status, height, weight or marital 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 co-op manager. Enlist the counsel of a trusted advisor, if necessary, to report discrimination whenever it occurs. The University pledges that all complaints of discrimination will be investigated promptly and will 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 was done).
- Report the discrimination to the Vice President of Student Life & Dean of Students, the Director of Human Resources, other University officials, or via our Non-Academic Grievance Form, available in the Student Life, Academic Services, the Wellness Center, Thompson Hall, and online at the Student Life website.

Health and Wellness Services

On-Campus
A licensed practical nurse is available during regular business hours. The nurse provides college specific nursing care and promotes health, wellness and preventive care for the student population. Care received in the Wellness Center is nurse-directed and based on physician approved clinical protocols.
All currently enrolled Kettering University students may utilize the center services. Services are free with the exception of a small charge for certain vaccinations and screening (TB screening, influenza). 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)
- Advise on effective self-care and well-being
- Drug and alcohol counseling and resources
- Referrals to community healthcare providers
- Stress management
- Wellness workshops

Where appropriate, our LPN will refer students to a physician at McLaren Family Medicine Residency Center, located less than two miles from campus. Kettering University Campus Safety unit will provide transportation to students at no cost.

**Off-Campus: 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 Hours:
12:30-1:15 P.M., Monday-Friday (Drop-in; first-come, first-served; time listed is the sign-in period each day - clinic will see all those signed-in that afternoon)

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.

**Counseling Services**
The Wellness Center provides individual counseling to students who experience psychological, behavioral, or learning difficulties whenever they occur. Counselors are 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:

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

**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 necessary to meet the legal requirements as required by law.
The Center will inform faculty and staff who may be responsible for providing the services and/or accommodations. Each term, students must 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. (Further information is available at http://www.kettering.edu/current-students/student-life/wellness-center/disability-services)

**Mandatory Health Insurance**
Kettering University requires all enrolled students to carry health insurance coverage. Students who have coverage through their parents or other means must provide proof of health insurance once a year through a third part, AIG Educational Markets, which verifies coverage through their online system. Students who fail to provide proof of health insurance through the verification process will automatically be enrolled in AIG Student Health Insurance Plan, at a cost of $1,260.00 for coverage from July 1, 2013 through June 30, 2014. No exceptions will be made. The 2013-14 verification period beings May 20, 2013 and concludes July 31, 2013. Students and parents may contact AIG Educational Markets at 888.722.1668 for further information.

**Confidentiality**
We are not permitted by law to disclose any medical information to a parent or guardian without the consent of the student unless the student is mentally incapacitated or threatens to harm him/herself or someone else. When parents call us with a concern, we contact the student directly to request permission to speak with you. If you wish to share medical information with your parents, you must complete and submit to the Wellness Center a Release of Information, which may be downloaded at 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.

**The Campus Store**
The Campus Store, generally referred to as “The Bookstore” is located in the Campus Center (CC) in the northwest corner of the second (ground) floor, room 2-910 and can be contacted at 810-762-9887.

Normally, the store is open 7:30 a.m. to 4:30 p.m. Monday through Friday. However, on special occasions throughout the year, including, but not limited to, Alumni Day, Parents Weekend, and Discover Kettering, the store may be open on Saturday or Sunday.

The Campus Store is operated by the Follett Higher Education Group for Kettering University. In addition to new and used textbooks, the store offers a wide variety of items, including a selection of programmable calculators. Greeting cards, postage
stamps, candy, snacks, sundry items and a large selection of imprinted Kettering clothing and glassware are also available. The Campus Store wills special order books, software and/or calculators not in stock, at any time. Academically priced software is available at www.journeyed.com and www.efollett.com. Special orders may require a non-refundable deposit. The Campus Store accepts online and phone orders.

The Campus Store accepts VISA, MasterCard, American Express and Discover credit cards, as well as personal and traveler’s checks. Personal checks should be made out to Kettering Campus Store for the exact amount of the purchase. Picture identification is required.

Community Service/Student Civic Engagement Center
The Student Civic Engagement Center (SCEC) is home to the community service, philanthropic, and voluntary organizations on campus, including Engineers Without Borders (EWB), Green Engineering Organization (GEO), realSERVICE, Relay for Life, and Up ‘Til Dawn. It also serves as the communications center for volunteer requests and community outreach opportunities for our students, as well as for coordinating CollegeTown service activities with UM-Flint, Baker College, and Mott Community College. Kettering students staff the center, under the direction of the Student Life office.

Food Services
Sodexo, a provider of food services to colleges and universities throughout the country, operates several venues to serve the campus community, including dining rooms, beverage and snack vending machines, etc. All first-year students who reside in Thompson Hall are required to purchase a board plan during their residency. Current information on food services and hours may be found at https://www.kettering.edu/node/1914/.

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, over 35% of our students belong to Greek organizations, which include 13 fraternities and 5 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. These 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.

Fraternities:
Alpha Phi Alpha
Beta Theta Pi
Delta Chi
Delta Tau Delta
Lambda Chi Alpha
Kappa Alpha Psi
Phi Delta Theta
Phi Gamma Delta
Pi Kappa Alpha
Sigma Alpha Epsilon
Sigma Chi
Sigma Nu
Theta Xi

Sororities:
Alpha Gamma Delta
Alpha Kappa Alpha
Alpha Phi
Alpha Sigma Alpha
Delta Sigma Theta

Kettering University endorses the College Fraternity Executives Association (CFEA) statement on hazing, which strictly prohibits its use and imposes severe sanctions on Greek letter organizations that engage in it. The CFEA hazing policy is contained in the “Statement of Relationship between Kettering University and Fraternities and Sororities,” to which all Greek letter organizations must subscribe. All activities sponsored by our fraternities and sororities must be consistent with their founding principles, as well as with the educational mission of the university. They must also comply with federal and state laws, and Kettering University policies.
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 for Mentor, Coach, or Tutor roles. Application dates vary throughout the year.

Library Services
Kettering University has a library on campus. Refer to the Library Services section of this catalog for more information.

Multi-Cultural Student Initiatives (OMSI)
The Office of Multi-Cultural Student Initiatives works to ensure students of color thrive and succeed at Kettering University. OMSI 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. The office provides pre-college programs to increase the pool of students of color qualified to pursue degrees in science, technology, engineering, mathematics, and business.

OMSI provides these services for students of color:

- Academic Advising
- Academic Excellence Workshops
- Career Counseling
- Financial Counseling
- Mentoring
- Personal Counseling
- Pre-college Programs
- Recruitment
- Scholarships
- Tutoring

New Student Orientation: COMPASS and Camp COMPASS
Our new student orientation program, COMPASS (Campus Orientation Meetings to Prepare Students for Academic and Social Success), 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 where to obtain specific services and transact business, finding out where to get help, etc. All new students must complete COMPASS prior to attending classes for the first time.

Camp COMPASS, an off-campus leadership development program, is offered each Summer and Fall to new students and a select group of Kettering’s student leaders. 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 at http://www.kettering.edu/current-students/campus-safety-0/parking-policy.

Parents’ Advisory Council
The Kettering University Parents’ Advisory Council provides a channel of communication between parents and the University. It enables Kettering to address the special interests and concerns of parents and provides a means for the exchange of ideas and support.

Professional Societies
Professional societies offer career development opportunities to students, as well as regional and national activities. Fourteen are represented on the Kettering campus:

- American Chemical Society
- Institute of Industrial Engineers
- American Institute of Aeronautics and Astronautics
- National Society of Black Engineers
- American Marketing Association
- Society of Automotive Engineers
- American Society of Heating, Refrigeration and Air-Conditioning Engineering
- American Society of Mechanical Engineers
- Society of Hispanic Professional Engineers
- American Society of Aeronautics and Astronautics
- Society of Manufacturing Engineers
- American Society of Mechanical Engineers
- Society of Physics
- Institute of Electrical and Electronics Engineers
- Society of Women Engineers

Each society has its own faculty advisor. Consult the Student Handbook for further information.

**Recreation Services**

Recreation Services provides facilities and programs to meet the recreational and fitness interests of the Kettering community and their families. Opportunities exist to practice and learn skills which lead to healthy and satisfying life-styles. Numerous competitive and cooperative activities provide an ideal environment to test one’s skills and to develop athletic competency.

The Recreation Center features an open multi-sports forum with 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, the semi-annual graduation ceremonies, and an annual 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 Magnum, Life Fitness, and other exercise equipment, Weight Room featuring Cybex equipment, equipment issue area, Student Lounge, Sargent Alumni Lounge, and staff offices.

Fitness programs including aerobics, water aerobics, yoga, body fat testing, indoor cycling, and walking programs. Clinics to familiarize students with Recreation Center equipment and fitness assessments are available for students. A number of instructional programs including scuba, Learn to Swim, Running for Fitness, and Karate are offered.

Reservations and drop-in play are accommodated. Memberships are available for individuals residing with students. A publication entitled “Recreation Center Guidelines” is published annually to aid members in use of the facility. A validated Kettering University ID card is required for access to the Recreation Center.

**Special Campus Programs**

**Fine and Performing Arts**

Opportunities to participate in a variety of fine and performing arts are available to Kettering University students. Band, choir, watercolor painting, clay hand-modeling, photography and piano and guitar lessons have been offered dependent upon student interest.

**Flint Area Public Affairs Debates**

Kettering University co-sponsors the Flint Area Public Affairs Debates (FAPAD), a program devoted to promoting public understanding of critical political and social issues. Since its founding in 1986 by local educational institutions, a member of the Department of Liberal Studies has represented the university on the planning committee. The FAPAD provides four panel discussions or debates each year on such topics as strategies for improving Flint’s business climate, the costs and benefits of increased homeland security, and the advantages and disadvantages of school vouchers. Debates take place at venues throughout Flint.

**Global Issues Film Festival**

The Global Issues Film Festival is presented annually to increase awareness of global issues among students and within the local community. Organized by the Department of Liberal Studies and jointly sponsored by Kettering University and Mott Community College, prize-winning documentaries from around the world are shown at both campuses. Every festival features discussions with filmmakers about the craft of filmmaking and the issues that stimulated the making of the films.

**Student Academic Resource Center**

The Student Academic Resource Center (SARC) is designed to provide academic support to Kettering University students. Refer to the Academic Performance section of this catalog for more information.
Student Life Programs
The Student Life Programs office coordinates the development and implementation of programs and services that enrich student’s collegiate experiences and facilitate personal growth.

(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, and to ratify the President’s appointment of a Director of Operations and a Treasurer.

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, major events, production of the student newspaper, and management of WKUF radio station. 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 focal point for all women on campus and provides both a place and a forum for programs that enhance their academic, professional, and personal development. Each term, the WRC presents weekly programs planned and carried out by students, as well as a number of special events designed to ensure women’s full participation in the professions.

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. The OWSA sponsors a wide variety of resources for current and potential women students so they have the knowledge and information necessary to pursue their interests.

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.
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 open to any student who has completed at least four courses in physics at Kettering, who ranks in the top third of their graduating class. Membership in the Society of Physics Students is also required.

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.

Clubs and Organizations

Kettering University Clubs and Organizations Recognized by Kettering Student Government (KSG)
KSG recognizes 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 Life office.

Aerospace Club: To promote interest in careers in aerospace and aviation.
Allies: Provides resources and support for gay, lesbian, bisexual, and transgendered students.
Airsoft Club: To provide a structured environment for interested students to learn the fundamentals of the sport of Airsoft.
Anime Club: The promotion, viewing, and discussion of the Japanese style of animation.
Aquaneers: Scuba diving club.
Asian American Association (AAA): Supports and celebrates the various cultural heritages of Asian-descent students.
Black Unity Congress (BUC): Organizes activities to unify, stimulate discussion, and educate students about African-Americans and others.
Chemistry Club: Dedicated to advancing knowledge about chemistry.
Chemical Engineering Club: Offers support and resources to chemical engineering students.
Chess Club: Kettering students play, compete, and enjoy the game of chess.
Cliffhangers/Rock Climbing: Rock climbing at off-campus facilities.
Dance Club: Learn swing dancing, salsa, and other styles of dance.
Fencing Club: Provides training and competitive opportunities to students interested in fencing.
Firebirds: Automotive enthusiasts participate in competitive events, shows, instruction, tools, and facilities.
FIRST Robotics: Competitive robotic challenges.
Gaming Society: Members host matches and tournaments each semester playing Bridge, Euchre and other card games; role-playing games; board games such as Chess, Battletech, StarCraft, WarCraftII, and Magic; and others.
Golf Club: Members play golf.
Green Engineers Organization: Hosts eco-friendly activities and events.
Grill Club: Expands Kettering Student’s knowledge of the art of grilling.
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**Hockey Team:** Members play regional teams through the Michigan Collegiate Hockey Conference.

**International Club:** Members learn about history, world views, and diverse cultures.

**Jazz Band:** Musicians play jazz, rock, swing, and other styles of music.

**Karate Club:** Promotes the martial arts. Members who train regularly have the opportunity to join the World Tang Soo Do Association and to test for belts.

**Kettering Thunder Ultimate Frisbee Team:** Kettering's team competes in USA Ultimate college season and includes both A and B section members.

**Kettering Crusade for Christ (B-Section):** Christian campus ministry.

**KLUG:** Kettering Linux Users Group.

**Laser Tag:** Members play laser tag.

**Mudboggers/Off Road Club:** Sponsors trips to various off-road venues; promotes responsible four-wheeling.

**Open Source Club:** Further student knowledge of open source software.

**Outdoors Club:** Promotes outdoors activities, appreciation for nature, and sportsmanship through hiking, rock climbing, horseback riding, skiing, white-water rafting, and canoeing.

**Paintball Club:** Members play indoor and outdoor paintball.

**Physics Club:** To promote interest in Physics and related career fields.

**Pre-Med Club:** Open to all students who have an interest in medicine.

**Real Service:** Promotes and sponsors opportunities for volunteerism and community service.

**Soccer Club:** Members participate in scrimmages and sport club matches. The club also participates in city-wide leagues and tournaments.

**Student Newspaper:** Members produce the *Technician*, published monthly as the voice of Kettering students.

**Trap and Skeet Club:** Members, through training and educational sessions, learn how to shoot trap and skeet, sporting clays, .22 caliber rifles, and pistols. Hunting and firearm safety courses are also offered.

**Welding Club:** Instruction in welding technology.

**WKUF-FM:** Members operate a low-power radio station at 94.3 in Flint.

### Student Housing

**On Campus Student Housing**

Frances Willson 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, with each resident receiving their own room and unit groupings of 30-40 residents per unit. Resident Assistants staff individual units. RAs and professional staff carry out programs and activities which contribute to students' personal maturation. Residential Peer Tutors, upper class students with exemplary academic performance, provide tutoring, at no cost, in a variety of subjects.

All first year students, except those who are married or over 21 years of age, are required to live in Frances Willson Thompson Hall for a minimum of two academic terms. Transfer students who have completed one year of residence life elsewhere may request a waiver of the housing residency requirement. Waivers should be sent to the Director of Residence Life at least 30 days prior to enrollment.

The residence hall is air conditioned, heated, and networked for internet. Each student’s room is equipped with a bed, desk, dresser(s), bookshelf, closet space, a Micro Fridge, telephone jack, a computer jack, and a cable television outlet.

**Off-Campus Student Housing**

As a service to Kettering students, the University provides the opportunity for individuals, companies, and firms to publicize available off-campus housing through Kettering’s housing portal, located at [http://www.kettering.edu/current-students/student-life-programs/student-life-programs/campus-housing](http://www.kettering.edu/current-students/student-life-programs/student-life-programs/campus-housing).

The University does not investigate, endorse, or guarantee the suitability of those who respond to the listings. Users of this service communicate and contract with each other individually and at their own risk. The University and employees of Kettering University are not liable for any actions occurring as a result of arrangements made between users of this service or for any errors or omissions made in compilation or printing of the listings.
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 provide students with progressively more responsible and productive experiences related to, and consistent with their academic program and professional goals.
2. To provide educational experiences which orientate and integrate students into productive and professional roles within their respective work environments or to prepare them for the next level of their educational pursuits.
3. To develop positive work-related habits, characteristics, and transferable skills which promote professionalism, leadership, 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 authorized employer. In addition to the required work terms, students must complete and receive credit for a culminating undergraduate experience (CUE/thesis) term.

Students who enter in at freshman status (less than 24 credits) must complete a minimum of five successful work terms and one CUE term. Three of the five successful work terms must be completed after the student reaches junior status.

Transfer Students who enter in at sophomore level status (24 earned credits) must complete a minimum of four successful work terms and one CUE term. Three of the four successful work terms must be completed after the student reaches junior status.

Transfer Students who enter in at junior level status (56 earned credits) must complete a minimum of three successful work terms and one CUE term.

Students transferring to Kettering University with a baccalaureate degree (from another institution) must complete a minimum of three successful work terms and one CUE term. The work terms must be earned while a Kettering University student.

For students who wish to return to Kettering University for an additional baccalaureate degree, refer to the Academic Policies and Procedures section of this catalog, under “Second Baccalaureate” for co-op work term requirements.

NOTE: The CUE term requirement is in addition to the required work terms. Students may not receive co-op credit during the CUE registration term.

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, as well as any resulting consequences of not meeting them. Students whose cumulative GPA falls below 2.7 may be in jeopardy of being released from their co-op assignment. It is the students’ 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 should consult with their Cooperative Education Manager/Educator with questions about this process.

The Alternation Sequence

Each student assumes responsibility for maintaining satisfactory progress toward their degree. This includes following an alternating sequence between school and work while they are 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.

<table>
<thead>
<tr>
<th>A-Section</th>
<th>B-Section</th>
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<tbody>
<tr>
<td>Summer: School</td>
<td>Summer: Work</td>
</tr>
<tr>
<td>Fall: Work</td>
<td>Fall: School</td>
</tr>
<tr>
<td>Winter: School</td>
<td>Winter: Work</td>
</tr>
<tr>
<td>Spring: Work</td>
<td>Spring: School</td>
</tr>
</tbody>
</table>

Any changes to this school/work sequence must be approved in advance through the petition process. Refer to the Academic Policies and Regulations section of this catalog (Petition to Alter Academic/Work Sequence) for more information.
Continuous Growth

The cooperative education partnership is designed to achieve the educational and career goals of our students in conjunction with meeting the future human resource 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 organization, they start over in the learning process and are often given less responsibility until their learning curve increases. Staying with the same organization throughout the entire program has proven to increase opportunities and the responsibility level afforded to the student.

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/Educator to help determine if the process is necessary. Kettering will approve reassignment after it has been determined that it would be in the best interest of the student and the employer (see below: Changing Co-op Employers). It should be recognized that changes in assignment are permitted, but are not granted solely on the basis of student financial gain, personal commitments or assumed responsibilities. The intent of the cooperative relationship is to meet the goals of both the student and the employer, but not at the expense of the other. A healthy respect for both is needed to maintain a successful program.

Other Experiential Learning Opportunities

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

- On-campus co-op opportunities
- Internships
- Research opportunities
- Entrepreneurship opportunities
- Service Learning
- Competitions

Students who are interested in integrating some of these options should work closely with their Cooperative Education Manager/Educator; 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 staff, or a variety of other means such as Co-op Employment Fairs, personal referrals, or through self selection via our Kettering Connect System, where employers may post their positions on line 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 staff 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 while registered for a co-op or thesis term.

Grading System

To receive a Pass/Fail 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 completion of 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, required to work overtime or various shifts depending on the employers needs. A student hired later than the start of the term, or released prior to the end of the term (except under extreme conditions) must work at least six weeks (250 hours) of the twelve week term and receive a “satisfactory” grade to have their work experience count toward graduation requirements.

The Work Term Reflection

For questions about Work-Term Reflections, students should contact their Cooperative Education Manager/Educator.

Work Experience Evaluations

The student’s performance during a cooperative work experience term 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.

Changing Co-op Employers

It is mandatory that students work at least two work terms with an employer and have given their best to be a responsible employee before they petition for reassignment. Students desiring a change in co-op employer must meet with their Kettering University Cooperative Education Manager/Educator to discuss the reason(s) for the request. Requests for reassignment must be approved by the Cooperative Education Manager/Educator 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 knowledge and approval from the Cooperative and Experiential Education Office.

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.).

The Reassignment Process

The Reassignment Committee will consider all reassignment requests on a case-by-case basis. In order to submit requests for reassignment, students must follow these steps:

- Make an appointment with the Cooperative Education Manager/Educator before pursuing reassignment, preferably at the beginning of a term.
- The Cooperative Education Manager/Educator will work with the student to determine if reassignment is the right step.
- If pursuing reassignment is agreed upon, the student will fill out all necessary forms, which include:
  - Reassignment Employment Request/Authorization Form.
  - Reflection Form (for terminations).
  - Provide written documentation explaining reason(s) for the reassignment request.
  - Student Obligation Form (if necessary).
  - Employer Notification - This is a formal resignation letter (if necessary).
Ensure copies of the following are accurate and up-to-date:
- All evaluations, both student and employer, are complete.
- Current transcripts.
- Updated resume.

The Cooperative Education Manager/Educator or Review Team 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 encouraged to contact their Cooperative Education Manager/Educator for advice and counsel before making any change to their cooperative education program.

**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 are allowed to continue in the academic program until they can no longer meet the minimum co-op requirements to graduate. 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 assistance of the Cooperative Education staff.

Locating positions for students with unsatisfactory academic performance can be difficult. 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/Educator.

**Student Concerns and Complaints**

Refer to the Academic Policies and Regulations section of this catalog, under Student Complaint Procedures.
CULMINATING UNDERGRADUATE EXPERIENCE

The Culminating Undergraduate Experience (CUE) is a unique aspect of a Kettering University education. Students become eligible to begin work on the CUE when they have earned a minimum of 88 credit hours. The CUE project is an academic requirement completed during two terms, commonly the two following completion of the required number of co-operative education terms. The purpose of the CUE is for students to perform a comprehensive project from its inception to its conclusion. There are 4 credit hours awarded for the CUE. The focus of this project may be a product, system, creation of a comprehensive business plan or results of investigation of a new idea. The student must produce a technical document, the Thesis, reporting on the student’s performance and project outcomes. The project may be industrial or non-industrial based. Details on the CUE process and associated deadlines may be obtained from the Center for Culminating Undergraduate Experiences (CCUE). The CCUE is responsible for the overall CUE process at Kettering University. Initial Thesis Advisement is required for all students who have JR I status at which time will learn the process of conducting a CUE.

NOTE: The CUE term requirement is in addition to the required work terms. Students may not receive co-op credit during the CUE registration term.

Registration

While the CUE project is designed to be completed within two terms, there is only one registration. In most cases, the registration is placed in one of the students final work terms, but not in their final (graduating) term. Upon completion of the CUE project, when the final, passing grade is received in the Registrar’s Office and posted to the record, students will receive four credit hours for the project. Students who do not complete the project within two terms must contact the Center for Culminating Undergraduate Experiences.

CUE Options

A student is eligible to pursue one of four CUE options: Co-op Thesis, Research Thesis, Professional Practice Thesis and E-ship Thesis. Kettering University requests that employers make the thesis project at least half of the student’s workload during the two thesis terms. Students are highly encouraged to pursue a Co-op Thesis; however, if the student is unemployed or is seeking a different track of study (approval from co-op employer is required), students can choose one of the other options. Two work terms should be devoted to the thesis. Over the Thesis 1 term the student should be conducting the research, testing, etc. completing all of the work on the project and begin writing the thesis. While during the Thesis 2 term the student should finish up his/her writing and submit the preliminary thesis. This is normally the flow when a student is ending his/her last required term as an academic term. However, if a student’s last required term is a Thesis 2 term, then the student will need to finish the writing and submit the thesis in the academic term prior to his/her Thesis 2 term. This will provide adequate time to go through the review process by the end of the Thesis 2 term. A thesis grade of Pass with Distinction, Pass or Fail will be issued. The thesis will be archived in the Thesis Digital Archive on Kettering’s Library website for viewing. Both the student and employer with receive a bound copy of the thesis within two months upon completion. All confidential theses will not be bound nor will be available for viewing in the Digital Thesis Archive. Kettering’s Confidential Agreement is available in KqUest for the student’s employer to determine the sequestering period and for signature.

Co-op Thesis

This CUE option is carried out at the student’s co-op employment. It is an individual project providing an opportunity for the senior student to apply his or her academic and co-op experience to a realistic problem. This option requires that a student be advised by a faculty member and employer supervisor. The student and employer advisor together develop the project. The topic selected is to be submitted to Kettering for approval, specifically the faculty member accepting the topic. The student is required to produce a tangible artifact including a comprehensive final written report. This is a two-term project. This new CUE option is offered as one of four options and will normally be undertaken in the students last work term. In addition, participation in an annual Kettering Poster Session and/or presentation of the thesis is highly encouraged.

Research Thesis

This CUE option requires the student to apply and be accepted through the Center for Culminating Undergraduate Experiences (CCUE) in collaboration with the research faculty member. This option requires that a student be advised by a faculty member as well as at least one qualified committee member. The topic is determined by a Kettering faculty member for accepted students pursuing this option and requires topic approval from CCUE. The student is required to produce a tangible artifact including a comprehensive final written report. This is a two-term project. This new CUE option is offered as one of four options and will normally be registered in the students last work term. In addition, participation in an annual Kettering Poster Session and/or presentation of the thesis is highly encouraged.
Professional Practice Thesis
This CUE option requires the student to apply and be accepted through the Center for Culminating Undergraduate Experiences (CCUE). The project is focused on professional practice in a group setting and is interdisciplinary, providing an opportunity for the senior student to apply his or her academic and co-op experience to a realistic problem at a pre-selected organization. This option requires that a student be advised by a faculty member as well as at least one committee member (normally company liaison). The topic is pre-selected for accepted students pursuing this option. The student is required to produce a tangible artifact including a comprehensive final written report. This is a two-term project. This new CUE option is offered as one of four options and will normally be registered in the students last work term. In addition, participation in an annual Kettering Poster Session and/or presentation of the thesis is highly encouraged.

E-ship Thesis
This CUE option requires the student to apply and be accepted through the Center for Culminating Undergraduate Experiences (CCUE). This option requires that a student be advised by a faculty member as well as at least one qualified committee member (normally the Director from the Entrepreneurship Across the University). The topic selected requires approval from CCUE in collaboration with the Director from Entrepreneurship Across the University. The student is required to produce a tangible artifact including a comprehensive final written report. This is a two-term project. This new CUE option is offered as one of four options and will normally be registered in the students last work term. In addition, participation in an annual Kettering Poster Session and/or presentation of the thesis is highly encouraged.

Submitting a Topic Idea
A proposal/topic for the project, the Proposed Thesis Assignment (PTA), is submitted electronically by the student to Kettering University via KqUest. Once the PTA has been approved, the student may begin work on the project. The role of the employer advisor is to provide company resources, expertise to the student and reviews the preliminary thesis document. For further details, an employer advisor manual is available on the CUE website. The faculty advisor mentors the student, reviews the preliminary and final thesis documents, and issues a grade for the thesis upon completion.

CUE Process
Students will learn about the CUE process during initial thesis advisement as a Junior I. KqUest (thesis software tool) houses all information for the student about the CUE. KqUest is a time management tool with due dates, tasks toward completion, the process and all the forms needed to be completed by CUE. Students must submit their Final Thesis Submission a minimum of six weeks prior to their expected graduation date.
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 Web Self Service. Changes in addresses and phone numbers can also be made in the Registrar’s Office, Room 3-309 AB.

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 in writing and should include the student's full name (or name used while attending Kettering), Student Identification Number (or last four digits of Social Security number), current daytime telephone number and signature to ensure proper identification of the records requested. The Registrar's Office will accept this written permission in person, by fax 810-762-9836, scan/email, or by US mail. There is no charge for transcripts. Official transcripts will not be issued to students who fail to meet their financial obligations or agreements with Kettering University. Unofficial transcripts are also available on Banner Web.
FEDERAL FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (FERPA)

By federal law, students have the right to review, verify the accuracy of and be assured of the confidentiality of all information kept on their behalf by the Kettering Registrar’s Office. Other than the individuals and committees specifically mentioned in the Educational Need To Know section below, the student records maintained by Kettering other than directory information, cannot and will not be released without specific written permission of the student or their legally designated representative or a duly authorized and issued court order. In the case of directory information, a student may deny its release on a yearly basis by so stating in writing to the Registrar’s Office. Students may obtain further information regarding the federal law and Kettering’s policies and practices regarding student information by contacting the Registrar’s Office directly. A student may file a complaint with the United States Department of Education if the student feels his/her rights have been violated.

Family Policy Compliance Office
US Department of Education
400 Maryland Avenue South West
Washington, DC 20202-4605

Federal Right to Know Laws

Federal Right to Know Laws prescribe certain mandatory information concerning the success rate of students entering the degree programs may be given to all parties. In compliance with federal regulations, graduation and retention rates for Kettering University are available on the Kettering University website at http://www.kettering.edu/oie/retention-and-graduation-rates.

Directory Information

Kettering University maintains the following public information for each student:
- Corporate affiliation
- Date of Graduation (actual or expected)
- Dates of attendance
- Degree program
- Degrees and honors awarded
- Enrollment Status (full or part-time)
- Photo
- Previous institutions attended
- Student classification (Freshman, Sophomore, Junior, Senior, Graduate Student)
- Student name, address, phone number, and e-mail address

Educational Need to Know

The following offices, committees, and persons receive specific information for some students appropriate to their assigned responsibilities:
- Academic Advisors
- Academic Success Center
- Accrediting Organizations
- Agencies conducting business on behalf of Kettering (i.e. National Clearinghouse and banks)
- Cooperative Education Managers
- Corporate Employers
- Equal Opportunity and Institutional Diversity Office
- Faculty Senate Academic Review Committee
- Financial Aid Office
- Provost Office
- Registrar’s Office
- Student Affairs Office
- Permission for each of these parties to receive the student’s academic grades is implied when the student agrees to enroll in the Kettering University degree program.

Solomon Amendment

Federal law requires that all institutions of higher learning provide directory information to the military upon request.
ACADEMIC POLICIES AND REGULATIONS

All faculty and students are urged to review and understand the University’s Academic Policies and Regulations. This section is 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 sections of the catalog, when necessary. Each section also concludes with the name of the official or office to contact with questions.

Academic Advising

The primary purpose of the Kettering University academic advising program is to support the university’s mission of preparing future leaders for a global workplace by assisting students in the development of meaningful educational plans. At Kettering, academic advising represents a shared relationship between the student and his/her academic advisor and a process of continuous improvement, clarification and evaluation with the aim of assisting the student in achieving his/her goals. Each academic department has established its own system for facilitating advising processes as well as a representative academic program. In addition to following the representative program, students are encouraged to meet regularly with an academic advisor (at least once per academic term) to discuss academic matters, to determine progress toward degree completion, and to ensure that prerequisites have been satisfied and other departmental requirements have been met.

Questions: Contact the degree/program department

Academic Standing (Probation)

To be in good academic standing, students must maintain a minimum cumulative GPA (grade point average) of 2.0 and successfully complete 12 credit hours within an academic term. Students who do not meet these criteria are placed on academic probation.

Students should reference the Financial Aid section of this catalog regarding Satisfactory Academic Progress (SAP) and how it may affect Financial Aid disbursement.

Academic Probation

A student who fails to meet the above criteria after being in good standing is placed on Level I (P1) Probation.

- If the student completes 12 credit hours and maintains a cumulative GPA ≥ 2.0 at the end of the P1 term, the student returns to good standing.
- If the student completes 12 credit hours and earns a term GPA ≥ 2.0 (but a cumulative GPA < 2.0) at the end of the P1 term, the student is held on Probation Level I for the next term.
- If the student fails to complete 12 credit hours and to earn a cumulative GPA > 2.0 at the end of the P1 term, the student is placed on Probation Level II.

A student is placed on Level II (P2) Probation after two consecutive terms in which he or she fails to complete 12 credit hours and to maintain a cumulative GPA > 2.0.

- If the student completes 12 credit hours and maintains a cumulative GPA ≥ 2.0 at the end of the P2 term, the student returns to good standing.
- If the student completes 12 credit hours and earns a term GPA ≥ 2.0 (but a cumulative GPA < 2.0) at the end of the P2 term, the student is held on Probation Level II for the next term.
- If the student fails to complete 12 credit hours and to maintain a cumulative GPA > 2.0 at the end of the P2 term, the student meets the criteria for academic dismissal and the case is reviewed by the Academic Review Committee.

A student on academic probation is required to develop and implement strategies for academic success with the assistance of a success coach. Appointments for success coaching may be arranged by visiting the Academic Success Center (3-322, Academic Building), emailing academicsuccess@kettering.edu, or calling (800) 955-4465 ext. 9775.

Academic Dismissal

Academic dismissal can occur if a student on Level II Probation fails to show significant academic improvement. Upon notification of a review for academic dismissal, the student may choose to withdraw from Kettering University or submit a written appeal to the Academic Review Committee, a subcommittee of the Kettering University Faculty Senate. The decision of that committee is final, and no further appeal process is available.
Voluntary Withdrawal
A completed Undergraduate Withdrawal from University Form must be submitted to the Academic Success Center by the end of the 5th week of the term within which a student is being considered for dismissal. Students that decide to return to Kettering after a voluntary academic withdrawal can do so only after three consecutive terms (nine months) and with the signed approval of the Academic Success Center. A student that loses good academic standing after an academic return will proceed directly to the academic review process.

Readmission of Academically Dismissed Students - Freshmen and Sophomores
A student who appeals and is dismissed by the Academic Review Committee must petition directly to the Committee for readmission one term prior to the term in which the student seeks readmission. A student may not petition for readmission until the following four conditions are met:
1. A minimum of three terms (nine months) elapsed following the term of academic dismissal.
2. During the period of dismissal the student attended another institution of higher education as a full-time, non-degree-seeking student, completing a minimum of twelve credit hours per term/semester.
3. The student earned a 3.0 term/semester GPA from the college of attendance.
4. Courses taken were representative of courses taken within the student’s chosen degree program at Kettering University.

Once the above requirements have been met, the student may petition the Academic Review Committee for readmission. To do so, the student must request probationary readmission by submitting a letter and an official transcript from the institution in which the courses were taken to the Academic Review Committee. For further information call (800) 955-4464, ext. 9775.

All students granted readmission will be admitted on a probation level II status and will not be allowed to attend consecutive academic terms immediately following the readmission term. Additionally, these students will be required to meet with an adviser and success coach (these may be one and the same) to design a study plan and create an academic improvement plan (AIP), which will outline the steps each student needs to take to return to good standing. These students are expected to fulfill all of the requirements outlined in the AIP. Readmission after the dismissal by the Academic Review Committee will be permitted one time only.

Provisional Readmission - Juniors and Seniors
Readmission by Provisional Readmission Agreement is available only to students at the junior and senior level. Students may petition for readmission by Provisional Readmission Agreement after a minimum of two terms (six months) following the term of academic dismissal.

A student granted provisional readmission will not be allowed to attend consecutive terms immediately following the readmission term. Readmission under the Provisional Readmission Agreement will be permitted one time only. At the end of the provisional term, the student must meet all of the following requirements in order for readmission to be valid:
1. **Course Load:** The student must meet with his or her academic department to determine how many credits (between 12 and 16) and which courses the student is allowed to take during the provisional term.
2. **Academic Performance:** The student must achieve a term GPA ≥ 3.0 with no individual course grade less than a C for all enrolled courses. Withdrawals, audits, and incompletes are determined on a case-by-case basis.
3. **Curriculum Advising and Success Coaching:** The student is required to meet with an adviser and success coach (these may be one and the same) to design a study plan and create an academic improvement plan (AIP), which will outline the steps the student needs to take to return to good standing. The student is expected to fulfill all of the requirements outlined in the AIP.
4. **Course/University Expectations:** Additional requirements may be put forward by faculty or staff (for example, course attendance), which do not modify academic performance requirements listed above.

**Academic Support (peer tutoring and writing assistance)**
The Academic Success Center provides various types of academic support to Kettering University students. Peer tutors assist students with subject knowledge in undergraduate math and science courses. Writing consultants help students with writing assignments in any classes. Appointments are preferred but not necessary. Tutoring schedules are available online (www.kettering.edu/academicsuccesscenter) and in the Academic Success Center (3-322 AB). For more information, call (810) 762-9775.

**Questions:** Contact the Academic Success Center

**Academic and Work Terms**

Students alternate 11 week academic terms with 12 week terms of progressively challenging work with an authorized employer.

**Questions:** Contact the Office of the Registrar
The Alternation Sequence – Academic and Work Terms

Each student assumes responsibility for maintaining satisfactory progress toward their degree. This includes following an alternating sequence between school and work while they are 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.

<table>
<thead>
<tr>
<th>A-Section</th>
<th>B-Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer:  School</td>
<td>Summer: Work</td>
</tr>
<tr>
<td>Fall: Work</td>
<td>Fall: School</td>
</tr>
<tr>
<td>Winter: School</td>
<td>Winter: Work</td>
</tr>
<tr>
<td>Spring: Work</td>
<td>Spring: School</td>
</tr>
</tbody>
</table>

Any changes to this school/work sequence must be approved in advance through the petition process (below).

Petition to Alter Academic/Work Sequence

If circumstances arise and a student finds it necessary to alter their academic/work sequence, they must submit a Petition to Alter Academic/Work Sequence Form. Exceptions are considered for circumstances involving GPA issues, problems in course scheduling, change in academic major, employment status, special academic opportunities (such as study abroad programs) or a documented, major medical concern. Students may not adjust their alternation sequence without receiving advisement and all required approvals on the petition form. This ensures the student, their academic advisor, the employer, the Cooperative Education Manager/Educator and the Office of the Registrar will be aware of any change in plans. As such, arrangements made between students and employers may or may not be approved. It is the responsibility of the student to submit the completed, signed Petition to the Office of the Registrar so that appropriate registration adjustments are made. Failure to comply with this procedure may put the student’s status with the university in jeopardy and, in some cases, the student being dropped from the co-op program. Students should consult with the Financial Aid Office for information on how altering the academic/work sequence may affect financial aid.

Questions: Contact the Office of the Registrar

Attendance

Prompt and regular attendance is expected of the student 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 outcome. Faculty may include explicit attendance requirements with course grade penalties in their course. The student is expected to clearly understand, at the beginning of the term, if such requirements exist. Students should note that, although professors are not required to provide opportunity for making up missed work due to absence, most professors provide that opportunity when the absence was beyond the student’s control. Only the professor may or may not excuse an absence.

Dismissal for Violation of Professor’s Attendance:

Faculty may have strict attendance policies whereby a student is dismissed from a class when a set number of absences are accumulated. If the dismissal occurs during the course withdrawal period specified on the academic calendar, a grade of WN (withdrawal for non-attendance) is issued. If the dismissal occurs after the specified course withdrawal period, the grade of FN (failure for non-attendance) is issued. The student may appeal the dismissal to the department head.

Last Known Date of Attendance Reporting:

Kettering University does not require faculty to take attendance. However, the U.S. Department of Education requires the Financial Aid Office to differentiate students who fail a class because they quit attending from those who fail a class based on merit. Because a student could be a financial aid applicant at any point during the academic year, we must collect this information for all students, so that financial aid eligibility can be accurately determined.

The Last Known Date of Attendance Reporting Policy is necessary to appropriately assess the financial liability for students, ensure good stewardship of financial aid funds, and limit the financial liability for the university and academic consequences for the student. The amount of Title IV funds earned by a student is based on the amount of time spent in attendance by the student for that term. In addition, this is often useful in arbitrating cases when students believe they completed the process to drop or withdraw from a course.

After the drop/add period each term, a “last date of attendance” notification, or “never attended” notification by a faculty member will result in the automatic assignment of either a WN (withdrawal for non-attendance) grade or an FN (failure for non-attendance) grade by the Registrar’s Office. This will initiate re-evaluation of a student's financial aid and Federal Title IV aid will be adjusted for those classes.
**Student Responsibility**

Students are expected to regularly attend classes in which they are enrolled. Students who decide to stop attending courses should immediately withdraw from those course(s) prior to the course withdrawal deadline specified on the academic calendar. Students who do not officially withdraw from a course (or courses) they are not attending may be reported by their instructor as having a 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.

**School Responsibility**

After the drop/add period each term, a last date of attendance reporting by a faculty member will result in the automatic assignment of either a grade of WN (withdrawal for non-attendance) or FN (failure for non-attendance) by the Registrar’s Office as follows:

- A grade of WN (withdrawal for non-attendance) will be 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 will not affect a student’s term or overall GPA.
- A grade of FN (failure for non-attendance) will be 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 will be included in a students’ term and overall GPA.
- Once a faculty member has reported a last date of attendance, the student will no longer be able to attend or participate in the class.

With the Last Known Date of Attendance Reporting Policy, the assumption is that students who receive an F in a class have received that grade based on merit, and not because they quit attending.

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 a transcript with the grade AU (audit) and no credits earned. 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.

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 during 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.

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.

Questions: Contact the Office of the Registrar

**Bachelor/Master Program**

The Bachelor/Master Program is available to Kettering University undergraduate students only. Kettering undergraduate students who desire to obtain a master’s degree may elect to complete the bachelor/master program which provides students an opportunity to accelerate the process in which they earn both a bachelor’s degree and a master’s degree. This program is available only to Kettering University undergraduate students and leverages Kettering University’s premier academic programs. Not all graduate degrees are available through the bachelor/master options. See the degree granting department for information.

Students who are admitted into the bachelor/master program will complete the same total number of work terms as conventional non-bachelor/master undergraduate students.
Option 1: Undergraduate Thesis and Optional Graduate Thesis

- Students must apply before graduating (after completing 120 credit hours) or within six (6) years after obtaining their undergraduate degree.
- The student completes the undergraduate degree, with the traditional undergraduate thesis (BS), and receives the bachelor's degree at the conventional time.
- Up to eight (8) credits of mezzanine level (500-level) courses, which were completed at the undergraduate level, are also applied to the master’s degree. (Mechanical Engineering capstone courses do not apply.)
- Forty (40) credits remain to complete the MBA (total of 48 graduate credits) or thirty-two (32) credits remain to complete the master’s degree (total of 40 graduate credits). As an option, four (4) of these credits can be granted for an MS thesis.

Option 2: Graduate Thesis Only: No Undergraduate Thesis

- Eight credits granted for the graduate-level thesis, four are applied to the undergraduate degree, four are applied to the graduate degree.
- The student will not receive the bachelor's degree until completion of the graduate-level thesis.
- One course (four credits) will be waived in the graduate program.
- Eight credits of mezzanine level (500-level) courses, which were completed at the undergraduate level, are also applied to the master's degree.
- 28 credits will remain to complete the master's degree (for a total of 36 graduate credits).
- The graduate-level thesis will be a more purely academic thesis driven by the faculty, but must be authorized by the student sponsor.

Students must apply to this option before normally starting their undergraduate thesis (i.e. before submitting their Proposed Thesis Assignment) (PTA).

Grade Requirements
Students who possess an overall minimum GPA of 3.7 are granted acceptance into this program. Students with a GPA lower than 3.7 may be considered on an individual basis. The degree-granting department will determine acceptance.

Other Requirements
Both part-time and full-time Graduate Students may qualify for this program; this program is only available to students who will receive (or have received) a Kettering bachelor's degree; and students must formally apply to the program. See the respective academic department (as listed below) for an Admission Application for the bachelor/master program.

Questions:
- For Mechanical Engineering options, please contact Dr. Raghu Echempati at 810-762-7835 or rechempa@kettering.edu.
- For more information on this program for Industrial or Manufacturing Engineering, please contact the IME Department at 810-762-7941.
- For more information on this program for Business options, please contact the Department of Business at 810-762-7952 or business@kettering.edu.

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

<table>
<thead>
<tr>
<th>Classification</th>
<th>Code</th>
<th>Earned Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>FRI</td>
<td>0-11</td>
</tr>
<tr>
<td>Freshman</td>
<td>FRII</td>
<td>12-23</td>
</tr>
<tr>
<td>Sophomore</td>
<td>SOI</td>
<td>24-39</td>
</tr>
<tr>
<td>Sophomore</td>
<td>SOII</td>
<td>40-55</td>
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<tr>
<td>Junior</td>
<td>JRI</td>
<td>56-71</td>
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<tr>
<td>Junior</td>
<td>JR II</td>
<td>72-87</td>
</tr>
<tr>
<td>Senior</td>
<td>SRI</td>
<td>88-103</td>
</tr>
<tr>
<td>Senior</td>
<td>SRII</td>
<td>104-119</td>
</tr>
<tr>
<td>Senior</td>
<td>SRIII</td>
<td>120 and above</td>
</tr>
</tbody>
</table>
Note: The classification code, (FRI, FRII, SOI, SOII, JRI, JRII, SRI, SRII, and SRIII) whereby each major classification (Freshman, Sophomore, Junior, Senior) is subdivided into first and second semester levels, is for internal tracking of a student’s progress and estimation of the expected graduation date.

Questions: Contact the Office of the Registrar

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 the head of the department that houses the minor, or a faculty advisor in that department. 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

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.

Questions: Contact the Office of the Registrar

Dual Majors/Degrees

Double Major
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.

Two Degrees
Students may earn two undergraduate degrees simultaneously by completing all course requirements for any two majors that in combination require at least 28 credits beyond 161 credits. If capstone courses are required in both majors, both must be completed. Only one thesis is required. To pursue two degrees, obtain approval from departments for both degrees. Two diplomas will be awarded and both degrees will be shown on the transcript.

Questions: Contact the degree/program departments

Dual Undergraduate/Graduate Student Status

A Kettering undergraduate student may also hold Kettering graduate student status provided that (1) the student is currently accepted into a Kettering graduate program, and (2) all program requirements for the student’s declared undergraduate major(s), except thesis, will be met during the current academic term. Under such dual status, a student may be permitted to take up to a combined total of 20 credits of undergraduate and graduate courses, including guest credits, during that term. Student must declare, in advance, how each course is to be used to meet specific program requirements.

Questions: Contact the Office of the Registrar
E-mail: Notification/Obligation to Read

All students are provided with a Kettering University e-mail account. The Kettering e-mail account is one of the official ways Kettering University faculty and staff communicate to students. Students are responsible for required actions and information conveyed to them through this communication vehicle whether or not they read the message. Emails delivered through a Kettering account by a student to the University may be considered a formal communication, with the use of this password-protected account serving as a student’s consent for the communication. Refer to the Information Technology section of this catalog for more information.

Questions: Contact Information Technology

Enrollment Status/Verifications

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. Listed below are the enrollment statuses at Kettering University:

- 15 or more credits or COOP = Full Time
- 12-14 credits = Three Quarter Time
- 8-11 credits = Half Time
- 1-7 credits or THS3 = Less Than Half Time

Inactive Status Due to Non-enrollment

Students must have a registration in each term for course work, coop, or the culminating undergraduate experience (CUE) in order to remain a student in an active status. Circumstances may occur where this may not be possible. The student must then withdraw from the Kettering degree program until the next academic term in which they could be enrolled. Refer to the Academic Policies and Regulations section of this catalog for information on Withdrawals. Students with no registrations and who do not formally withdraw 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, available in the Office of the Registrar or on their website. The student’s cooperative employer is not obligated to continue their agreement with the student if the student status becomes inactive. However, the student and the employer are encouraged to make arrangements to re-establish that agreement when the student returns to active degree-seeking status whenever that is desirable and in their mutual interest. Inactive students in an inactive status will no longer have access to any campus buildings, the Recreation Center or Banner Web. Inactive students are not eligible for participation in commencement.

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 professor and by course, but generally amounts to between 20 and 40 percent.

Questions: Contact the Office of the Registrar
Grades

Students may view and print their term grades on the Banner Web by using their Student Identification Number and Personal Identification Number (PIN). Unofficial transcripts are also available on Banner Web.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>These grades are awarded to students whose level of performance is outstanding. These students understand the concepts and the principles of the course and are able to apply them creatively to unfamiliar situations, to use correct methods accurately in problem solving, and to communicate their feelings to others effectively.</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>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.</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td></td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>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.</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td></td>
<td>1.7</td>
</tr>
<tr>
<td>D+</td>
<td>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.</td>
<td>1.3</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>F</td>
<td>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.</td>
<td>0.0</td>
</tr>
<tr>
<td>FN</td>
<td>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.</td>
<td>0.0</td>
</tr>
<tr>
<td>AU</td>
<td>A student is issued the non-punitive grade of Audit (AU) upon submission of Request to Audit form during the course withdrawal period specified on the academic calendar.</td>
<td>0.0</td>
</tr>
<tr>
<td>I</td>
<td>A student is issued Incomplete (I) whenever the circumstances do not allow completion in the normal time period.</td>
<td>0.0</td>
</tr>
<tr>
<td>S</td>
<td>A Student is issued a grade of Satisfactory (S) upon receipt of a satisfactory employer/student evaluation.</td>
<td>0.0</td>
</tr>
<tr>
<td>U</td>
<td>A student is issued a grade of Unsatisfactory (U) upon receipt of an unsatisfactory employer/student evaluation.</td>
<td>0.0</td>
</tr>
<tr>
<td>W</td>
<td>A student is issued a grade of W (withdrawal) whenever withdrawing from a course during the course withdrawal period specified on the academic calendar.</td>
<td>0.0</td>
</tr>
<tr>
<td>WN</td>
<td>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.</td>
<td>0.0</td>
</tr>
<tr>
<td>P, PD, F, EX, NR</td>
<td>The thesis project is awarded the grade of Pass (P), Pass with Distinction (PD), Fail (F), Extension (EX), or Not Required (NR).</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Course Hours and Points Definitions

Quality Points = Grade x Credit Hours
GPA = Quality Points ÷ GPA Hours

**Attempted hours (AHRS)** - are 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 a measure of the student load.

**Credit hour** - represents one sixty-minute class period per week. For laboratory courses each credit hour represents two hours of scheduled laboratory work. A student is expected to devote three hours of effort per week for each registered credit hour. For example, a sixteen credit-hour load would require a total of forty-eight hours a week in classes, laboratories, study, and preparation.

**Earned hours (EHRS)** - represent 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.
Academic Policies and Regulations

Grade Point Average (GPA) - is 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) - are equal to the credit hour value of the course and are 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) - are a 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

Grade Appeals

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. The first level of academic appeal is the professor whose decision is questioned. The first step in this process involves contacting the course instructor in writing.

The process is initiated by completing a Grade Appeal Form which is available on the Registrar’s Office web page at: http://www.kettering.edu/registrar/forms_online.jsp. Each student must complete a Grade Appeal Form and attach any pertinent documentation to support his/her claim. Appeals should be initiated as soon as possible but no later than four (4) months after the grade has been posted. The student’s failure to access grades does not provide an exemption from the time limitation. The faculty member should respond within two (2) weeks of the student’s request for grade modification.

Students who are not satisfied with the decision of the Professor to whom they appealed, may subsequently appeal to the instructor’s department head within 30 days of the faculty member’s response. The Department Head must respond in writing to the student with a copy to the Instructor within 30 days of receipt of the appeal. The Department Head will serve as a mediator between the student and the instructor but cannot change a grade.

Students may submit a final appeal to the Associate Provost and Associate Vice President for Academic Affairs for appeal board review under the following conditions:

- Final course grades may be appealed only if the student can demonstrate that the grading policy applied to his/her grade does not conform with the stated grading policy of the professor. The absence of a grading policy will be considered reasonable grounds for appeal.
- The only legitimate grounds for second level appeal are arbitrariness, prejudice, or error, as applied to a specific student.
- Final appeals are restricted to cases in which the department head disagrees with the instructor’s decision.

When a final appeal is initiated, the Associate Vice President for Academic Affairs will convene an appeal board comprised of the following members: one tenured faculty member from the instructor’s department, chosen by the instructor; one tenured faculty member from the instructor’s department, chosen by the department head; one tenured faculty member from outside the instructor’s department, chosen by the Chair of ADEPT and the Associate Vice President for Academic Affairs (or designee), who does not vote, but chairs the board and handles all administrative matters. If the Appeal Board chooses to override the faculty member’s grade, they can only do so by changing the grade to a “P” for passing. The Provost’s Office will provide a written overview of the Appeal Board’s decision to all involved parties. Appeal Board actions represent a final university decision.

Students who are dismissed or suspended for reasons other than academic should refer to the Student Handbook for appeal procedures.

Questions: Contact the Office of the Registrar

Grade Changes

Grades (except incompletes) reported by an instructor are considered permanent and final. However, requests for a change of grade after an instructor reports a final grade will be honored to correct an error in calculating or assigning that grade. To facilitate this process, the instructor will submit to the Registrar a grade change form noting the rationale for the change and what retroactive correction is to be made. This form must be countersigned by the instructor’s department head. 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
Graduation

Detailed graduation information is available on the Office of the Registrar website at https://www.kettering.edu/offices-administration/registrar/information-undergraduate-students under “Graduation Information.” 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.

Application to Graduate

Graduation is not automatic upon completion of requirements. All students are required to complete and submit an application to graduate to the Office of the Registrar. Applications are available online at www.kettering.edu/registrar/forms_online.jsp.

Mailing Address and Email

It is the student’s responsibility to have a current mailing address on record in the Office of the Registrar and to regularly check their Kettering email. Important notifications and information are frequently sent via U.S. mail and email.

Graduation Requirements

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.

- **CUE (Culminating Undergraduate Experience) Requirement**: Satisfactorily complete a CUE project.

- **Academic Performance Requirements**: Be in academic Good Standing and achieve a cumulative GPA of at least 2.0.

- **Residency Requirements**: Complete a minimum of five full-time academic terms on the Kettering University Campus.

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

A final letter is sent to the student and his/her co-op employer 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.
Diplomas
Diplomas are mailed (to graduates who have completed all requirements) approximately 6-8 weeks after their graduation date. Diplomas are not considered official proof of graduation. For proof of graduation, students must request an official transcript. Diplomas and transcripts are withheld if the student has outstanding debt with the University.

Degree Completion for Inactive Students with Coursework Remaining
Inactive students who wish to return to Kettering University must contact the Registrar’s Office for assistance. After ensuring there are no outstanding financial obligations to the university, the Registrar will refer such students to the appropriate Academic Department Head or Discipline Chair to develop a plan of study. The final plan will be filed in the departmental office and in the student’s permanent file in the Registrar’s Office. These students will be subject to meeting the requirements for degrees in effect at the time of readmission.

Commencement
Commencement is the formal ceremony which recognizes and celebrates graduates and graduation candidates. At Kettering University, commencement is held annually at the conclusion of the spring term. Refer to the published academic calendar for the date of commencement. Detailed information including eligibility requirements is available on the web at https://www.kettering.edu/offices-administration/registrar/information-undergraduate-students under “Graduation Information.”

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.

Other Honors

- **Leadership Fellow**: A student leadership endowment established by recent graduates recognizing aspiring student leaders.

- **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 theses and be nominated by their faculty advisors.

- **President’s Medal**: The President’s Medal is a recognition given to graduating seniors who excel in scholarship, in professionalism on the job, in their academic pursuits, in involvement 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.

- **Sobey Scholars**: This award is made annually in memory of Albert Sobey, the founder and first president of GMI/Kettering University. Students are recipients of the Albert Sobey Memorial Award if they are elected to membership of both their discipline honor society and the Robots honor society (as noted below):
  - 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
  - Physics students who are elected to membership in both Sigma Pi Sigma and Robots

Questions: Contact the Office of the Registrar
Incomplete Grades

Incomplete (Permission of Professor)
If circumstances peculiar to a specific course or assignment occur within a course where it would be fair and equitable to allow a student more time to complete the requirements of the course, the professor may issue the grade of incomplete directly. Arrangements to complete the deficient work should be made directly between the student and the professor. The incomplete grade remains on the student’s record for a maximum time of six months, thereafter converting to a failing grade.

Incomplete (Administratively Issued)
Circumstances may occur whereby a student is unable to complete a course in accordance to the fixed academic calendar. If these circumstances occur during 7th week or later, are beyond the student’s control, and documentable to the satisfaction of the Registrar, then the Registrar will issue the grade of incomplete representing a temporary non-graded status while the student completes the necessary deficiencies. The course professor determines the work necessary for the student to complete the course and issues a letter grade when course requirements are met. The Registrar will notify the faculty member. The incomplete grade remains on the student’s record for a maximum time of six months, thereafter converting to a failing grade.

Questions: Contact the Office of the Registrar

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/Directed 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. This is done by completing an Independent/Directed Study Form stating the course number 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.

Questions: Contact the department offering the course

 Majors (Declaring/Changing)

A major is an area of concentrated study which requires a minimum of 41 classes (161 credits). A student wishing to declare, change or add a major should consult the head of the department housing the major, or a faculty advisor within that department. The student is then responsible for completing a Declare/Change of Degree Request Form and obtaining all required signatures. This form must then be submitted to the Office of the Registrar for processing. The Registrar, in turn, will update the student record and send official notification of the change to the appropriate departments.

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. Coursework taken outside of Kettering University is not transferable towards a minor. 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. The Academic Department granting the
minor provides an audit for each student who applies to graduate. Refer to the “Minors” section of this catalog for a complete list of minors and their requirements.

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 completing a Minor Declare/Change Request Form (this form is necessary to declare or remove a minor). This form must then be submitted to the Office of the Registrar for processing. The Registrar, in turn, will update the student record.

Questions: Contact the Office of the Registrar

**Proficiency Credit by Examination**

Students may petition the Department Head 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. If such demonstration is successful, the course credit hours will be 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

**Readmission to Kettering University**

Students who were academically eligible to continue when they became inactive or withdrew may return to active status by completing an Application for Readmission form (available at www.kettering.edu/registrar/forms_online.jsp). The Registrar will inform the student of the registration steps and assist in obtaining the necessary classes. The student will also need to be in good financial standing to be reinstated. Students are allowed to reactivate their active student status without having an official cooperative employer for one term only. Permission to continue after that one term is determined on a case-by-case basis and is for one additional term at a time.

Questions: Contact the Office of the Registrar

**Registration**

**New Students**

All first-time freshmen are given exams in mathematics unless college transfer credit or Advanced Placement credit is awarded for calculus. Based on exam results and intended degree program, each student will be registered for first term courses and will receive their schedules during orientation weekend.

First-term transfer students are scheduled based upon the individual’s choice of major and the amount of transferable course work awarded. The student will be given an opportunity to review transfer credits and term class schedule during the transfer student orientation held prior to the start of classes.

**Continuing Students**

Registration takes place each term during eighth, ninth, tenth and eleventh weeks. Students register for the next academic term; i.e., register in spring term for fall classes, register in summer term for winter classes, etc. Financial clearance from the Student Accounts Office and a completed course selection form, if required, signed by both student and faculty advisor are required to participate in registration. Future schedules will be administratively adjusted if prerequisite courses are not satisfactorily completed.

Students may receive academic advising and course selection approval by making an appointment with their faculty advisor. Seniors, juniors, sophomores and freshmen with a declared major receive advisement in their degree department. Freshmen and sophomore engineering students who have not yet declared a major receive advisement in Academic Services.

A students’ registration time period is based upon their current class standing and does not count current registrations or class rank. Each class standing will have a 24 hour window of opportunity to register for classes before the next standing will be allowed to register.

Registration instructions for current students are posted on the Office of the Registrar Website.
Course Registration with Co-op or 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.

Course Loads
The representative program of courses shown term-by-term for each of the degrees offered indicate 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.

Drop/Add
Students may drop and add courses during the late registration and drop/add period noted on the published academic calendar. Any student who does not appear on the final roster by the conclusion of the late registration and drop/add period will not receive credit for the course.

Late Registration
Students may “late register” (after the registration period) by contacting the Office of the Registrar. The deadline to late register is by the end of the late registration and drop/add period noted on the published academic calendar. Any student who does not appear on the final roster by the conclusion of the late registration and drop/add period will not receive credit for the course.

Overloads
Students are eligible to register for one additional course beyond the limits if:
- 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.

Students wishing to take overloads beyond the standards above will need to obtain approval from the Registrar, Room 3-309 AB. 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 Academic Services (Room 3-322 AB) with questions and for advisement.

Undergraduates Taking Graduate Courses
Students taking 500 or above level courses are not automatically admissible to the graduate program. They still have to meet all published admissions requirements.

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 (above 500-level) for undergraduate credit. To do this, students must:
- Complete and receive instructional department and degree department approvals on the Undergrad 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 or above 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 if:
- They are enrolled in an undergraduate program at Kettering University, and
- They are in good academic standing, and
- They have a minimum of 120 earned credits, and
- They are carrying no more than 20 credits, unless qualified to take 24 credits.

In order to receive graduate level credit, students:
- Must 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.
- May be enrolled as a guest student.

Questions: Contact the Office of the Registrar
Repeating a Course

Students may repeat any course taken at Kettering University as long as it is still offered. The following conditions apply:

- There is a limit of one repeat per course (for a total of two attempts). Withdrawals and audits are included in the number of repeat attempts.
- Both grades will appear on the student record and transcript.
- The higher grade received is used in computing the term and cumulative GPA values; the lower grade 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.

Additional repeats (beyond one) require the approval of the Academic Success Center, which will be provided only if the student commits to an Academic Improvement Plan. The following conditions apply:

- All grades will appear on the student record and transcript.
- Only one grade (the lowest grade) will be excluded from the term and cumulative GPA values. All other grades will be included in 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

Second Baccalaureate

Students can earn a second bachelor’s degree after graduating. The policy regarding requirements for Two Degrees applies. The department offering the major sought for the second bachelor’s degree must evaluate the student’s transcript to determine which additional courses are required and any additional work term and CUE requirements will be required.

Questions: Contact the degree/program department head

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.

Harassment and Discrimination

For complaints related to harassment or discrimination in the learning or work environment, refer to the Student Life section of this catalog, under Student Conduct: Behavioral Standards.

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 Student (for non-academic-related issues) or the Associate Provost for Academic Affairs (for academic-related issues).

Questions: Contact the Student Life Office for non-academic issues or the Office of the Provost for academic-related issues
Student Conduct: Rights, Responsibilities and Judicial Procedures

Refer to the Student Life section of this catalog

Questions: Contact the Student Life Office

Study Abroad

International Programs section of this catalog.

Questions: Contact the Office of International Programs

Terms and Semesters

An academic term consists of eleven weeks of instruction and evaluation. A cooperative work experience term consists of twelve weeks of supervised employment at an authorized Kettering University corporate affiliate; no credit, quality points or hours are earned through the work experience. A semester consists of one academic term and one cooperative work experience term for a total of twenty-three weeks. An academic year consists of two semesters for a total of forty-six weeks.

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 the student has taken an equivalent course, in content and level, at their previous institution.

The following conditions apply:

• Upon receipt of transfer credit information from the Admissions Office, coursework will be evaluated for transferability to Kettering University.
• 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.
• All coursework is evaluated for transfer to Kettering University regardless of a student’s intended major.
• All credits awarded may not be applicable to graduation requirements. Consult with your degree department to determine how the equivalent courses will apply to your degree.
• Any requests for transfer coursework review must be submitted with any requested supporting documentation by the end of the student’s first academic term.
• Final official transcripts are required to be mailed 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 degree program may take selected coursework at other institutions if the need arises and the opportunity is available. Guest Applications are available online at the Registrar’s Office website or in the Registrar’s Office. Students wishing to take a guest course should acquire the application and carefully read the instructions on page 1 of the application form.

The following conditions apply:

• A maximum of eight transfer credits are allowed while an active student, over and above approved study abroad transfer credits.
• 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 taken elsewhere can earn credit for a failed Kettering course but the Kettering course grade will remain on the student transcript and in the GPA.
• Independent Study work is not transferable.
• The course repeat policy only affects courses repeated at Kettering University. Guest credits do not qualify under this policy.
• Coursework for Kettering minors is not transferable.
• Courses approved for guest credit do not eliminate pre-requisite requirements.
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 accredited by a U.S. regional accreditation such as North Central Association.
- A course from an institution outside the U.S. will be considered for FREE-297/497 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 which have a 100 or 200 level at the transfer institution will be considered for FREE-297.
- Courses which have a 300 or 400 level at the transfer institution will be considered for FREE-497.
- A minimum of 2400 classroom minutes in one or more courses is required for four credits of FREE-297/497. A number of credits different from four is not allowed.
- A student must receive academic advisement from his/her degree department before initiating the process of transferring FREE-297/497.
- The number of credits of FREE-297/497 shall be limited to the number of Free Electives in the student’s degree program which have not already been fulfilled through other transfer or Kettering courses.
- Eligibility for Free-297/497 credit is determined by a student’s term of admission to Kettering University.
- FREE-297/497 credit may be awarded to students admitted in 200401 and beyond. Students admitted prior to 200401 are not eligible for FREE-297/497 credit for a course completed prior to January 1, 2004.
- Current Kettering students may apply for FREE-297/497 credit through the normal Application for Guest Credit process.

Questions: Contact the Office of the Registrar

Veterans
Information on Veterans Administration, including forms and reporting services are handled in the Office of the Registrar, Room 3-309 AB.

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 interest, the student may request a non-punitive grade of W (withdrawn) be issued by the Registrar’s Office. The following conditions apply:
- Withdrawal requests will be accepted and honored during the course withdrawal period specified on the academic calendar. After that period, the student may not withdraw from the course and is committed to receiving a Kettering letter grade, which may include a grade of FN (failure for non-attendance).
- Students must complete a course withdrawal request form, have it signed by the course instructor (and advisor if the student is a freshmen or sophomore), and submit it to the Registrar’s Office for processing by the deadline for course withdrawals specified on the academic calendar.
- 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 impact financial aid.

Term Withdrawal
Withdrawing from the term requires a completed Undergraduate Withdrawal from University Form available in the Office of the Registrar or on their website. Complete instructions and information are included on the form.

University Withdrawal
Withdrawing from the University requires a completed Undergraduate Withdrawal from University Form available in the Office of the Registrar or on their website. Complete instructions and information are included on the form.

Withdrawal due to Military Call to Active Duty
Students may withdraw from the University and receive a 100% tuition refund upon presenting to the Registrar, the original Armed Forces orders. Non-punitive grades of W will be issued. Should the call come during eighth week or later, in the judgment
of the instructor and the student, incompletes may be given with no reimbursement of tuition. Course work then would be completed per arrangements agreed upon by the instructor and student.

Withdrawal – Medical/Compassionate (After 7th Friday)
A medical/compassionate withdrawal request may be made in extraordinary cases in which serious illness or injury (medical) or another significant personal situation (compassionate) prevents a student from continuing his or her classes or withdrawing during the course withdrawal period specified on the academic calendar, and incompletes or other arrangements with the instructors are not possible.

Usually, consideration is for a complete withdrawal. All applications for withdrawal require thorough and credible documentation; however, applications for less than a complete withdrawal must be especially well 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 and require approval by the Vice President for Student Life and Dean of Students. 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 reason for the withdrawal began or took place during the course withdrawal period specified on the academic calendar, students must provide an explanation for not withdrawing 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 and how and why it prevented you from completing your course work, and the last date you were able to attend 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, etc.

Students considering requesting 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 medical or compassionate withdrawals which take place after the course withdrawal deadline.

Questions: Contact the Office of the Registrar
INFORMATION TECHNOLOGY

Information Technology Services (ITS) Operations 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. These documents are available on the Information Technology Services web site located on www.kettering.edu/it. Some of the major technical services provided to students are:

**Help Desk** - The Help Desk is located in the Academic Building (AB), Room 2-340. The Help Desk is available for technical support of our computing resources. The Help Desk is open 8:00 a.m. – 5:00 p.m., Monday through Friday, and may be contacted by phone at 810-237-8324 or by coming in person to 2-340 AB. You may also send e-mail to helpdesk@kettering.edu at any time. The support staff will respond to support requests during normal business hours.

**E-mail** - All students are provided with a Kettering University e-mail account. The Kettering e-mail account is one of the official ways 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 25 GB of e-mail server storage. We strongly recommend that students do not auto forward to another e-mail service. Due to the proliferation of spam and phishing emails, be advised that you may receive emails that may request personal information such as ids 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 in an email. 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 in a current status to protect their personal PCs. Any up to date properly licensed or free virus protection software will be acceptable. Further information on available free software may be found on the Blackboard system by logging into Blackboard and going to My Files, Institution Content, IT Information, and Virus Protection for Students. It will be mandatory to have virus protection installed, current, and running on PCs 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 can also access the Internet, as well as most network resources, using their wireless devices from a majority of campus locations.

**Web-Based Student Services** - All students have access to a variety of on-line 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** - Announcements for the University and many of its organizations are posted through the Blackboard System. Many professors utilize Blackboard for course syllabi, homework assignments, and tests. The Student Senate also utilizes Blackboard for election of officers and surveys. To help protect your privacy, security, and confidential information, you must sign on to Blackboard to access these services.

**Multi-media Workstations** - Multi-media workstations are made available for all students. They are located in the Library and in 3-501AB and 3-503AB and are available for use during normal Library and General PC Lab hours.

**Computer Labs** - The main computer labs are located in the computer wing on the 3rd floor of the Academic Building. There are over 200 PCs running Windows 7, Windows XP, and Linux for student use. Most PC lab computers have DVD-RWs and keyboards with USB ports for flash drives. Students have 2GB storage on the network. Most of these are available 24 hours a day, 7 days a week unless otherwise posted.

**Information and Help Sheets** - Help for accessing the various systems, including the Internet, is available in the IT Department, (2-340 AB) and on the IT web site. The IT web pages contain valuable information to help maximize your use of the Kettering University computing resources.

**Identification (ID) Card Access Center** - All students are required to have a Kettering University picture ID. ID cards are issued when students are enrolled. The ID card is considered Kettering University property and should be carried by the owner at all times. When asked by Kettering University employees performing official University functions, a student must present the ID card as validation of Kettering University affiliation. The student ID allows access to a variety of services at Kettering, such as...
meal plans, checking out equipment for use in the Recreation Center, Library, Student Accounts, Financial Aid, and checking out laboratory tools or equipment. It is also required for entry into all campus buildings including Thompson Hall for residents.

Services may be denied if a valid Kettering University ID card is not presented. Misuse of your or another person’s photo ID card may result in immediate suspension of all privileges and result in disciplinary action. If an ID is lost, there is a $10 replacement charge. To obtain a replacement, a check or cash may be presented to the Student Accounts office, 2-312 CC, whereby a receipt will be given for the transaction. Present the receipt to the Card Access Office, 2-340 AB, Monday – Friday, 8:00 a.m. – 5:00 p.m., and a new ID card will be issued. If the card breaks or is damaged as a result of normal use, it may be replaced at no charge. Card owners should present the damaged card when requesting replacement.

NOTE: If an error has been made on your ID card or in the event of a name change, there is no charge for a new ID card. You may go directly to the Card Access Office for corrections and changes.
Kettering University Library

Located on the second floor of the Academic Building, the Library has a collection of over 180,000 items of print and non-print materials, with 48,000 periodical titles. The Library Mission focuses on service. “In support of Kettering University’s mission, goals, and curriculum, the library and archives serve the university community by providing resources and services to facilitate quality teaching, learning, and research.”

Library Catalog

Kettering University Library is a member of PALnet, an academic resource sharing library network. Searches in the PALnet catalog reveals the holdings of Kettering University Library and cooperative members, Mott Community College and Baker College. For more information, or for assistance using the PALnet catalog, call 810-762-9598, or email: library@kettering.edu.

Collection

Materials purchased for the library collection are to support the curriculum of Kettering University. Leisure reading material, fiction, newspapers and magazines are also available. Special attention has been given to include the publications of American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers (IEEE), Society of Automotive Engineers (SAE), Society of Manufacturing Engineers (SME), and proceedings for many curriculum-related societies. Access and storage for student theses is another important part of the collection.

Hours/Loan Information

The library is open seven days a week, with reference assistance available most of those hours. During final exam week, the library hours are extended. Changes in hours are posted on the sign just outside the library entrance and on the library’s webpage.

Some helpful library telephone numbers are the following:

- 810-762-7814 Circulation Desk
- 810-762-7938 Interlibrary Loan
- 810-762-9598 Reference Desk
- 800-955-4464 Kettering University Toll-free Number

While the library is open to the public for use during all of its hours of operation, circulation of library material is restricted to Kettering University students, faculty, staff, alumni, Friends of the Library and Archives (FOLA) members, and sponsoring company employees. Students, faculty and staff may renew material twice, by phone, online, or in person. The standard loan period for Kettering University Library materials is 30 days. Course reserves (e-Reserves) are available on Blackboard. Photo ID cards serve as library cards and must be presented when checking out materials. The library has 15 computer workstations and wireless connectivity (WiFi). Two Xerox multi-function devices (MFD’s) provide copying, printing, and email scanning in both black and white and color. The MFD’s also have the ability to scan to and print from USB storage devices and send/receive faxes. The Library has a microfilm/microfiche viewer that can scan and print images or save images in PDF format. A laptop PC, a tablet (iPad2) and three eReaders (a Kindle DX, a Kindle Fire HD, and a Nook HD) are available for borrowing. A charging station is available which can charge almost any phone or mobile device. Audio and video equipment is also available including a 52-inch LCD flat-screen monitor/television. A drop box is located near the library entrance for use when the library is closed.

Interlibrary Loan

Materials not owned by the Kettering University Library can usually be obtained through Interlibrary Loan (ILL). Resource sharing is available to students, faculty and staff. In addition to local reciprocal agreements, the library uses OCLC WorldCat (a world-wide database of library holdings) to locate requested material. Interlibrary Loan is not a free service, but most requests are filled free of charge. The library absorbs many of the costs which can include lender fees, postage, and copyright permissions. In cases where the total per item charge exceeds $50, the requesting party will be asked to pay any amount exceeding the $50 limit. ILL staff will seek approval before proceeding with the request. For our students, faculty and staff, other reciprocal agreements are available among the Flint-area academic libraries. Please contact a Librarian or ILL Technician for assistance with your request.

Electronic Indexes

The Library subscribes to various online databases which index journal and newspaper articles, conference proceedings, etc. Twenty-four hour campus-wide and remote access is available at the Library’s website, www.kettering.edu/library. FirstSearch, InfoTrac, ProQuest, ABI/INFORM, and ScienceDirect provide indexing (citations, abstracts and some full-text articles) to thousands of publications. Society database subscriptions include Association for Computing Machinery, American Chemical Society, American Society of Mechanical Engineers, Institute of Electrical and Electronics Engineers, Institute of Physics, and Society of Automotive Engineers.
Additional databases include Engineering Index (Compendex), INSPEC (an electrical engineering, physics and computing database), MathSciNet, and Science Citation Index Expanded. All provide citations and abstracts to literature in the areas of science and technology. Additional online resources include over 30,000 eBooks from Ebsco ebooks, Springer and CRCnet BASE, and a link to Kettering’s Full Text Electronic Journal Holdings (over 48,000 titles).

**Instruction**
Equipment or database assistance is available on an individual basis. Exposure to general and specialized library resources is also provided through instructor-requested tours.

**Richard P. Scharchburg Archives**
Scharchburg Archives is located on the main floor of the Campus Center next to the bookstore. The archives documents America’s industrial and business heritage with particular interest in the American automobile industry. The Charles Kettering Collection is one of the largest collections in the archives and is used by scholars worldwide. The archives’ digital photo collection now exceeds 80,000 images. A collection of 375,000 vehicle patents are also found in the archives. The archives also maintains material related to the history of Kettering University.

The archives is open to researchers Monday through Friday between 9 a.m. and 4 p.m. Students are encouraged to stop by and view the small exhibits and school memorabilia in the reading room. A partial online catalogue along with digitized photos can be found on the archives website at kettering.edu/archives. The archives can be contacted at 810-762-9890.
ALUMNI ENGAGEMENT

The Alumni Engagement staff work in partnership with the Kettering/GMI Alumni Association Board with a mission to engage and connect the approximate 31,000 living alumni throughout the world. This mission benefits all alumni by developing and building relationships with each other, recognizing them for their achievements, offering needed services and offering access to life-long learning opportunities.

Each year programming includes class reunions, Homecoming Weekend, Regional Alumni Receptions throughout the country, company alumni “Bulldog Breakfasts,” alumni recognition ceremonies and affinity programs directed to specific alumni segments.

The Kettering/GMI Alumni Association Board is made up alumni who want to give back to the university with their time, talent and resources. The Board is comprised of five committees:

1. Alumni Engagement
2. Awards Committee
3. Programs Committee
4. Alumni Giving
5. Committee on Directorship

The Kettering/GMI Alumni Association annually recognizes outstanding and notable alumni for their professional accomplishments with the following awards:

- Alumni Service Award
- Young Alumni Award
- Engineering Achievement Award
- Entrepreneurial Achievement Award
- Management Achievement Award
- Civic Achievement Award
- Outstanding Achievement Award
- Human Relations Award
- Distinguished Alumnus/Alumnae Award

The Alumni Engagement staff and Alumni Board jointly support the Student Alumni Council (SAC) on campus. SAC is a 15-student organization fostering interaction between alumni and students through various activities such as the Visiting Alumnus/Alumnae Speaker Program, Freshmen Orientation, fundraising, Homecoming Weekend and special workshops. SAC typically brings four alumni speakers on campus each term representing a diversity of industries, careers and subjects students are interested in.
INTERNATIONAL PROGRAMS

Basem Alzahabi, Ph.D., Director
Room 1-919 AB, 810-762-9690
international@kettering.edu

PROGRAM OVERVIEW
The Office of International Programs (OIP) is the pivotal focal point for 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 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.

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 are required to check in at the Office of International Programs with the stamped immigration documents and passports within the first week on campus.

SERVICES
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 (1-919 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.

Immigration Services
- Provide 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 all 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.

International Services
- Develop and oversee programs for the University’s faculty exchange, international research programs, and fellowships.
- Develop and oversee student exchange and study-abroad programs.
- Recruit international students, oversee international activities at Kettering University, and serve as advisors to international student organizations.
- Maintain federal regulations for international visitors, export controls, and SEVIS systems for visas.
- Offer advisement on visa status maintenance for all international visitors (F-1 student visa holders, J-1 exchange students and scholars, H-1B faculty, Permanent Residency for faculty, International Guest Speakers) and all types of non-immigrant visa holders.
- Assist F-1 and J-1 students with the application processes and endorsements for various non-immigrant benefits, such as practical training programs, employment, travel, and status.
• Organize orientation programs for international students and scholars to provide international newcomers with information on immigration regulations, social opportunities, and academic issues.
• Provide assistance with insurance, bank accounts, housing, applying for a driver’s license, obtaining social security cards, taxation, and other settlement concerns.

Other areas of service include:
• Study-Academic Programs
• International Student Recruitment
• International Students and Visitors
• Oswald International Faculty Fellowships
• Oswald International Student Fellows Program
• Ronald G. Greenwood Memorial scholarship

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 will provide students with knowledge and experience that gives 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. All programs are offered in English and listed below by major. New study-abroad programs are continually developed, so please check with the OIP to obtain an update of new opportunities in your academic areas.

Business
• Germany at the Reutlingen University (fall term)

Chemistry
• Germany at the Reutlingen University (fall term)
• Sweden at Linköping University

Computer Science
• Germany at the Hochschule Furtwangen (fall term)
• Germany at the Hochschule Ulm (spring term)

Electrical and Computer Engineering
• Germany - CE at the Hochschule Ulm (spring term)
• Germany - EE at the Reutlingen University (fall term)
• Germany - EE at the Hochschule Ulm (spring term)

Industrial & Manufacturing Engineering
• Germany at the Reutlingen University (fall term)
• Germany at the Hochschule Esslingen (spring term)

Mechanical Engineering
• Germany at the Hochschule Esslingen (spring and fall)
• Germany at the Hochschule Konstanz (spring term)
• Germany at the Hochschule Ulm (fall term)
• Germany at the Reutlingen University (fall term)

Development of programs with China, South Korea and Turkey
• China at Yangzhou University in Yangzhou
• China at Tongji University in Shanghai
• South Korea at Ajou University in Suwon
• South Korea at Chungju National University in Chungju City
• Turkey at Yeditepe University in Istanbul

Graduate degree program development
• Germany at Hochschule Reutlingen

The study-abroad program for graduate students at Kettering University is designed for a maximum of 20 students to attend courses in Germany each spring. Admission is handled on first-come, first-served basis, so early application is encouraged.
Tuition is paid to Kettering University for all courses. All students participating in the study-abroad program must take all 16 credits plus the orientation while studying abroad. The orientation is required for all students; no cost is involved. Students will receive a stipend to assist with program costs.

**Academic Requirements**

Students applying for a study-abroad term 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. Information on the specific requirements, including prerequisites, is available for each program in the OIP.

**Course Work**

The course work 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. Students may receive this maximum only if 4 credits are earned from passing a foreign language course. The study-abroad curriculum also requires participants to register for a 4 credit Advanced Social Science elective as one of the five classes taken abroad, whenever an approved class is offered by the partner institution.

**Course Credit for Laboratory Courses Taken at German Partner Universities:**

Students enrolled in our German partner universities receive a grade of P or F for laboratory courses. In the German system, a P grade is equivalent to a C grade or higher. 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 foreign universities and (Kettering University equivalent course)**

### Esslingen, Germany

<table>
<thead>
<tr>
<th>Course</th>
<th>German Equivalent</th>
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<tbody>
<tr>
<td>Computer Simulation in Automotive Engineering</td>
<td>MECH-330 Dyn Sys with vibrations</td>
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<tr>
<td>Basic Elements of Feedback</td>
<td>MECH-430 Dynamic Systems with Controls</td>
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<tr>
<td>Fluid Mechanics</td>
<td>MECH-322 Fluid Mechanics</td>
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<tr>
<td>Finite Element Analysis</td>
<td>MECH-498 or 516</td>
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<tr>
<td>Alternative Powertrain</td>
<td>MECH-498</td>
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<tr>
<td>Germany within Europe</td>
<td>SSCI-398 Advanced Social Science Elective</td>
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### Furtwangen, Germany

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<tr>
<th>Course</th>
<th>German Equivalent</th>
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<tbody>
<tr>
<td>Effective Java Programming</td>
<td>CS-398 Advanced Java Programming</td>
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<tr>
<td>Collaborative Systems</td>
<td>CS-398 Collaborative Systems</td>
</tr>
<tr>
<td>XML &amp; Web Services</td>
<td>CS-398 Web Services</td>
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<tr>
<td>Mobile Interactive Applications</td>
<td>CS-398 Mobil Interactive Applications</td>
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<tr>
<td>Computer Networks</td>
<td>CS-498 Computer Networks</td>
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<tr>
<td>Cellular Networks</td>
<td>CS-398 Cellular Networks</td>
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<tr>
<td>Germany within Europe</td>
<td>SSCI-398 Advanced Social Science Elective</td>
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<tr>
<td>Logistics with Reference to SAP R/3</td>
<td>MRKT-381 Fundamentals of Supply Chain Management</td>
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<tr>
<td>eBusiness Media and Mobility</td>
<td>ISYS-450 Enterprise Information System Models</td>
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<tr>
<td>Business Process Management</td>
<td>MGMT-398 Business Process</td>
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<tr>
<td>Controlling</td>
<td>ACCT-398 Controlling</td>
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</table>

### Konstanz, Germany

<table>
<thead>
<tr>
<th>Course</th>
<th>German Equivalent</th>
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<tbody>
<tr>
<td>Design of Mechanical Components</td>
<td>MECH-312 Mechanical Component Design I</td>
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<tr>
<td>Fluid Mechanics</td>
<td>MECH-322 Fluid Mechanics</td>
</tr>
<tr>
<td>Heat Transfer</td>
<td>MECH-420 Heat Transfer</td>
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<tr>
<td>Germany within Europe</td>
<td>SSCI-398 Advanced Social Science Elective</td>
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### Reutlingen, Germany

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Special Topics in Mechanical Engineering</td>
<td>MECH-498 or ME Free Elective</td>
</tr>
<tr>
<td>International Business</td>
<td>BUSN-451 International Business, or ME Free Elective</td>
</tr>
<tr>
<td>Applied Finite Element Analysis</td>
<td>MECH-516 Introduction to Finite Element Analysis with Structural Application, or ME Free Elective</td>
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<td>Hybrid Electric Vehicle Propulsion</td>
<td>MECH-545 Hybrid Electric Vehicle Propulsion</td>
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<td>Heat Transfer</td>
<td>MECH-420 Heat Transfer</td>
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<td>SSCI-398 Advanced Social Science Elective</td>
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<td>Advanced Communication Technology</td>
<td>EE-340 Electromagnetic Wave Propagation</td>
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<tr>
<td>Semiconductor Fabrication Technology</td>
<td>EE-427 Semiconductor Device Fundamentals</td>
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**BUSN, CHEM**  
**Fall Term**  
- Internet Workings I (CE-480 Computer Networks)  
- Industrial Ecology (IME-598)  
- Lean Management (IME-498)  
- International Business (BUSN-451 International Business)  
- Lean Manufacturing (MGMT-461 Operations Management)  
- European Business Law (MGMT-498)  
- Germany within Europe (SSCI-398 Advanced Social Science Elective)  
- Biochemistry (CHEM-351 Biochemistry I)  
- Introduction to Macromolecular Chemistry and Lab (CHEM-4XX)  
- Polymeric Materials and Lab (CHEM-4XX)  
- Physical Chemistry (CHEM-361 Physical Chemistry I)  
- Lab Instrumental Analysis (CHEM-4XX)

**Ulm, Germany**  
**ME**  
**Fall Term**  
- Process Automation (MECH-430 Dynamic Systems with Controls)  
- Fluid Mechanics (MECH-322 Fluid Mechanics)  
- CAD/CAM (MECH-498 ME Elective)  
- Applied Thermal Fluids (MECH-422 Energy Systems Laboratory)  
- Germany within Europe (SSCI-398 Advanced Social Science Elective)

**Ulm, Germany**  
**EE, CS, and CE**  
**Spring Term**  
- Advanced Project Work (EE-499 Independent Study)  
- Analog Integrated Circuits (EE-420 Electronics II)  
- Control Technology (EE-432 Feedback Control Systems)  
- Computer Networks (CE-480 Computer Networks)  
- Computer Architecture (CE-422 Computer Architecture and Organization)  
- Machine Vision (CS Elective)  
- Operating Systems (CS-451 Operating Systems)  
- Germany within Europe (SSCI-398 Advanced Social Science Elective)

**Financial Considerations**
To encourage undergraduate students to participate in the study-abroad programs, Kettering University has agreed to provide these terms as relatively “cost neutral” 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 and pay the regular Kettering University tuition.

**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 term length), but may not exceed the $1,500 total during each degree program at Kettering. Students must receive class credit during the study-abroad experience to be awarded the stipend. Stipend amount will be determined by the number of credits received from program participation.

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.

**Orientation**
Students enrolled in a study-abroad term are required to attend orientation. The orientation will provide practical, logistical, and cultural information to prepare for studying and living overseas.

**Application**
Application materials are posted online via the Blackboard system based on program location. Students are encouraged to make an appointment with an International Student Coordinator by calling (810) 762-9869 or e-mailing international@kettering.edu to find out more about completing academic advising for study-abroad and gaining access to the full application. It is favorable to apply for a program one year in advance of the term a student wishes to study abroad.

**Short-Term Study-Abroad Programs**
In an effort to give students at Kettering University more opportunities to study abroad, the OIP works closely with individual departments and faculty members to offer short-term study-abroad programs. These programs typically are one to two weeks in length, and give students the opportunity to experience a new culture while earning credit from Kettering University and
traveling with familiar faculty and staff. Program fees are usually all-inclusive (covering airfare, hotel, up to two meals a day, and some activity entrance fees) and vary depending on the destination and length of the program.

The Department of Business, in conjunction with the OIP, has spearheaded the initiative to offer short-term programs to students, offering trips during the Summer and Winter Recesses. Past study-abroad sites include China and London, and future locations are determined by the department on a yearly basis. Students choosing to earn credit for one class during this program are eligible for a $375 stipend to assist with costs.

**INTERNATIONAL STUDENT RECRUITMENT**

The OIP at Kettering University works very closely with the Office of Admissions and the Graduate Office to continuously recruit international students through strategic partnership with international academic institutions, foreign governments, and industries.

**INTERNATIONAL STUDENTS AND VISITORS**

**F-1 Students and Visitors**
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 Students and Visitors**
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, short-term scholars, and students.

**Important Documents for International Students and Visitors**

**Passport**
The Passport is a document issued by your home country government. It is your responsibility to keep your 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 Departure Card**
U.S. Immigration officials issued this document (white card) when you entered the United States. It shows when and where you entered the U.S., your type of visa status and how long you 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 ending date of your D/S is the completion date listed on the I-20 or DS-2019 form.

**Visa**
Visas to enter the United States are issued by an American Consulate abroad (usually in your home country) and are stamped in your 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 card at the Port of Entry, USCIS gives permission to enter the United States and grants status. 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).

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 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 an extension becomes necessary.

**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 F-1 students and F-2 dependents, while form DS-2019 is used for J-1 exchange visitors and J-2 dependents. 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.

**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 Visitors 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 in complying with federal, state and local regulations pertaining to immigration and taxation.
• Maintain immigration records on all F-1 and J-1 visitors currently enrolled at Kettering University.
• Verify change of status and lawful presences.

Orientation
• Check-in and visa registration.
• Evaluation of English proficiency.
• Provide international newcomers with information on:
  • immigration regulations.
  • academic issues (scheduling, help with transfer credit evaluation).
  • intercultural adjustment assistance.
• Offer guidance for international students as they negotiate the various offices of the University system.

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 come to 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 American culture.

Required Medical Insurance Coverage
All exchange visitors (J-1 or F-1 principles 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. The insurance must meet the following minimum coverage requirements:
• Medical benefits of at least $50,000 per accident or illness.
• Repatriation of remains in the amount of $7,500.
• Expenses associated with medical evacuation of the student, scholar, or dependent to his or her home country in the amount of $10,000.
• A deductible not to exceed $500 per accident or illness.

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 Chongqing Jiaotong University, Xi’an Polytechnic University, Dalian University of Technology, Tongji University and Yangzhou University; Germany at Reutlingen, Esslingen, Konstanz, Ulm, and Furtwangen; South Korea at Ajou University and Chungju National University; Sweden at Linköping University; and Turkey at Yeditepe University.

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.

OSWALD INTERNATIONAL STUDENT FELLOWS PROGRAM
The Oswald International Student Fellows Program provides financial grants for travel and living expenses for Kettering students involved in the international exchange program. Grants are awarded twice each academic year on a competitive basis. In general, consideration is given to the financial needs of students, the student’s plan for the expenditure of the grant and the country to be visited. Each spring and fall, up to 10 students will be selected as Oswald International Student Fellows based on merit and need. The selected students will receive travel grants of $1,000 or $2,000 in addition to the Kettering travel 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 with a GPA of at least 3.3.
• Plan to participate in a study-abroad program during the upcoming fall or spring academic terms (students studying abroad in summer or winter term must check with the OIP about eligibility).
• Demonstrate a financial need.
• Complete an application including an essay by the specified deadlines.

RONALD G. GREENWOOD MEMORIAL SCHOLARSHIP
Business students participating in term length study-abroad programs at Kettering University are eligible to apply for the Greenwood Memorial Scholarship. Dr. Ronald G. Greenwood was a management professor at Kettering University who was instrumental in making the original contacts between Kettering and Hochschule Reutlingen to establish the study-abroad program for business students. One $500 scholarship is awarded each fall to a business student participating in study abroad. More information can be obtained in the Office of International Programs.

For more information on our programs and services please contact the OIP by calling (810) 762-9869 or e-mailing international@kettering.edu.
ACADEMIC PROGRAM INFORMATION

Baccalaureate Degree Programs and Concentrations

1. Bachelor of Science in Applied Biology (BSAB)
2. Bachelor of Science in Applied Mathematics (BSAM)
   Concentrations:
   - Actuarial Science
   - Applied Statistics
   - Applied and Computational Mathematics
   - Mathematical Biology
3. Bachelor of Science in Applied Physics (BSAP)
   Concentrations:
   - Acoustics
   - Applied Optics
   - Materials Science
   - Medical Physics
4. Bachelor of Science in Biochemistry (BSBC)
5. Bachelor of Science in Bioinformatics (BSBI)
6. Bachelor of Science in Business Administration (BSBA)
7. Bachelor of Science in Chemical Engineering (BSCHM)
8. Bachelor of Science in Chemistry (BSCH)
9. Bachelor of Science in Computer Engineering (BSCE)
10. Bachelor of Science in Computer Science (BSCS)
    Concentrations:
    - Computer Gaming
    - System and Data Security
11. Bachelor of Science in Electrical Engineering (BSEE)
12. Bachelor of Science in Engineering Physics (BSEP)
    Concentrations:
    - Acoustics
    - Applied Optics
    - Materials Science
    - Medical Physics
13. Bachelor of Science in Industrial Engineering (BSIE)
    Concentrations:
    - Cognate
    - Healthcare Systems Engineering
    - International Study
    - Quality Assurance
14. Bachelor of Science in Mechanical Engineering (BSME)
    Concentrations/Specialties:
    - Aerospace
    - Alternative Energy
    - Automotive Engineering Design
    - Bioengineering Applications
    - Machine Design & Advanced Materials

Course of Study

1. Pre-Med

Minors

1. Acoustics
2. Applied and Computational Mathematics
3. Applied Optics
4. Biochemistry
5. Bioinformatics
6. Biology
7. Business
8. Chemistry
9. Computer Engineering
10. Computer Gaming
11. Computer Science
12. Economics
13. Electrical Engineering
14. Fuel Cells and Hybrid Technology
15. Healthcare Systems Engineering
16. History
17. Innovation and Entrepreneurship
18. International Studies
19. Literature
20. Manufacturing Engineering
21. Materials Science
22. Medical Physics
23. Physics
24. Pre-Law
25. Quality Engineering
26. Statistics
27. System and Data Security
LIBERAL STUDIES

Home Department: Liberal Studies

Department Head: Karen Wilkinson, Ph.D.
Room 4-502 AB, 810-762-7827
kwilkins@kettering.edu

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

COMM-101 Written & Oral Communication I
COMM-301 Written & Oral Communication II
ECON-201 Economic Principles
HUMN-201 Introduction to the Humanities
LS-489 Senior Seminar: Leadership, Ethics, and Contemporary Issues
SSCI-201 Introduction to the Social Sciences
300 Level Humanities Elective: ART, COMM, HUMN, LIT, MUS, PHIL
Social Science Elective: ECON, HIST, SOC, SSCI

Courses eligible for 300 level humanities and social science elective credit include:

Humansities Elective Courses
ART-305 Art: Styles and Aesthetics
COMM-311 Rhetorical Principles of Persuasion
COMM-313 Rhetorical Principles of Public Speaking
COMM-391 Topics in Communications
HUMN-360 Technology and Culture
HUMN-362 Global Film Cultures
HUMN-365 Art & Nature in Early Industrial England
HUMN-391 Topics in Humanities
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-315 Literature of the Fantastic
LIT-317 Masterpieces of Drama
LIT-351 Literature in a Foreign Language
LIT-372 Masterpieces of Literature
LIT-374 Seminar on J.R.R. Tolkien
LIT-379 The Plays of Shakespeare
LIT-391 Topics in Literature
MUS-380 Music, the Arts, and Ideas
PHIL-373 Philosophy
PHIL-378 Moral and Ethical Philosophy
PHIL-391 Topics in Philosophy

Social Science Elective Courses
ECON-342 Intermediate Microeconomics: Managerial Economics
ECON-344 Intermediate Macroeconomics: Economic Growth and Fluctuation
ECON-346 Introduction to Econometrics
ECON-348 History of Economic Thought
ECON-350 Comparative Economic Systems
ECON-352 International Economics
ECON-391 Topics in Economics
HIST-306 International Relations
HIST-308 America and the World
HIST-310 Imperialism
HIST-312 History of Science
HIST-314 Human Conflict & Conflict Resolution
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 and reach the Registrar’s Office no later than Friday, first week.

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. All Kettering University students, regardless of major, are entitled to take two courses in any area they choose. These free electives might be used to acquire a minor in a discipline within the Department of Liberal Studies.
APPLIED BIOLOGY (Bachelor of Science)

Home Department: Chemistry and Biochemistry

Program Director: Stacy Seeley, Ph.D.
Room 3-203 MC, 810-762-9561
sseeley@kettering.edu

Program Overview
The Bachelor of Science Degree in Applied Biology provides students with a strong foundation in the principles and applications of biology. Students in the Applied Biology Program take courses in the major areas of biology including general biology, human biology, microbiology, molecular biology, cellular biology, ecology, plant biology 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 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 a faculty member 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 prepared to do the following:

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

Applied Biology Program Curriculum Requirements

First Year Experience
FYE-101 First Year Foundations 1
Total 1

General Education
COMM-101 Written & Oral Communication I 4
COMM-301 Written & Oral Communication II 4
ECON-201 Economic Principles 4
HUMN-201 Introduction to the Humanities 4
LS-489 Senior Seminar: Leadership, Ethics and Contemporary Issues 4
SSCI-201 Introduction to the Social Sciences 4
Advanced Humanities Elective 4
Advanced Social Science Elective 4
Total 32

Biology Core
BIOL-141/142 General Biology/Lab 4
BIOL-241/242 Human Biology/Lab 4
BIOL-311 Ecology 4
BIOL-282 Biological Techniques 4
BIOL-321 Experimental Design 4
BIOL-361/362 Microbiology/Lab 6
BIOL-381/382 Molecular Biology/Lab 6
BIOL-441/442 Cellular Biology/Lab 6
BIOL-481 Genetics 4
BIOL-461/462 Plant Biology/Lab 6
BIOL-491/491L Advance Topics in Biology/Lab 6
BIOL-494 Seminar/Research 2
Total 56
Chemistry Core
CHEM-137/136 General Chemistry/Principles of Chemistry Lab 4
CHEM-237/238 General Chemistry II/Lab 4
CHEM-247 Survey of Organic 4
CHEM-345/346 Organic Chemistry I/Lab 6
CHEM-347 Organic Chemistry II 4
CHEM-351/352 Biochemistry I/Lab 6
Total 28

Mathematics
One from:
MATH-101 Calculus I 4
MATH-101X Calculus I 4
And one from:
MATH-102 Calculus II 4
MATH-102X Calculus II 4
MATH-102H Calculus II Honors 4
And one from:
MATH-410 Biostatistics II 4
MATH-203 Multivariate Calculus 4
MATH-203H Multivariate Calculus Honors 4
And:
MATH-310 Biostatistics I 4
Total 16

Physics
PHYS-114/115 Newtonian Mechanics and Lab 4
Total 4

Electives
Technical Electives 12
Free Electives 8
Total 20

Culminating Undergraduate Experience
One from:
CUE-495C Co-op Thesis 4
CUE-495E Intra/Entre/Social E-ship Thesis 4
CUE-495P Professional Practice Thesis 4
CUE-495R Research Thesis 4
Total 4

(Minimum) Total Credits Required for Program 161

Representative Program

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<th>Course Name</th>
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<td>General Biology Lab</td>
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<td>CHEM 137</td>
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<td>BIOL 241</td>
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<td>CHEM 237</td>
<td>General Chemistry II</td>
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<td>MATH 102/102X</td>
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<td>MATH 310</td>
<td>Biostatics I</td>
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<td>SSCI 201</td>
<td>Introduction to Social Sciences</td>
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<td>CHEM 345</td>
<td>Organic Chemistry I</td>
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<td>BIOL 361/362</td>
<td>Microbiology and Lab</td>
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<td>MATH 410 or</td>
<td>Biostatistics II</td>
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<td>MATH 203</td>
<td>Multivariate Calculus</td>
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<td>Molecular Biology and Lab</td>
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<td>COMM 301</td>
<td>Written and Oral Communication II</td>
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<td>Biochemistry I</td>
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<td>BIOL 441/442</td>
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<td>BIOL 481</td>
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<td>BIOL 491</td>
<td>Advanced Topics in Biology</td>
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<td>BIOL 494</td>
<td>Senior Research/Seminar</td>
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</table>

**Total Credits Required for Program**: 161

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 Biology majors must meet the general educational requirements and their program's requirements for a minor or concentration.
2. Biology students seeking a dual major must take an additional 28 earned credit hours above and beyond their first degree.
3. Humanities and Social Science electives must be selected from approved 300 or 400 level courses, including one Humanities course and one Social Science course.
4. A minor or concentration is required with a minimum of 12 hours of approved courses that are not required for the Biology Degree. 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 224/225 can also count as a technical elective. All other courses must be approved by the department head.
APPLIED MATHEMATICS (Bachelor of Science)

Home Department: Mathematics

Department Head: Leszek Gawarecki, Ph.D.
Room 2-324 AB, 810-762-9557
lgawarec@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 and MLC). The actuarial science concentration provides excellent preparation for the student interested in starting a career in the actuarial profession. It 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 both 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 real 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

First Year Experience
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FYE-101</td>
<td>First Year Foundations</td>
<td>1</td>
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General Education
COMM-101 Written & Oral Communication I 4
COMM-301 Written & Oral Communication II 4
ECON-201 Economic Principles 4
HUMN-201 Introduction to the Humanities 4
LS-489 Senior Seminar: Leadership, Ethics and Contemporary Issues 4
SSCI-201 Introduction to the Social Sciences 4
Advanced Humanities Elective 4
Advanced Social Science Elective 4
Total 32

Computer Programming
Choose one from:
CS 101 Computing and Algorithms I 4
ECE-101 MATLAB and C Programming
IME-211 Algorithms and Computer Programming 4
Total 4

Basic Science
CHEM-135/136 Principles of Chemistry/Lab 4
PHYS-114/115 Newtonian Mechanics/Lab 4
PHYS-224/225 Electricity and Magnetism/Lab 4
Total 12

Mathematics
One from:
MATH-101 Calculus I 4
MATH-101X Calculus I 4
And one from:
MATH-102 Calculus II 4
MATH-102X Calculus II 4
MATH-102H Calculus II Honors 4
And one from:
MATH-203 Multivariate Calculus 4
MATH-203H Multivariate Calculus Honors 4
And one from:
MATH-204 Differential Equations and Laplace Transforms 4
MATH-204H Differential Equations and Laplace Transforms Honors 4
And:
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 Mathematical Statistics I 4
MATH-412 Complex Variables 4
MATH-416 Vector Analysis 4
Total 48

Concentration
Choose from:
Actuarial Science,
Applied and Computational Mathematics
Applied Statistics
Mathematical Biology
Total 28-36

Electives
Science Electives 8
Free Electives 16-24
Total 24-32
Culminating Undergraduate Experience

One from:
- CUE-495C: Co-op Thesis
- CUE-495E: Intra/Entre/Social E-ship Thesis
- CUE-495P: Professional Practice Thesis
- CUE-495R: Research Thesis

Total: 4

(Minimum) Total Credits Required for Program: 161

Representative Program

<table>
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<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
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<td>FYE-101</td>
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<tr>
<td></td>
<td>CHEM-135</td>
<td>Principles of Chemistry</td>
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<td>CHEM-136</td>
<td>Principles of Chemistry Lab</td>
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<td>COMM-101</td>
<td>Written &amp; Oral Communication I</td>
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<td>MATH-101</td>
<td>Calculus I</td>
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<td></td>
<td>Computer Programming (CS-101 or IME-211 or ECE-101)</td>
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<tr>
<td>FR-II</td>
<td>ECON-201</td>
<td>Economic Principles</td>
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<td>MATH-102</td>
<td>Calculus II</td>
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<td>MATH-307</td>
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<td>PHYS-114</td>
<td>Newtonian Mechanics</td>
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<td>PHYS-115</td>
<td>Newtonian Mechanics Lab</td>
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<td>MATH-203</td>
<td>Multivariate Calculus</td>
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<td>MATH-308</td>
<td>Abstract Algebra</td>
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<td>MATH-327</td>
<td>Mathematical Statistics I</td>
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<td>SO-II</td>
<td>MATH-204</td>
<td>Differential Equations and Laplace Transforms</td>
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<td>PHYS-224</td>
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<td>PHYS-225</td>
<td>Electricity and Magnetism Lab</td>
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<td>SSCI-201</td>
<td>Introduction to the Social Sciences</td>
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Actuarial Science Concentration

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<tr>
<td>JR-I</td>
<td>COMM-301</td>
<td>Written &amp; Oral Communication II</td>
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<td>ECON-342</td>
<td>Intermediate Microeconomics: Managerial Economics</td>
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<td>FINC-311</td>
<td>Financial Management</td>
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<td>MATH-313</td>
<td>Boundary Value Problems</td>
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<td>MATH-408</td>
<td>Probability and Statistics</td>
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<tr>
<td>JR-II</td>
<td>MATH-305</td>
<td>Numerical Methods and Matrices</td>
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<tr>
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<td>MATH-350</td>
<td>Financial Mathematics</td>
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<td>ECON-344</td>
<td>Intermediate Macroeconomics: Economic Growth and Fluctuation</td>
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<td>SR-I</td>
<td>MATH-427</td>
<td>Mathematical Statistics II</td>
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<td>MATH-360</td>
<td>Life Contingencies I</td>
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<td>MATH-416</td>
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### Applied and Computational Mathematics Concentration

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<td>MATH-321</td>
<td>Real Analysis I</td>
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<td>MATH-361</td>
<td>Life Contingencies II</td>
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<td>MATH-448</td>
<td>Time Series</td>
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<td>Free Electives</td>
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<td><strong>SR-III</strong></td>
<td>LS-489</td>
<td>Senior Seminar: Leadership, Ethics and Contemporary Issues</td>
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<td>MATH-412</td>
<td>Complex Variables</td>
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Culminating Undergraduate Experience

### (Minimum) Total Credits Required for Program

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<td>Real Analysis I</td>
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<td>MATH-423</td>
<td>Partial Differential Equations</td>
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<td>Engineering Applications/CS Sequence</td>
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<td>LS-489</td>
<td>Senior Seminar: Leadership, Ethics and Contemp. Issues</td>
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<td>MATH-412</td>
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Culminating Undergraduate Experience

### (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.

**CS-Sequence**
- CS-102 Computing and Algorithms II
- CS-203 Computing and Algorithms III
- CS-312 Theory of Computation
- or CS-415 Cryptography

Applied Mathematics / 81
EE-Sequence
EE-210 Circuits I
EE-240 Electromagnetic Fields and Applications
EE-340 Electromagnetic Wave Propagation
EE-348 Electromagnetic Compatibility

IME-Sequence
IME-251 Systems Analysis I: Engineering Cost Analysis
IME-321 Systems Modeling I: Deterministic Models
IME-423 Systems Modeling III: Stochastic Models
IME-453 Tools for Managing the Supply Chain

MECH-Sequence
MECH-210 Statics
MECH-212 Mechanics of Materials
MECH-310 Dynamics
MECH-320 Thermodynamics

PHYS-Sequence
PHYS-302 Vibration, Sound, and Light
PHYS-362 Modern Physics
PHYS-412 Theoretical Mechanics
PHYS-462 Quantum Mechanics

Applied Statistics Concentration

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<td>JR-I</td>
<td>COMM-301</td>
<td>Written &amp; Oral Communication II</td>
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<td>MATH-313</td>
<td>Boundary Value Problems</td>
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<td>MATH-408</td>
<td>Probability and Statistics</td>
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<td>MATH-412</td>
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<td>JR-II</td>
<td>MATH-305</td>
<td>Numerical Methods and Matrices</td>
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<td>MATH-448</td>
<td>Time Series</td>
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<tr>
<td>SR-I</td>
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<tr>
<td>SR-II</td>
<td>IME-333</td>
<td>Engineering Statistics III: Design of Experiments</td>
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<td>IME-471</td>
<td>Quality Systems I: Quality Assurance</td>
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<td>MATH-321</td>
<td>Real Analysis I</td>
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<td>Free Elective</td>
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<td>Science Elective</td>
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<td>SR-III</td>
<td>LS-489</td>
<td>Senior Seminar: Leadership, Ethics and Contemporary Issues</td>
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<td>Industrial/Math Elective</td>
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</tbody>
</table>

(Minimum) Total Credits Required for Program 161
The student should select at least two IME/MATH electives from the following courses:
IME-321 Systems Modeling I: Deterministic Models
IME-422 Systems Modeling II: Simulation
IME-423 Systems Modeling III: Stochastic Models
MATH-428 Sampling Theory
MATH-438 Data Analysis for Engineers and Scientists

Mathematical Biology Concentration

<table>
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<th>Course Name</th>
<th>Credits</th>
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<td>JR-I</td>
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<td>MATH-313</td>
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<td>BIOL-241</td>
<td>Human Biology</td>
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<td>BIOL-242</td>
<td>Human Biology Lab</td>
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<td>(CHEM-245</td>
<td>Survey of Organic Chemistry)</td>
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| SR-III   | LS-489    | Senior Seminar:
|          |          | Leadership, Ethics and Contemp. Issues           | 4       |
|          |          | MATH-412  | Complex Variables                                | 4       |
|          |          | BIOL-481  | Genetics                                         | 4       |
|          |          | Free Electives                                   | 8       |
|          |          |                                                   | 20      |
|          |          | Culminating Undergraduate Experience             | 4       |
|          |          |                                                   | 4       |

(Minimum) Total Credits Required for Program 161
APPLIED PHYSICS (Bachelor of Science)

Home Department: Physics

Department Head: Kathryn Svinarich, Ph.D.
Room 2300N AB, 810-762-7499
physics@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; between the theory, laboratory, and practice. It 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, and applied sciences and physics with emphasis on the four areas of Applied Optics, Acoustics Materials Science, nanotechnology and Medical Physics.

- Applied Physics 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.
- Applied Physics students at Kettering University will graduate from the most distinctive physics program in the nation consist of the most comprehensive work integrated physics co-op in the nation, with emphasis on industrial physics that includes an industrial thesis and areas of concentrations in applied physics.
- The Applied Physics program includes a thorough background in mathematics, science, computer programming, social sciences, humanities, and communication.
- Applied Physics students complete a concentration in an area of applied science, mathematics or advanced technology or even business, pre-law, or pre-med.
- Applied Physics students complete a written senior thesis.

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

Program Educational Objectives
The Applied Physics degree program is designed as a flexible applied program that provides graduates with a solid educational foundation that combines mathematics, science, technical knowledge, communications and liberal studies to prepare graduates for applied sciences and technical fields and interdisciplinary based career and graduate studies. The Department of Physics strives to produce Applied Physics graduates who:

- 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.

Applied Physics Program Curriculum Requirements

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General Education

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PHYS-464 Nuclear Physics 4

*Topics in Physics*

Any physics course that is not a core physics requirement listed above 4

**Total** 52

**Free Electives**

**Total** 8

**Technical Electives**

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

**Total** 16

**Culminating Undergraduate Experience**

One from:

CUE-495C Co-op Thesis
CUE-495E Intra/Ente/Social E-ship Thesis
CUE-495P Professional Practice Thesis
CUE-495R Research Thesis

**Total** 4

**(Minimum) Total Credits Required for Program** 161

**Representative Program**

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Dual Options
One of the advantages of being Physics major is that because physics leads to or has overlaps with nearly any 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 thinking about dual option as Physics major please be aware that Kettering University offers two distinct dual degree options as described below.

**Double Major:** 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.

**Two Degrees:** Students may earn two undergraduate degrees simultaneously by completing all course requirements for any two majors that in combination require at least 28 credits beyond 161 credits. If capstone courses are required in both majors, both must be completed. Only one thesis is required. To pursue two degrees, obtain approval from departments for both degrees. Two diplomas will be awarded and both degrees will be shown on the transcript.

- Applied Physics/ Applied Mathematics
- Applied Physics/Computer Science
- Applied Physics/Electrical Engineering
- Applied Physics/Mechanical Engineering

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

**Physics Program Concentrations**
Applied and Engineering Physics students who wish to obtain a concentration in acoustics, applied optics, or materials science, and have it so designated on their transcript should contact one of the following Professors: Ludwigsen (Acoustics), Vaishnava (Materials or Medical Physics) or Svinarich (Optics). The basic criteria is that to obtain a concentration students must successfully complete four courses (16 credits) the same as those listed under minor programs (16 credits).
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 studies 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.

1 Advanced Physics includes Nuclear Physics (PHYS-464) or Solid State Physics (EP-446).
2 Topics in Physics includes any physics course, which is not a core physics requirement as listed above.
3 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.
BIOCHEMISTRY (Bachelor of Science)

Home Department: Chemistry and Biochemistry

Department Head: Stacy Seeley, Ph.D.
Room 3-203 MC, 810-762-9561
sseeley@kettering.edu

Program Overview
The Bachelor of Science Degree in Biochemistry 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
Biochemistry Graduates will:
- Have a broad, fundamental and mathematically rigorous understanding of theoretical and experimental chemistry.
- Function effectively and ethically within an organization and society as professional chemists.
- Have the skills necessary to effectively communicate their chemical understanding to the general public and to the professional chemical community.
- Be familiar with health and safety concerns and the use of chemicals in industry.
- Be able to pursue an advanced degree.

Biochemistry Program Curriculum Requirements

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<td>COMM-301 Written &amp; Oral Communication II</td>
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**Biology Core**

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**Culminating Undergraduate Experience**

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(Minimum) Total Credits Required for Program  

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## Representative Program

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(Minimum) Total Credits Required for Program  

161

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

2Biochemistry students seeking a dual major must take an additional 28 earned credit hours above and beyond their first degree.

3Humanities and Social Science electives must be selected from approved 300 or 400 level courses, including one Humanities course and one Social Science course.

4A minor or concentration is required with a minimum of 12 hours of approved courses that are not required for the Biochemistry 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 100-200 level courses may be used but require approval by the Department Head of Chemistry/Biochemistry.
BIOINFORMATICS (Bachelor of Science)

Home Department: Computer Science

Department Head: John G. Geske, Ph.D.
Room 2-300 AB, 810-762-7963
jgeske@kettering.edu

Program Overview
The Bachelor of Science degree in Bioinformatics at Kettering University represents a collaborative effort between the Computer Science and Chemistry/Biochemistry departments and provides students with a strong foundation in computational methods used to analyze biological systems. Students in the Bioinformatics program will obtain a strong foundation in computer software, hardware, and theory. They will also obtain a solid background in biological chemistry by taking courses and laboratories in organic chemistry, inorganic chemistry, and biochemistry. Additional special emphasis in the biological area will be achieved by taking courses and laboratories in biology. All bioinformatics students will have several terms of cooperative work experience so that concepts learned in the classroom can be applied to real world problems.

A bioinformatics degree provides an excellent foundation for careers in biotechnology, medicine, pharmacology, environmental fields, technical management, education, business, software engineering, and information systems.

Program Educational Objectives
Graduates of the Bioinformatics Degree Program will:

• Have a broad, fundamental and mathematically rigorous understanding of theoretical and applied computer science.
• The graduates of the Bioinformatics Degree Program will have a broad and fundamental knowledge of theoretical and experimental biological chemistry.
• Have the teamwork, communication, and interpersonal skills to enable them to work effectively with interdisciplinary teams in industrial, government, academic, and medical fields.
• Understand and value the ethical implications of the bioinformatics field.
• Be able to pursue an advanced degree in Bioinformatics, Computer Science, Chemistry, Biochemistry, Molecular Biology, or Medicine.

Bioinformatics Program Curriculum Requirements

First Year Experience

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Biology Core

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Biochemistry Core

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CHEM-237  General Chemistry II  3
CHEM-238  General Chemistry II Lab  1
CHEM-345  Organic Chemistry I  4
CHEM-346  Organic Chemistry I Lab  2
CHEM-347  Organic Chemistry II  4
CHEM-348  Organic Chemistry II Lab  2
Total  26

Computer Science Core
CS-101  Computing and Algorithms I  4
CS-102  Computing and Algorithms II  4
CS-203  Computing and Algorithms III  4
CS-211  Discrete Mathematics  4
BINF-310  Introduction to Bioinformatics  4
CS-300  The Computing Professional  4
CS-312  Theory of Computation  4
CS-461  Database Systems  4
CS-465  Information Retrieval and Data Mining  4
BINF-490  Bioinformatics Capstone  4
Total  40

Mathematics
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MATH-101  Calculus I  4
MATH-101X  Calculus I  4
One from:
MATH-102  Calculus II  4
MATH-102X  Calculus II  4
MATH-102H  Calculus II Honors  4
And:
MATH-310  Biostatistics I  4
MATH-410  Biostatistics II  4
Total  16

Electives
Technical Electives  12
Free Electives  16
Total  28

Culminating Undergraduate Experience
One from:
CUE-495C  Co-op Thesis  4
CUE-495E  Intra/Entre/Social E-ship Thesis  4
CUE-495P  Professional Practice Thesis  4
CUE-495R  Research Thesis  4
Total  4

(Minimum) Total Credits Required for Program  161

Representative Program

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**(Minimum) Total Credits Required for Program** 161
BUSINESS ADMINISTRATION (Bachelor of Science)

Home Department: Business
Department Head: Vacant.
Contact the Department of Business business@kettering.edu

Program Overview
This is a transition year for Kettering University’s programs in Business Administration. The new Business Administration programs will be fully implemented in the 2014-2015 academic year. Entering students and current sophomores will take the courses shown in the example program during their first two years. They will follow the new course plan for their Junior and Senior years. The programs are designed to give students the knowledge and experience in taking an idea and bringing it to the marketplace.

Students majoring in Business are required to complete the ETS (Educational Testing Service) field test in Business at the conclusion of their studies.

Both of the majors in the Department of Business offer the opportunity to study abroad. Business students wishing to study abroad have the opportunity to attend classes held in English at Reutlingen University in Reutlingen, Germany. The program is one term in length, normally the SR-I term, and takes place during the Fall term. Students interested in studying abroad need to make their decision no later than the JR-I term and discuss their intentions with their academic advisor. Additional information is available from the Department of Business and the Kettering University Office of International Programs.

The Department of Business offers two minors available to students no majoring in Business. These minors are: Business, and Innovation and Entrepreneurship.

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 (MS) in Engineering Management, and MS 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.

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.

Since June 18, 1995, select degree programs in the Department of Business have been accredited by the Association of Collegiate Business Schools and Programs (ACBSP).

Program Educational Objectives
The purpose of the BSBA is to prepare students to work with an established business or entrepreneur to manage the transformation of an idea – whether product or service – from concept to the marketplace. The BSBA program provides the strong analytical base needed to analyze managerial, operational, and marketing data.

1. Graduates will lead efforts in their organizations to transform ideas into products or services for the marketplace.
2. Graduate will become high level managers and executives within their organizations.
3. Graduates will earn advanced degrees in Business or other fields.

Business Administration Program Curriculum Requirements

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<tr>
<th>First Year Experience</th>
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General Education

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<td>ECON-201</td>
<td>Economic Principles</td>
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<td>HUMN-201</td>
<td>Introduction to the Humanities</td>
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<tr>
<td>LS-489</td>
<td>Senior Seminar: Leadership, Ethics and Contemporary Issues</td>
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<td>Introduction to the Social Sciences</td>
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Advanced Social Science Elective  
4

Total  
32

**Engineering, Mathematics and Science**

MATH-100  College Mathematics  
4

or a science, math or engineering elective if placed into MATH-101 through math placement examination  
4

**And one from:**

MATH-101  Calculus I  
4

MATH-101X  Calculus I  
4

**And:**

IME-100  Interdisciplinary Design and Manufacturing  
4

Basic Science Elective  
4

Science or Engineering Elective  
4

Total  
20

**Business Core**

BIZ-101  Business Decision Making I  
4

BIZ-102  Business Decision Making II  
4

BIZ-150  Introduction to computer Applications  
4

BIZ-210  Management Concepts  
4

BIZ-220  Accounting/Finance I  
4

BIZ-240  Introduction to Marketing  
4

BIZ-212  Organizational Behavior  
4

BIZ-260  Business Statistics  
4

BIZ-265  Business Statistics and Analysis  
4

BIZ-319  Business Law  
4

BIZ-454  Enterprise Resource Planning  
4

**One from:**

BUSB-372  Innovation and New Ventures  
4

BUSB-373  Intrapreneurship and Innovation Development  
4

**And:**

BUSB-451  International Business  
4

ECON-342/344  Managerial/Intermediate Macroeconomics  
4

FINC-310  Financial Markets  
4

FINC-311  Financial Management  
4

MGMT-456  Strategic Management  
4

MGMT-461  Operations Management  
4

MRKT-471  Marketing Management  
4

Total  
76

**Electives**

Business Electives  
12

Business or Engineering Electives  
8

Free Electives  
8

Total  
28

**Culminating Undergraduate Experience**

**One from:**

CUE-495C  Co-op Thesis  
4

CUE-495E  Intra/Entre/Social E-ship Thesis  
4

CUE-495P  Professional Practice Thesis  
4

CUE-495R  Research Thesis  
4

Total  
4

(Minimum) Total Credits Required for Program  
161
Representative Program

In the Bachelor of Science in Business Administration Degree curriculum, all concentrations have the same course requirements for the first five semesters.

Representative Core Program - First Five Semesters

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<td>BIZ-150</td>
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<td>BUSN-372/373</td>
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Representative Program – Concentration

Each concentration area includes three advanced courses related to the concentration. The following section shows the representative programs for the concentration areas, Accounting/Finance, General Business, Information Systems, Marketing, and Supply Chain Management.

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(Minimum) Total Credits Required for Program | 161 |
CHEMICAL ENGINEERING (Bachelor of Science)

Home Department: Chemistry and Biochemistry

Program Director: Stacy Seeley, Ph.D.
Room 3-203 MC, 810-762-9561
sseeley@kettering.edu

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 will develop a broad knowledge of engineering science and environmental regulations, becoming more apt for 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 Chemical Engineering Degree Program is a strong interdisciplinary program which draws on the strengths of our exceptional faculty, curricula, laboratories, and unique co-op component.

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 prepared to do the following:

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

Chemical Engineering Program Curriculum Requirements

First Year Experience

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<td>ECON-201</td>
<td>Economic Principles</td>
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<td>HUMAN-201</td>
<td>Introduction to the Humanities</td>
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<td>LS-489</td>
<td>Senior Seminar: Leadership, Ethics and Contemporary Issues</td>
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Basic Sciences

One From:

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And:

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**Mathematics**

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- MATH-101  Calculus I  4
- And one from:
  - MATH-102  Calculus II  4
  - MATH-102X  Calculus II  4
  - MATH-102H  Calculus II Honors  4
- And one from:
  - MATH-203  Multivariate Calculus  4
  - MATH-203H  Multivariate Calculus Honors  4
- And:
  - MATH-408  Probability and Statistics  4

**Total**  20

**Engineering Topics**

- CHME-100  Introduction to Chemical Engineering  4
- CHME-200  Mass and Energy Balance  4
- CHME-210  Chemical Engineering Thermodynamics I  4
- CHME-300  Fluid Dynamics and Heat Transfer  3
- CHME-301  Fluid Dynamics and Heat Transfer Laboratory  1
- CHME-400  Mass Transfer and Separations  3
- CHME-401  Mass Transfer and Separations Laboratory  1
- CHME-410  Chemical Engineering Thermodynamics II  4
- CHME-420  Applied Transport Phenomena  3
- CHME-421  Applied Transport Phenomena Laboratory  1
- CHME-435  Process Control and Optimization  3
- CHME-436  Process Control and Optimization Laboratory  1
- CHME-440  Senior Chemical Engineering Design I  4
- CHME-450  Reaction Engineering  3
- CHME-451  Reactor Engineering Laboratory  1
- CHME-480  Senior Chemical Engineering Design Capstone  4
- CHME-491  Advanced Chemical Engineering Elective  4
- EE-212  Applied Electrical Circuits  3
- IME-211  Algorithm and Computer Programming  4
- MECH-231L  Signals for Mechanical Systems Lab  1

**Total**  56

**Electives**

- Technical Electives  8
- Free Electives  8

**Total**  16

**Culminating Undergraduate Experience**

*One from:*
- CUE-495C  Co-op Thesis  4
- CUE-495E  Intra/Entre/Social E-ship Thesis  4
- CUE-495P  Professional Practice Thesis  4
- CUE-495R  Research Thesis  4

**Total**  4

**(Minimum) Total Credits Required for Program**  161
## Representative Program

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| SR-III  | CHME-420       | Applied Transport Phenomena                  | 3       |
|         | CHME-421       | Applied Transport Phenomena Lab              | 1       |
|         | CHME-480       | Senior Chemical Engineering Design II        | 4       |
|         | LS-489         | Senior Seminar: Leadership, Ethics and Contemp. Issues | 4       |
|         | Technical Elective |                                              | 4       |

| Culminating Undergraduate Experience |                      | 4       |

**(Minimum) Total Credits Required for Program**: 161
CHEMISTRY (Bachelor of Science)

Home Department: Chemistry and Biochemistry

Department Head: Stacy Seeley, Ph.D.
Room 3-203 MC, 810-762-9561
sseeley@kettering.edu

Program Overview

Kettering University offers a rigorous chemistry degree consistent with the guidelines for degree certification by the American Chemical Society which ensures our graduates obtain a solid chemical foundation. 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 and work closely with faculty members on a research project. 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 technical management, education, technical writing, sales, business, and law.

Program Educational Objectives

Chemistry Graduates will:
- Have a broad, fundamental and mathematically rigorous understanding of theoretical and experimental chemistry.
- Function effectively and ethically within an organization and society as professional chemists.
- Have the skills necessary to effectively communicate their chemical understanding to the general public and to the professional chemical community.
- Be familiar with health and safety concerns and the use of chemicals in industry.
- Be able to pursue an advanced degree.

Chemistry Program Curriculum Requirements

First Year Experience

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Mathematics

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**Culminating Undergraduate Experience**

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*(Minimum) Total Credits Required for Program*  

161
Representative Program\textsuperscript{1-4}

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Advanced Chemistry Elective II  
Advanced Chemistry Elective II Lab  
Free Elective  

SR-III  LS-489  
Senior Seminar:  
Leadership, Ethics, and Contemp. Issues  
Free Elective  
Technical Electives^4  

Culminating Undergraduate Experience  

(Minimum) Total Credits Required for Program  

161^1

1The minimum total number of credit hours required for graduation is 161; however, the total number of credit hours taken may exceed 161. All Chemistry majors must meet the general educational requirements and their program’s requirements for a minor or concentration.
2Chemistry students seeking a dual major must take an additional 28 earned credit hours above and beyond their first degree.
3Humanities and Social Science electives must be selected from approved 300 or 400 level courses, including one Humanities course and one Social Science course.
4A minor or concentration is required with a minimum of 12 hours of approved courses that are not required for the Chemistry 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 100-200 level courses may be used but require approval by the Department Head of Chemistry/Biochemistry.
COMPUTER ENGINEERING (Bachelor of Science)

Home Department: Electrical and Computer Engineering

Department Head: James S. McDonald, Ph.D.
Room 2-703E AB, 810-762-7900
mcdonald@kettering.edu

Program Overview
Computer engineering is a branch of engineering concerned with the design, development, and application of computer systems. The 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 program in Computer Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Program Educational Objectives
The Computer Engineering program aims to provide each of its graduates a solid educational foundation on which he/she can build a successful and sustainable career in computer engineering or a related field. In particular, all graduates of the Computer Engineering program will have the following:

• The analysis, design, and documentation skills to qualify them for immediate employment in technical areas including:
  a) hardware and/or software design of real-time embedded computer systems,
  b) design of complex digital systems, especially computers, and
  c) applications of real-time embedded-computer or other complex digital systems (in, for example, manufacturing, monitoring, control, or communications).
• The teamwork, communications, and interpersonal skills to enable them to be productive members of interdisciplinary engineering teams.
• The skills, confidence, professionalism, and experience to enable them to assume positions of technical and/or managerial leadership as their careers develop.
• A solid foundation in basic mathematics, science, and electrical and computer engineering that will enable them to continue their professional development and sustain a life-long career in computer engineering, either through graduate study or continuing self-directed learning and development activities.

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 Senior CE Design Project, 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, haptic systems, logic systems, parallel computing, mobile robotics, mobile application development, circuits, and electronics.
## Computer Engineering Program Curriculum Requirements

### First Year Experience

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<tr>
<th>Course</th>
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<th>Credits</th>
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### General Education

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<td>COMM-101</td>
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<td>COMM-301</td>
<td>Written &amp; Oral Communication II</td>
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<td>ECON-201</td>
<td>Economic Principles</td>
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<td>HUMN-201</td>
<td>Introduction to the Humanities</td>
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<td>LS-489</td>
<td>Senior Seminar: Leadership, Ethics and Contemporary Issues</td>
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<td>Introduction to the Social Sciences</td>
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### Mathematics and Basic Science

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<td>MATH-101</td>
<td>Calculus I</td>
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<td>MATH-101X</td>
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<td>MATH-102</td>
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<td>MATH-102X</td>
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<td>MATH-203</td>
<td>Multivariate Calculus</td>
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<td>Multivariate Calculus Honors</td>
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<td>MATH-204</td>
<td>Differential Equations and Laplace Transforms</td>
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<td>CE-320</td>
<td>Microcomputers I</td>
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<td>CE-420</td>
<td>Microcomputers II</td>
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<tr>
<td>CE-422</td>
<td>Computer Architecture and Organization</td>
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<td>CE-426</td>
<td>Real-Time Embedded Computers</td>
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<td>CE-480</td>
<td>Computer Networks</td>
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<td>CE-490</td>
<td>Senior Computer Engineering Design Project</td>
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<td>ECE-101</td>
<td>MATLAB and C Programming</td>
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<td>EE-210/211</td>
<td>Circuits I</td>
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<td>EE-320/321</td>
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Electives
Free Electives 8
Technical Elective 4
Total 12

Culminating Undergraduate Experience
One from:
- CUE-495C Co-op Thesis
- CUE-495E Intra/Entre/Social E-ship Thesis
- CUE-495P Professional Practice Thesis
- CUE-495R Research Thesis
Total 4

(Minimum) Total Credits Required for Program 161

Representative Program

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### SR-I<br>**CE-480**<br>Computer Networks 4<br>Advanced Social Science Elective 4<br>Computer Science Elective 4<br>Electrical Engineering Elective 4<br>Math/Science Elective 4 20

### SR-II<br>**LS-489**<br>Senior Seminar 4<br>Computer Engineering Elective 4<br>Engineering Elective 4<br>Free Elective 4 16

### SR-III<br>**CE-490**<br>Senior Computer Engineering Design Project 4<br>Computer Engineering Elective 4<br>Free Elective 4<br>Technical Elective 4 16<br>Culminating Undergraduate Experience 4 4

**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 and EE-322.

**Engineering Elective**
The engineering elective may be any course with a CE, CHME, EE, IME, or MECH prefix, *except* EE-212 and EE-322.

**Math/Science Electives**
A math/science elective may be any course with a BIOL, CHEM, MATH or PHYS prefix, *except* CHEM-171, EP-235, MATH-100, and PHYS-235.

**Technical Elective**
The technical elective may be any course with an EE, CE, CS, MECH, IME, CHME, MATH, BIOL, CHEM, or PHYS prefix, *except* EE-212, EE-322, MATH-100, and CHEM-171.

(Minimum) Total Credits Required for Program 161
COMPUTER SCIENCE (Bachelor of Science)

Home Department: Computer Science

Department Head: John G. Geske, Ph.D., Department Head
Room 2-300 AB, 810-762-7963
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, 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 system and data security; students can easily obtain minors in diverse fields such as applied mathematics, economics, 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, http://www.abet.org.

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 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, 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

First Year Experience
FYE-101 First Year Foundations 1
Total 1

General Education
COMM-101 Written & Oral Communication I 4
COMM-301 Written & Oral Communication II 4
ECON-201 Economic Principles 4
HUMN-201 Introduction to the Humanities 4
LS-489 Senior Seminar: Leadership, Ethics and Contemporary Issues 4
SSCI-201 Introduction to the Social Sciences 4
Advanced Humanities Elective 4
Advanced Social Science Elective 4
Total 32

Basic Science
Science Electives 16
Total 16

Computer Science
CS-101 Computing and Algorithms I 4
CS-102 Computing and Algorithms II 4
CS-202 Systems Programming Concepts 4
CS-203 Computing and Algorithms III 4
CS-211 Discrete Mathematics 4
CS-300 The Computing Professional 4
CS-312 Theory of Computation 4
CS-435 Functional Languages and Parsing 4
CS-451 Operating Systems 4
CS-471 Software Engineering 4
Computer Science Technical Electives 16
Total 56

Computer Engineering
CE-210 Digital Systems I 4
CE-320 Microcomputers I 4
Total 8

Mathematics
One from:
MATH-101 Calculus I 4
MATH-101X Calculus I 4
And one from:
MATH-102 Calculus II 4
MATH-102X Calculus II 4
MATH-102H Calculus II Honors 4
And:
Mathematics Electives 12
Total 20
Electives
Free Electives 16
Total 16

Culminating Undergraduate Experience
One from:
- CUE-495C Co-op Thesis
- CUE-495E Intra/Entre/Social E-ship Thesis
- CUE-495P Professional Practice Thesis
- CUE-495R Research Thesis 4
Total 4

(Minimum) Total Credits Required for Program 161

Representative Program

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Free Elective 4

SR-II

CS-435 Functional Languages and Parsing 4
or
CS-471 Software Engineering 4
LS-489 Senior Seminar:
Leadership, Ethics and Contemp. Issues 4
CS Technical Elective 4
Free Elective 4
Mathematics Elective 4

SR-III

CS-451 Operating Systems 4
Liberal Studies Electives 8
Science Elective 4

Culminating Undergraduate Experience 4

(Minimum) Total Credits Required for Program 161

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 System and Data Security concentrations should contact Professor John Geske, 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.

Required Courses

- CS-320 Computer Graphics
- CS-385 Introduction to Game Design
- CS-420 Multimedia Design
- CS-485 Advanced Game Development

System and Data Security

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

Required Courses

- CS-415 Cryptography
- CS-455 Computer and Network Security
- CS-458 Computer and Network Forensics
- CS-459 Secure Software

1 Must include two courses (8 credits) with a laboratory component.
2 These courses are offered in alternate years.
3 A list of approved technical electives is available from the department and listed on the department web-site
ELECTRICAL ENGINEERING (Bachelor of Science)

Home Department: Electrical and Computer Engineering

Department Head: James S. McDonald, Ph.D.
Room 2-703E AB, 810-762-7900
mcdonald@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 program in Electrical Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

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, all graduates of the Electrical Engineering program will have the following:

- The analysis, synthesis and design skills to qualify them for immediate employment or graduate study in the areas of electrical, electronic and digital systems.
- The teamwork, communications and interpersonal skills to enable them to be productive members of interdisciplinary engineering teams.
- The confidence, professionalism and experience to enable them to assume positions of technical and/or managerial leadership as their careers develop.
- A solid foundation in basic mathematics, science and electrical engineering that will enable them to continue their professional development and sustain a life-long career in electrical engineering, either through advanced course work or continuing self-directed learning and development activities.

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 Senior EE Design Project, 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, haptic systems, and embedded computer systems.

Electrical Engineering Program Curriculum Requirements

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<td>HUMN-201</td>
<td>Introduction to the Humanities</td>
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<tr>
<td>LS-489</td>
<td>Senior Seminar: Leadership, Ethics and Contemporary Issues</td>
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<td>SSCI-201</td>
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### Mathematics and Basic Science

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<td>Principles of Chemistry and Lab</td>
<td>4</td>
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<td>MATH-102</td>
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<td>MATH-102X</td>
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<td>MATH-203</td>
<td>Multivariate Calculus</td>
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<td>MATH-204</td>
<td>Differential Equations and Laplace Transforms</td>
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<td>MATH-307</td>
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(Minimum) Total Credits Required for Program: **161**
## Representative Program

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Electrical Engineering / 118
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(Minimum) Total Credits Required for Program **161**

### Electives

#### Electrical Engineering Electives
An electrical engineering elective may be any course with an EE prefix, *except* EE-212 and EE-322. At least 8 credits of electrical engineering electives must be at the 400 level or above.

#### Electrical or Computer Engineering Elective
The electrical or computer engineering elective may be an electrical engineering elective or any course with a CE prefix.

#### Math/Science Elective
The math/science elective may be CS-211, or any course with a BIOL, CHEM, MATH, PHYS prefix, *except* CHEM-171, MATH-100, and PHYS-235.

#### Technical Electives
A technical elective may be any course with an EE, CE, CS, MECH, IME, CHME, MATH, BIOL, CHEM, or PHYS prefix, *except* EE-212, EE-322, MATH-100, and CHEM-171.
ENGINEERING PHYSICS (Bachelor of Science)

Home Department: Physics

Department Head: Kathryn Svinarich, Ph.D.
Room 2300N AB, 810-762-7499
physics@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 such as nanotechnology, telecommunications, medical physics and devices, or advanced and electronic materials. Engineering Physics degree is a flexible degree designed to interface physics with applied sciences and engineering disciplines.

The degree in Engineering Physics (EP) at Kettering University unifies the Physics knowledge applications in Optics, Acoustics, and advanced materials with a comprehensive engineering component emphasizing the systems engineering approach 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 consist of the most comprehensive work integrated physics co-op in the nation, with emphasis on industrial physics that includes an industrial thesis and areas of concentrations.
- The Engineering Physics (EP) program includes a thorough background in mathematics, science, engineering fundamentals, individually designed engineering concentration, social sciences, humanities, and communication.
- Engineering Physics (EP) students have the opportunity to earn an individually designed concentration in any area of engineering that includes an engineering capstone design and combines that with a sequence of courses in the field of optics, acoustics, materials science or medical physics.
- Engineering Physics students complete a written senior thesis.

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

Program Educational Objectives
The Engineering Physics degree program is designed as an interdisciplinary program that provides graduates with a solid educational foundation that combines mathematics, science, engineering, communications and liberal studies to prepare graduates for physics, engineering and interdisciplinary based career and graduate studies. The Department of Physics strives to produce Engineering Physics graduates who:

- 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.

Engineering Physics Program Curriculum Requirements

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<tr>
<th>First Year Experience</th>
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General Education
COMM-101  Written & Oral Communication I  4
COMM-301  Written & Oral Communication II  4
ECON-201  Economic Principles  4
HUMN-201  Introduction to the Humanities  4
LS-489    Senior Seminar: Leadership, Ethics and Contemporary Issues  4
SSCI-201  Introduction to the Social Sciences  4
Advanced Humanities Elective  4
Advanced Social Science Elective  4
Total  32

Engineering
One From:
EE-210/211  Circuits I/Lab  4
EE-212/MECH-231L  Applied Electric Circuits/Signals for Mechanical Systems Lab  4
And:
EE-240  Electromagnetic Fields and Applications  4
IME-100  Interdisciplinary Design and Manufacturing  4
And one from:
IME-301  Engineering Materials  4
PHYS-342  Materials Science or Nanotechnology  4
And:
MECH-210  Statics  4
MECH-212  Mechanics of Materials  4
Engineering Elective Sequence  20
Total  44

Chemistry
One From:
CHEM-137/136  General Chemistry I/Principles of Chemistry Lab  4
CHEM-135/136  Principles of Chemistry/Lab  4
Total  4

Mathematics
One from:
MATH-101  Calculus I  4
MATH-101X  Calculus I  4
And one from:
MATH-102  Calculus II  4
MATH-102X  Calculus II  4
MATH-102H  Calculus II Honors  4
And one from:
MATH-203  Multivariate Calculus  4
MATH-203H  Multivariate Calculus Honors  4
And one from:
MATH-204  Differential Equations and Laplace Transforms  4
MATH-204H  Differential Equations and Laplace Transforms Honors  4
And:
MATH-305  Numerical Methods and Matrices  4
MATH-327  Mathematical Statistics I  4
Total  24

Physics
EP-235  Computers in Physics  4
PHYS-114/115  Newtonian Mechanics and Lab  4
PHYS-224/225  Electricity and Magnetism and Lab  4
PHYS-302  Vibration, Sound and Light  4
PHYS-362  Modern Physics  4
PHYS-412  Theoretical Mechanics  4
PHYS-452  Thermodynamics and Statistical Physics  4
PHYS-462  Quantum Mechanics  4
PHYS-477  Optics  4
PHYS-485    Acoustic Testing and Modeling    4

One From:
PHYS-464    Nuclear Physics: Principles and Applications
EP-446    Solid State Physics

Total    44

Electives
Free Electives    8

Total    8

Culminating Undergraduate Experience

One from:
CUE-495C    Co-op Thesis
CUE-495E    Intra/Entre/Social E-ship Thesis
CUE-495P    Professional Practice Thesis
CUE-495R    Research Thesis

Total    4

(Minimum) Total Credits Required for Program    161

Representative Program

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(Minimum) Total Credits Required for Program 161

¹ Engineering Electives are any 300 or 400 level Engineering or Applied Sciences courses approved by the academic advisor to form a sequence of courses in a specific Engineering or technical field of study (in some cases, this may also include one or more courses in Science, Math, or Business necessary to complete an engineering sequence, such as fuel cell sequence). Engineering sequence courses will be designed based on individual student interests and their future career or graduate studies plans and in some cases may satisfy a minor program requirements.

² Offered winter and spring terms only.

³ Offered summer and fall terms only.
INDUSTRIAL ENGINEERING (Bachelor of Science)

Home Department: Industrial and Manufacturing Engineering
Department Head: Vacant
Contact the Industrial and Manufacturing Engineering Department

Program Overview
The Department of Industrial & Manufacturing Engineering offers a degree in Industrial Engineering. 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 (IE) is a discipline known for its breadth of scope and application. The preparation received in industrial engineering is valuable in virtually all industrial, commercial and governmental activities which are engaged in the manufacture of a product or the 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 the 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 the optimal utilization of its resources. The utilization 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 both 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 in Computer Graphics, Computer Software Development, Human Factors (ergonomics), Manufacturing Materials and Processes, Methods Analysis, Networked Microcomputers, and Physical Simulation.

The program in Industrial Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Program Educational Objectives
During the 5-8 years following completion of the Bachelor of Science in Industrial Engineering Degree, our graduates will:
- Use principles of Industrial Engineering to work successfully with a variety of people to further the aims and objectives of themselves, their organization and others.
- Grow professionally, having increased their level of authority, contribution, leadership and teamwork.
- Demonstrate their ability to increase their knowledge in ways most appropriate for their goals.
- Meet personal career goals.
## Industrial Engineering Program Curriculum Requirements

### First Year Experience

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### Basic Sciences

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### Engineering Core

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### Industrial Engineering Core

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<tr>
<td>IME-301</td>
<td>Engineering Materials</td>
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<td>IME-321</td>
<td>Systems Modeling I: Deterministic Models</td>
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<td>IME-332</td>
<td>Engineering Statistics II: Statistical Inference and Regression</td>
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<td>IME-333</td>
<td>Engineering Statistics III: Design of Experiments</td>
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<tr>
<td>IME-361</td>
<td>Work Design I: Methods &amp; Standards</td>
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<td>IME-412</td>
<td>Applied Control Systems Design</td>
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<td>IME-452</td>
<td>Designing Value in the Supply Chain</td>
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<td>Tools for Managing the Supply Chain</td>
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<td>Senior Design Project</td>
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<td>IME-462</td>
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<td>Quality Systems I: Ergonomics</td>
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### Mathematics

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MATH-310  Biostatistics I  4
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**Concentration**
Industrial Engineering Cognate (three IME electives)  12
Total  12

**Electives**
Free Electives \(^3\)
(Both IME and Free electives may be used to complete a non-IE minor)  8
Total  8

**Culminating Undergraduate Experience**
*One from:*
CUE-495C  Co-op Thesis  4
CUE-495E  Intra/Entre/Social E-ship Thesis  4
CUE-495P  Professional Practice Thesis  4
CUE-495R  Research Thesis  4
Total  4

(Minimum) Total Credits Required for Program  161

### Representative Program

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Science or Math Elective$^{1}$  

SR-I
- IME-422 Systems Modeling II: Simulation 4
- IME-453 Tools for Managing the Supply Chain 4
- Advanced Social Science Elective 4
- Free Elective 4
- IE Concentration Elective I 4  

SR-II
- IME-412 Applied Control Systems Design 4
- IME-462 Work Design II: Ergonomics 4
- IME-471 Quality Systems I: Quality Assurance 4
- Advanced Humanities Elective 4
- IE Concentration Elective II 4  

SR-III
- IME-454 Senior Design Project 4
- LS-489 Senior Seminar: Leadership, Ethics and Contemp. Issues 4
- Free Elective 4
- IE Concentration Elective III 4  

Culminating Undergraduate Experience 4  

(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, MATH-408 (if student has taken MATH-310), CHEM-171 and PHYS-235.  
$^{2}$ The credits for Engineering Statistics II and III are split between Industrial Engineering Core and Mathematics  
$^{3}$ Students taking MATH-310 (Biostatistics I) may not take MATH-408 (Probability and Statistics) as an elective, including as a free elective. MATH-408 may only be substituted for MATH-310 with Department Head approval.  

Dual Degrees in Industrial Engineering and Mechanical Engineering

A coordinated program is available to earn both a Bachelor of Science in Industrial Engineering and a Bachelor of Science in Mechanical Engineering in 193 credits (189 credits of course work and 4 thesis credits). A student can complete the program in 10 or 11 academic terms at Kettering University. During the first three terms, a student can follow the representative program for either degree. The following representative program is intended as a guide to assist the student in planning for the remaining terms. An eligible student may be able to avoid a SR-V term by one of the following three methods: 1) take 5 courses per term for one term prior to JR-I, 2) take 6 courses per term for one term after SO-II, or 3) take Kettering or guest courses during a work term. 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.  

Dual Degrees in Industrial Engineering and Mechanical Engineering Representative Program

FR I through SOI Representative Program Credit Total: $^{49}$

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<td>MECH-212</td>
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(Minimum) Total Credits Required for Program: 161
Concentrations

Students in Industrial Engineering (IE) have the opportunity to complete a concentration within the degree program. A concentration is for a student to gain specialized knowledge within a particular area of IE. Concentrations may be defined by choices made for the IE concentration electives. Available concentrations in IE are:

**Cognate:**
Any 3 IME electives

**Quality Assurance:**
IME-572 Introduction to Reliability & Maintainability
IME-573 Advanced Quality Assurance
IME-474 Design for Manufacture & Assembly or IME-575 Failure Analysis
NOTE: A certificate in Six-Sigma fundamentals can be earned by completing IME-572 and IME-573

**Healthcare Systems Engineering**
IME-456 Healthcare Systems Engineering
IME-476 Lean Six-Sigma
HMG-409 Healthcare Management

**International Study:**
IE students participating in the international study program may use some courses taken abroad as IE and free electives. They may also use their electives for the Manufacturing Minor from the Department of Industrial and Manufacturing Engineering (IME), or a minor from another department. Current information on courses can be obtained from the Department of IME.

Minors

Many academic departments offer minors. Refer to the department offering the minor for details. Popular minors among IE students include the Business Minor and the Applied Statistics Minor. IME offers the Manufacturing Minor, which is available to all students. Courses required for the Manufacturing Minor are:

IME-301 Engineering Materials
IME-403 CNC Machining
IME-409 Computer Integrated Manufacturing
IME Process Elective
IME Integration Elective
Additional process or integration course or IME-499 Independent Study

Students may also use electives for the Manufacturing Minor from the Department of Industrial and Manufacturing Engineering (IME), or a minor from another department. Current information on courses can be obtained from IME.

Bachelor-Master Programs

A Bachelor-Master Program in Manufacturing Engineering is available to students in all undergraduate engineering programs, provided that they meet University criteria for such programs. The program consists of ten courses, or forty credits. This program provides the opportunity to take two 500-level IME courses during the Senior year that can count toward both undergraduate and graduate program credit. The remaining 600-level coursework is generally completed over two additional school terms. Two thesis plans are available: (1) normal undergraduate thesis plan, with Bachelor’s degree earned upon completion of all undergraduate program requirements; and (2) graduate thesis plan counting for both undergraduate and graduate credit, with Bachelor’s and Master’s degrees completed concurrently. Contact the Department Head for more information. All majors must take IME-301 (or equivalent course approved by the IME Department Head), as a prerequisite to entry into the program. Additional information about this graduate program can be found in the Graduate Catalog.
MECHANICAL ENGINEERING (Bachelor of Science)

Home Department: Mechanical Engineering
Department Head: Craig J. Hoff, Ph.D.
Room 2-103 MC, 810-762-7833
choff@kettering.edu

Program Overview
The degree program in Mechanical Engineering 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.

Groupings of five courses provide an elective specialty in alternative energy, automotive engineering design, bioengineering applications, machine design, or plastic product design.

The program in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET, [http://www.abet.org](http://www.abet.org).

Program Educational Objectives
The Kettering Mechanical Engineering Program prepares graduates to:
- Provide leadership in contributing to the success of their organizations.
- Work collaboratively to synthesize information and formulate, analyze and solve problems with creative thinking and effective communication.
- Make professional decisions with an understanding of their global, economic, environmental, political and societal implications.
- Apply modern tools and methodologies for problem solving, decision making and/or design.
- Be committed to professional and ethical practices, continuous improvement and life-long learning.

Program Curriculum Requirements

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MATH-102H  Calculus II Honors  4
And one from:  
MATH-203  Multivariate Calculus
MATH-203H  Multivariate Calculus Honors  4
And one from:  
MATH-204  Differential Equations and Laplace Transforms
MATH-204H  Differential Equations and Laplace Transforms Honors  4
And:  
MATH-305  Numerical Methods and Matrices  4
MATH-408  Probability and Statistics  4
Total  24

Mechanical Engineering Required Courses  
EE-212  Applied Electrical Circuits  3
MECH-231L  Signals for Mechanical Systems Lab  1
IME-100  Interdisciplinary Design and Manufacturing  4
One from:  
IME-301  Engineering Materials  4
PHYS-342  Materials Science and Nanotechnology  4
And:  
MECH-100  Engineering Graphical Communication  4
MECH-210  Statics  4
MECH-212  Mechanics of Materials  4
MECH-300  Computer Aided 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  Dynamic Systems with Vibrations  4
MECH-420  Heat Transfer  4
MECH-422  Energy Systems Laboratory  4
MECH-430  Dynamic Systems with Controls  4
Total  64

Electives  
Two Free Electives  8
Two Mechanical Engineering Electives  8
Mechanical Engineering Senior Design Project  4
Total  20

Culminating Undergraduate Experience  
One from:  
CUE-495C  Co-op Thesis  4
CUE-495E  Intra/Entre/Social E-ship Thesis  4
CUE-495P  Professional Practice Thesis  4
CUE-495R  Research Thesis  4
Total  4

(Minimum) Total Credits Required for Program  161
# Representative Program

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<td>MECH-422</td>
<td>Energy Systems Lab</td>
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^2: Individual choice

^3: Note: May be taken independently of other courses depending on the interested.

^4: Note: May be taken independently of other courses depending on the interested.
Free Elective 4
ME Senior Design Project 4
MECH-231L/EE-212.
MECH-100 FR-I and IME MECH-100 FR-II, the other one-half take MECH-300 SR-I and MECH-300 FR-II.
MECH-300 JR-II and MECH-311 JR-I, the other one-half take MECH-311 JR-II and MECH-300 SR-I.
Elective courses may vary in lecture and/or laboratory credits and terms from those shown.
ME Senior Design Projects may vary in lecture and/or laboratory credits and terms from those shown.

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. SR I through SR 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.

Aerospace Specialty (Concentration) – Offered During B-Section Only

Required Courses:
MECH-562 Compressible Flow/Gas Dynamics
MECH-564 Aerodynamics and Wing Theory
MECH-522/MECH-600 Engineering Mathematics with Applications

Electives:
Select one elective courses from the following:
MECH-523 Applied Computational Fluid Dynamics
CHEM-561 Physical Chemistry of Energy Conversion
MECH-622 Computational Heat and Mass Transfer
MECH-641 Combustion and Emissions

Capstone:
Select one capstone design course:
Recommended Capstone: MECH-521 Energy and Environmental Systems Design

Alternative Energy Specialty

Required courses
MECH-526 Fuel Cell Science and Engineering
MECH-527 Energy and the Environment
MECH-528 Bio and Renewable Energy Laboratory
MECH-545 Hybrid Electric Vehicle Propulsion

Senior Capstone Design
Select one from the following:
MECH-521 Energy and Environmental Systems Design
MECH-529 Design and Modeling of Fuel Cell Systems

Automotive Engineering Design Specialty

Required Courses
MECH-548 Vehicle Design Project

Select three from the following:
MECH-516 Introduction to Finite Element Analysis with Structural Application
MECH-540 Introduction to Internal Combustion Engines
MECH-541 Advanced Automotive Power Systems
MECH-542  Chassis System Design
MECH-544  Introduction to Automotive Powertrains
MECH-545  Hybrid Electric Vehicle Propulsion
MECH-546  Vehicle Systems Dynamics

and select one from the following:
Any course previously listed
EE-580  Automotive Electronic Systems
IME-575  Failure Analysis
KETT-540  Environmentally Conscious Design and Manufacturing
MECH-510  Analysis and Design of Machines and Mechanical Assemblies
MECH-515  Failure and Material Considerations in Design
MECH-526  Fuel Cell Science and Engineering
MECH-550  Automotive Bioengineering: Occupant Protection and Safety
MECH-551  Vehicular Crash Dynamics and Accident Reconstruction
Other courses with the approval of the automotive faculty

Bioengineering Application Specialty
Required Courses
MECH-350  Introduction to Bioengineering Applications
MECH-554  Bioengineering Applications Project

Electives
Select three from the following:
BIOL-141/142 General Biology and Lab
BIOL-241/242 Human Biology and Lab
BIOL-341  Anatomy and Physiology
MECH-550  Automotive Bioengineering: Occupant Protection and Safety
MECH-551  Vehicular Crash Dynamics and Accident Reconstruction
PHYS-354  Medical Physics

Machine Design & Advanced Materials Specialty
Required Courses
MECH-412  Mechanical Component Design II
MECH-512  Mechanical Systems Design Project
OR  MECH-584/572 Product Design Capstone
MECH-516  Introduction to Finite Element Analysis with Structural Applications
OR  MECH-582 Mechanics & Design Simulation with Composite Materials

Electives:  Select two from the following:
IME-474  Design for Manufacture and Assembly
IME-575  Failure Analysis
MECH-515  Failure and Material Consideration in Design
MECH-580  Properties of Polymers

Bachelor of Science in Mechanical Engineering Curriculum by Specialty

Aerospace Specialty (Concentration) – FR I through JR II Representative Program Credit Total:  105
Note: Currently Aerospace Specialty Electives are only offered during B-Section

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**Alternative Energy Specialty** – FR I through JR II Representative Program Credit Total: 105

**Automotive Engineering Design Specialty** – FR I through JR II Rep. Program Credit Total: 105

(Minimum) Total Credits Required for Program: 161
### Bioengineering Application Specialty – FR I through JR I Representative Program

**Semester** | **Course #** | **Course Name** | **Credits**
--- | --- | --- | ---
JR-II | COMM-301 | Written & Oral Communication II | 4
 | MECH-300 | Computer Aided Engineering | 4
 | MECH-312 | Mechanical Component Design I | 4
 | MECH-320 | Thermodynamics | 4
 | MECH-350 | Introduction to Bioengineering Applications | 4

**Representative Program Credit Total:** 85

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**SR-II** | MECH-420 | Heat Transfer | 4 |
 | MECH-430 | Dynamic Systems with Controls | 4 |
 |  | Advanced Social Science Elective | 4 |
 |  | Bioengineering Specialty Related Elective<sup>6-7</sup> | 4 |

**SR-III** | LS-489 | Senior Seminar: Leadership, Ethics and Contemp. Issues | 4 |
 | MECH-422 | Energy Systems Lab | 4 |
 | MECH-554 | Bioengineering Applications Project | 4 |
 |  | Bioengineering Specialty Related Elective<sup>6-7</sup> | 4 |

**Culminating Undergraduate Experience** | 16

**(Minimum) Total Credits Required for Program** | 161

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### Machine Design & Advanced Materials Specialty – FR I through JR II Representative Program

**Semester** | **Course #** | **Course Name** | **Credits**
--- | --- | --- | ---
SR-I | MECH-322 | Fluid Mechanics | 4 |
 | MECH-330 | Dynamic Systems with Vibrations | 4 |
 | MECH-412 | Mechanical Component Design II | 4 |
 | MECH-516 | Intro to Finite Element Analysis w/ Struct App | 4 |
 |  | Advanced Humanities Elective | 4 |

**SR-II** | MECH-420 | Heat Transfer | 4 |
 | MECH-430 | Dynamic Systems with Controls | 4 |
 |  | Advanced Social Science Elective | 4 |
 |  | Machine Design Specialty Elective<sup>6-7</sup> | 4 |

**SR-III** | LS-489 | Senior Seminar: Leadership, Ethics and Contemp. Issues | 4 |
 | MECH-422 | Energy Systems Lab | 4 |
 | MECH-512 | Mechanical Systems Design Project | 4 |
 |  | Machine Design Specialty Elective<sup>6-7</sup> | 4 |

**Culminating Undergraduate Experience** | 16

**(Minimum) Total Credits Required for Program** | 161
Mechanical Engineering Program Electives

A Mechanical Engineering elective is defined as any course with one of the following prefixes except core courses used to complete degree requirements (other restrictions as noted): BIOL, CE, CHEM, CHME, CS, ECE, EE, IME, ISYS (level 300-599), MATH (except MATH-100), MECH (except MECH-325), PHYS. The following courses also qualify as an ME elective: BUSN-372, BUSN-373, and MGMT-546.

Math/Science Elective

Any level MATH, BIOL, CHEM, or PHYS course that is not used to complete core degree requirements.

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

7 Students select a Specialty Related Elective or Specialty Related ME Elective with approval of their ME Specialty Advisor.
PRE-MED EDUCATION COURSE OF STUDY

Home Department: Chemistry and Biochemistry

Pre-Med Coordinator: Stacy Seeley, Ph.D.
Room 3-213 MC 810-762-9561
sseeley@kettering.edu

PRE-MED EDUCATION COURSE OF STUDY

It’s all about options and increasing your opportunities to be successful. Getting an engineering or science undergraduate degree can be taken to the next level with a Pre-Med Course of Study. This is ideal for students who are considering medical school, a job in the growing Biotechnical industry, or continuing their education in graduate school. Medicine is becoming an increasingly technical field; an engineering or science degree and the Pre-Med Course of Study can prepare you to be a great doctor, medical researcher, or designer of tomorrow’s lifesaving technologies.

Two of Kettering’s programs already include the specific courses required for entrance into most medical schools: Biochemistry and Chemistry. Students in any of the other degree programs can obtain the required courses by taking the Biochemistry minor and a year of Biology to obtain the most common Medical School prerequisites which are as follows:

- One year of General Chemistry: CHEM-135/136 or CHEM-137/136, CHEM-237/238
  Students may take General Chemistry I, CHEM-137 and CHEM-136, Principles of Chemistry Lab or CHEM-135/136 for their first term of chemistry. Principles of Chemistry, CHEM-135/136 is already part of the typical Engineering curricula. A second term of General Chemistry must be taken (i.e. CHEM-237/238).

  Industrial Organic Chemistry which is included in the Engineering curricula is not considered sufficient for most Medical Schools. Two terms of Organic Chemistry (i.e. CHEM-345/346 and CHEM-347/348) must be taken.

- One year of Biology: BIOL-141/142, BIOL-241/242
  Students must take General Biology Lecture + Lab and Human Biology Lecture + Lab.

- One-half year of Biochemistry: CHEM-351/352
  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. The Premedical Education Course of Study will not appear on the transcript.

Engineering 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 chair or Dr. Stacy K. Seeley (pre-med coordinator). In addition to the Pre-Med Course of Study, Engineering students are typically required to take a Senior Capstone Course (sometimes referred to as a Senior Project Course) to complete their Major Degree course requirements. The typical Engineering student pursuing the Pre-Med Course of Study will require more credits (~8 credits) than a given Engineering Program—refer to your department degree program requirements for complete details. The typical Medical School does not usually require other courses in biology (e.g. Anatomy and Physiology). However, students planning on applying to specific medical schools must consult the given medical school for further details.
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 beyond the minimum of 41 classes (161 credits) required for completion of the major. Coursework taken outside of Kettering University is not transferable towards a minor. 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. The Academic Department granting the minor provides an audit for each student who applies to graduate.

Acoustics (Physics Department)

Required Courses:
- PHYS-302 Vibration, Sound, and Light
- PHYS-388 Acoustics in the Human Environment

Plus one from the following:
- EE-434 Digital Signal Processing
- MECH-330 Dynamic Systems with Vibrations

For more information on the Acoustics Minor contact Dr. Dan Ludwigsen at dludwigs@kettering.edu, or send an email to physics@kettering.edu.

Applied and Computational Mathematics (Mathematics Department)

Required Courses:
- MATH-101 Calculus I
- MATH-102 Calculus II
- MATH-203 Multivariate Calculus
- MATH-204 Differential Equations and Laplace Transform
- MATH-305 Numerical Methods and Matrices

Plus three mathematics courses including any two from the following:
- MATH-308 Abstract Algebra
- MATH-313 Boundary Value Problems
- MATH-321 Real Analysis I
- MATH-327 Mathematical Statistics I
- MATH-408 Probability and Statistics
- MATH-416 Vector Analysis
- MATH-418 Intermediate Differential Equations

For more information on the Applied and Computational Mathematics Minor contact Dr. Ilya Kudish at ikudish@kettering.edu or 810-762-7431, or Dr. Leszek Gawarecki at lgawarec@kettering.edu or 810-762-9557.

Applied Optics (Physics Department)

Required Courses:
- PHYS-302 Vibration, Sound, and Light
- PHYS-376 Photonics and Optoelectronics
- PHYS-376 Spectroscopy and Microscopy
- PHYS-477 Optics

Students interested in the Applied Optics Minor may contact Dr. Kathryn Svinarich at ksvinari@kettering.edu or 810-762-7471, or send an email to physics@kettering.edu.

Biochemistry (Chemistry/Biochemistry Department)

Required Courses (26 credits):
- CHEM-135/136 Principles of Chemistry/Lab (4)
- or CHEM-137/136 General Chemistry I/Lab (4)
- CHEM-237/238 General Chemistry II/Lab (4)
CHEM-345/346  Organic Chemistry I/Lab (6)
CHEM-347/348  Organic Chemistry II/Lab (6)
CHEM-351/352  Biochemistry I/Lab (6)

For more information on the Biochemistry Minor contact Dr. Stacy Seeley at sseeley@kettering.edu or 810-762-9561.

Bioinformatics (Computer Science Department)

Required Courses:
BINF-310  Introduction to Bioinformatics
BIOL-241/242  Human Biology/Lab:
BIOL-441/442  Molecular and Cellular Biology/Lab
BIOL-481  Genetics
CHEM 135  Principles of Chemistry OR CHEM-137 General Chemistry I
CHEM-136  Principles of Chemistry Lab
CHEM-247  Survey of Organic Chemistry
CS-101  Computing and Algorithms I
CS-102  Computing and Algorithms II
CS-465  Information Retrieval and Data Mining

Biology (Chemistry/Biochemistry Department)

Required Courses:
BIOL-141/142  General Biology/Lab
BIOL-241/242  Human Biology/Lab
Plus two from the following:
BIOL-341  Anatomy and Physiology
BIOL-441  Molecular and Cellular Biology
BIOL-481  Genetics

Students pursuing a major in biochemistry may pursue a minor in biology.
For more information on the Biology Minor contact Dr. Stacy Seeley at sseeley@kettering.edu or 810-762-9561.

Business (Business Department)

Required Courses:
ACCT-212  Managerial Accounting
BIZ-210  Management Concepts
BIZ-240  Introduction to Marketing
ECON-201  Economic Principles
FINC-310  Financial Markets or FINC-311 Financial Management
MATH-310  Biostatistics I or MATH-408 Probability and Statistics or MATH-327 Mathematical Statistics I

Plus one business elective:
Any 300-level business elective with an identifier of ACCT, BIZ, BUSN, FINC, ISYS, MGMT, or MRKT

Plus one economics elective:
Any 300-level economics elective with an identifier of ECON

For more information on the Business Minor contact the Department of Business at 810-762-7952.

Chemistry (Chemistry/Biochemistry Department)

Required Courses (20 credits):
CHEM-135/136  Principles of Chemistry/Lab (4)
or CHEM-137/136 General Chemistry I/Lab (4)
CHEM-237/238  General Chemistry II/Lab (4)
CHEM-345/346  Organic Chemistry I/Lab (6)
CHEM-347/348  Organic Chemistry II/Lab (6)

For more information on the Chemistry Minor contact Dr. Stacy Seeley at sseeley@kettering.edu or 810-762-9561.
Computer Engineering (Electrical and Computer Engineering Department)

**Required Courses:**
- CE-210 Digital Systems
- CE-320 Microcomputers I
- CS-101 Computing and Algorithms I
- CS-102 Computing and Algorithms II
- EE-210 Circuits I
- EE-211 Circuits I Lab
- EE-320 Electronics I
- EE-321 Electronics I Lab

**Plus one from the following:**
- CE-310 Digital Systems II
- CE-422 Computer Architecture and Organization

**Plus one from the following:**
- CE-420 Microcomputers II
- CE-426 Real-Time Embedded Computers

**Plus one from the following:**
- CE-480 Computer Networks
- CS-451 Operating Systems

For more information on the Computer Engineering Minor contact Dr. James McDonald at mcdonald@kettering.edu or 810-762-9701.

Computer Gaming (Computer Science Department)

**Required Courses:**
- CS-101 Computing and Algorithms I
- CS-102 Computing and Algorithms II
- CS-320 Computer Graphics
- CS-385 Introduction to Game Design
- CS-485 Advanced Game Development

For more information on the Computer Gaming Minor contact Dr. John Geske at jgeske@kettering.edu or 810-762-7963.

Computer Science (Computer Science Department)

**Required Courses:**
- CS-101 Computing and Algorithms I
- CS-102 Computing and Algorithms II
- CS-203 Computing and Algorithms III
- CS-211 Discrete Mathematics

**Plus two additional Computer Science courses numbered 300 or above**

For more information on the Computer Science Minor contact Dr. John Geske at jgeske@kettering.edu or 810-762-7963.

Economics (Liberal Studies Department)

**Required Courses:**
Select four from the following:
- ECON-344 Intermediate Macroeconomics: Economic Growth and Fluctuation
- ECON-346 Introduction to Econometrics
- ECON-348 History of Economic Thought
- ECON-350 Comparative Economic Systems
- ECON-352 International Economics
- ECON-391 Topics in Economics
- ECON-499 Economics Independent Study
- HIST-322 Africa in the World Economy

For more information on the Economics Minor contact Dr. Karen Wilkinson at kwilkins@kettering.edu or 810-762-7827.
Electrical Engineering (Electrical and Computer Engineering Department)

**Required Courses:**
- CE-210 Digital Systems I
- EE-210 Circuits I
- EE-211 Circuits I Lab
- EE-240 Electromagnetic Fields and Applications
- EE-310 Circuits II
- EE-320 Electronics I
- EE-321 Electronics I Lab
- EE-332 Signals and Systems

**Plus three from the following:**
- EE-340 Electromagnetic Wave Propagation
- EE-342 Electrical Machines
- EE-344 Fundamentals of Power Systems
- EE-346 High Voltage Generation and Measurement Techniques
- EE-348 Electromagnetic Compatibility
- EE-420 Electronics II
- EE-424 Power Electronics and Applications
- EE-427 Semiconductor Device Fundamentals
- EE-430 Communication Systems
- EE-432 Feedback Control Systems
- EE-434 Digital Signal Processing
- EE-444 Computational Methods in Power Systems
- EE-524 Fuel Cell System Integration and Packaging
- EE-530 Digital Control Systems
- EE-580 Automotive Electronic Systems
- EE-582 Robot Dynamics and Control
- EE-584 Wireless Communications for Automotive Applications

For more information on the Electrical Engineering Minor contact Dr. James McDonald at mcdonald@kettering.edu or 810-762-9701.

Fuel Cells and Hybrid Technology (Mechanical Engineering Department)

**Required Courses for Chemistry Students:**
- BUSN-372 Innovation and New Ventures
- CHEM-245 Applied Chemistry for Engineers
- MECH-526 Fuel Cell Science and Engineering
- MECH-527 Energy and the Environment
- PHYS-342 Materials Science

**Required Courses for Electrical Engineering Students:**
- BUSN-372 Innovation and New Ventures
- CHEM-245 Applied Chemistry for Engineers
- EE-320/321 Electronics I/Lab
- EE-424 Power Electronics and Applications
- EE-524 Fuel Cell Systems Integration and Packaging
- MECH-526 Fuel Cell Science and Engineering
- MECH-527 Energy and the Environment
- MECH-545 Hybrid Electric Vehicle Propulsion

**Required Courses for Mechanical Engineering Students:**
- BUSN-372 Innovation and New Ventures
- CHEM-237/238 General Chemistry II/Lab or CHEM-245 Applied Chemistry for Engineers
- EE-320/321 Electronics I/Lab (does not require CE-210)
- EE-524 Fuel Cell Systems Integration and Packaging
- MECH-526 Fuel Cell Science and Engineering
- MECH-545 Hybrid Electric Vehicle Propulsion
- MECH-521 Energy and Environmental Systems Design or MECH-529 Design and Modeling of Fuel Cell Systems
- ME Technical Elective

For more information on the Fuel Cells and Hybrid Technology Minor contact Dr. Joel Berry at jberry@kettering.edu or 810-762-7833.
History (Liberal Studies Department)

Required Courses (four from the following):
HIST-306 International Relations
HIST-308 America and the World
HIST-310 Imperialism
HIST-312 History of Science
HIST-314 Human Conflict & Conflict Resolution
HIST-316 History of the Atlantic World
HIST-320 Modern Middle East
HIST-322 Africa in the World Economy
HIST-391 Topics in History
HIST-499 History Independent Study

For more information on the History Minor contact Dr. Karen Wilkinson at kwilkins@kettering.edu or 810-762-7827.

Innovation and Entrepreneurship (Business Department)

Required Courses:
ACCT-212 Managerial Accounting
BIZ-210 Management Concepts
BIZ-240 Introduction to Marketing
BIZ-319 Business Law
BUSN-372 Innovation and New Ventures
BUSN-373 Intrapreneurship and Innovation Development
FINC-310 Financial Markets

For more information on the Innovation and Entrepreneurship Minor contact the Department of Business at 810-762-7952.

International Studies (Liberal Studies Department)

Required Courses (four from the following):
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.
BUSN-451 International Business
ECON-350 Comparative Economic Systems
ECON-352 International Economics
HIST-306 International Relations
HIST-308 America and the World
HIST-310 Imperialism
HIST-314 Human Conflict and Conflict Resolution
HIST-316 History of the Atlantic World
HIST-320 Modern Middle East
HIST-322 Africa in the World Economy
HIST-391 Topics in History (must have international focus)
HUMN-362 Global Film Cultures
HUMN-391 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 Topics in Literature (must have international focus)
SOC-332 Contemporary Social Problems
SOC-336 Sociology of the Family
SOC-337 Religion in Society
SOC-391 Topics in Sociology (must have international focus)
SSCI-314 Technology and Sustainable Development
SSCI-391 Topics in Social Sciences (must have international focus)
SSCI-398 Social Science course in a Study Abroad program
SSCI-499 Social Science Independent Study (must have international focus)
“Topics” courses in the humanities and social sciences (numbered 391) may also count for this minor. See the *Quick Guide to Liberal Studies Electives* distributed at registration for the minors these courses support.

For more information on the International Studies Minor contact Dr. Karen Wilkinson at kwilkins@kettering.edu or 810-762-7827.

### Literature (Liberal Studies Department)

**Required Courses (four from the following):**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUMN-365</td>
<td>Art &amp; Nature in Early Industrial England</td>
</tr>
<tr>
<td>HUMN-391</td>
<td>Topics in Humanities (must have literature focus)</td>
</tr>
<tr>
<td>HUMN-499</td>
<td>Humanities Independent Study (must have literature focus)</td>
</tr>
<tr>
<td>LIT-304</td>
<td>American Literature and Philosophy</td>
</tr>
<tr>
<td>LIT-307</td>
<td>Poetry: Substance and Structure</td>
</tr>
<tr>
<td>LIT-309</td>
<td>The Literature of Multicultural America</td>
</tr>
<tr>
<td>LIT-310</td>
<td>African American Literature</td>
</tr>
<tr>
<td>LIT-311</td>
<td>Literatures of the African Diaspora</td>
</tr>
<tr>
<td>LIT-315</td>
<td>Literature of the Fantastic</td>
</tr>
<tr>
<td>LIT-317</td>
<td>Masterpieces of Drama</td>
</tr>
<tr>
<td>LIT-351</td>
<td>Literature in a Foreign Language</td>
</tr>
<tr>
<td>LIT-372</td>
<td>Masterpieces of Literature</td>
</tr>
<tr>
<td>LIT-374</td>
<td>Seminar on J.R.R. Tolkien</td>
</tr>
<tr>
<td>LIT-379</td>
<td>The Plays of Shakespeare</td>
</tr>
<tr>
<td>LIT-391</td>
<td>Topics in Literature</td>
</tr>
</tbody>
</table>

For more information on the Literature Minor contact Dr. Karen Wilkinson at kwilkins@kettering.edu or 810-762-7827.

### Manufacturing Engineering (Industrial and Manufacturing Engineering Department)

**Required Courses:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IME-301</td>
<td>Engineering Materials</td>
</tr>
<tr>
<td>IME-403</td>
<td>Computer Numerical Control Machining</td>
</tr>
<tr>
<td>IME-409</td>
<td>Computer Integrated Manufacturing</td>
</tr>
</tbody>
</table>

**Plus three from the following:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IME-404</td>
<td>Sheet Metal Forming</td>
</tr>
<tr>
<td>IME-405</td>
<td>Casting Processes</td>
</tr>
<tr>
<td>IME-408</td>
<td>Robotics in Automation</td>
</tr>
<tr>
<td>IME-474</td>
<td>Design for Manufacture and Assembly</td>
</tr>
<tr>
<td>IME-499</td>
<td>Independent Study (must be pre-approved by IME Department Head for use in minor)</td>
</tr>
<tr>
<td>IME-507</td>
<td>Polymer Processing</td>
</tr>
<tr>
<td>IME-575</td>
<td>Failure Analysis</td>
</tr>
<tr>
<td>KETT-540</td>
<td>Environmentally Conscious Design and Manufacturing</td>
</tr>
</tbody>
</table>

For more information on the Manufacturing Engineering Minor contact Dr. W.L. Scheller at wschelle@kettering.edu or 810-762-7974.

### Materials Science (Physics Department)

**Required Courses:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS-342</td>
<td>Materials Science and Nanotechnology</td>
</tr>
<tr>
<td>PHYS-362</td>
<td>Modern Physics</td>
</tr>
<tr>
<td>PHYS-376</td>
<td>Photonics and Optoelectronic or PHYS-446 Solid State Physics (PHYS-446 is required for the concentration)</td>
</tr>
</tbody>
</table>

**Plus one from the following:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM-345/346</td>
<td>Organic Chemistry I / Lab</td>
</tr>
<tr>
<td>CHEM-361/362</td>
<td>Physical Chemistry I/Lab</td>
</tr>
<tr>
<td>CHEM-373/374</td>
<td>Analytical Chemistry/Lab</td>
</tr>
<tr>
<td>EE-325</td>
<td>Principles of Microelectronics Processing</td>
</tr>
<tr>
<td>EE-427</td>
<td>Semiconductor Device Fundamentals</td>
</tr>
</tbody>
</table>

For more information on the Materials Science Minor contact Dr. Prem Vaishnava at pvaishna@kettering.edu or 810-762-7933 or send an email to physics@kettering.edu.
Medical Physics (Physics Department)

Required Courses:
PHYS-354 Medical Physics Principles
PHYS-362 Modern Physics
PHYS-464 Nuclear Physics

Plus one from the following:
BIOL-241/242 Human Biology and Lab
EE-332 Signals and Systems
MECH-350 Introduction to Bioengineering Applications
PHYS-378 Spectroscopy and Microscopy

For more information on the Medical Physics Minor contact the Physics Department Head at physics@kettering.edu.

Physics (Physics Department)

Required Courses:
PHYS-302 Vibration, Sound and Light
PHYS-362 Modern Physics

Plus two from the following:
PHYS-412 Theoretical Mechanics
PHYS-446 Solid State Physics
PHYS-452 Thermodynamics and Statistical Physics
PHYS-462 Quantum Mechanics
PHYS-464 Nuclear Physics: Principles and Applications

For more information on the Physics Minor contact the Physics Department Head at physics@kettering.edu.

Pre-Law (Liberal Studies Department)

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.
HIST-306 International Relations
HIST-308 America and the World
HIST-310 Imperialism
HIST-316 History of the Atlantic World
HIST-320 Modern Middle East
HIST-322 Africa in the World Economy

2. Achieve an understanding of 1) the development of political thought and/or 2) political and legal systems.
LIT-304 American Literature and Philosophy
PHIL-373 Philosophy
PHIL-378 Moral and Ethical Philosophy

3. Achieve an understanding of human behavior and social interaction with particular emphasis on understanding diverse cultures within and beyond the U.S.
HUMN-362 Global Film Cultures
HUMN-365 Art & Nature in Early Industrial England
LIT-309 The Literature of Multicultural America
LIT-310 African American Literature
LIT-311 Literatures of the African Diaspora
SOC-332 Contemporary Social Problems
SOC-336 Sociology of the Family
SOC-337 Religion in Society
SOC-338 Gender and Society
4. Achieve an understanding of effective and ineffective practices in human communication.

COMM-311  Rhetorical Principles of Persuasion
COMM-313  Rhetorical Principles of Public Speaking
HIST-314  Human Conflict and Conflict Resolution
SOC-335  Analysis of Social Dissent

“Topics” courses in the humanities and social sciences (numbered 391) may also count for this minor. See the Quick Guide to Liberal Studies Electives distributed at registration for more information.

For more information on the Pre-Law Minor contact Dr. Karen Wilkinson at kwilkins@kettering.edu or 810-762-7827.

Statistics (Mathematics Department)

Required Courses:
IME-332  Engineering Statistics II: Statistical Inference and Regression
IME-333  Engineering Statistics III: Design of Experiments
MATH-101  Calculus I
MATH-102  Calculus II
MATH-203  Multivariate Calculus
MATH-310  Biostatistics I
MATH-327  Mathematical Statistics I
MATH-427  Mathematical Statistics II

Plus two from the following:
IME-422  Systems Modeling II: Simulation
IME-471  Quality Systems I: Quality Assurance
IME-572  Maintainability & Reliability
MATH-427  Mathematical Statistics II
MATH-428  Sampling Theory
MGMT-460  Management Science II

For more information on the Statistics Minor should Dr. Phillip Richard at prichard@kettering.edu or 810-762-7925 or Dr. Leszek Gawarecki at lgawarec@kettering.edu or 810-762-9557.

System and Data Security (Computer Science Department)

Required Courses:
CS-101  Computing and Algorithms I
CS-102  Computing and Algorithms II

Plus three from the following:
CS-415  Cryptography
CS-455  Computer and Network Security
CS-458  Computer and Network Forensics
CS-459  Secure Software

For more information on the System and Data Security Minor contact Dr. John Geske at jgeske@kettering.edu or 810-762-7963.
COURSE DESCRIPTIONS

This section lists updated 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.

When planning a semester program, students should search the Banner web for information regarding course offerings.

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

The course numbers 291, 391, 491, and 591 shall be used to describe special topics courses at 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 contents.

The course numbers 297 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 and course numbers 297 and 497 are used to admit transfer or guest courses that are not equivalent to Kettering courses and do not fall within existing Kettering disciplines. These course numbers are not used for study abroad transfer credit.

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 499 and 599 shall be used to 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 Molecular and Cellular Biology
Prerequisites: BIOL-241, BIOL-242
Corequisites: BIOL-442
Minimum Class Standing: JRI
This course covers the basic theory and methodology in Molecular and Cellular Biology. The topics covered include the relationship between molecular structure and function, the dynamic character of cellular organelles, the use of chemical energy in running cellular activities, and the mechanisms that regulate cellular activities. Terms Offered: As Needed

This set of numbers indicates hours per week & credit hours:

<table>
<thead>
<tr>
<th>class</th>
<th>other</th>
<th>lab</th>
<th>credit hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>(4)</td>
</tr>
</tbody>
</table>

“Other” may refer to recitation hours or project time.

Course availability is subject to change due to low enrollment, or faculty availability.
ACCT-212 Managerial Accounting
Prerequisites: None
Corequisites: None
Minimum Class Standing: SO
This course focuses on the use of financial information in the making of managerial decisions. Subject areas included are the development of manufacturing costs and their control, budgeting, performance analysis, cost-profit-volume analysis, relevant costs, time value of money techniques, and capital budgeting. Terms Offered: Winter, Spring

ACCT-313 Cost Accounting
Prerequisites: ACCT-212
Corequisites: None
Minimum Class Standing: JR
This course is designed for students who expect to be using cost information. Units of study include the nature and behavior of production costs, cost cycle, overhead and overhead rates, absorption costing, cost standards, variance analysis and reporting for cost control. Emphasis is placed on the nature of cost concepts and reports as they relate to management objectives. Terms Offered: As Needed

ACCT-411 Intermediate Accounting
Prerequisites: ACCT-210, ACCT-212
Corequisites: None
Minimum Class Standing: JR
Theory, the conceptual framework, and development of generally accepted accounting principles are discussed in this course. Measurement, valuation, and reporting concepts and procedures underlying the assets, liabilities, owners' equity, revenues, and expenses contained in financial statements are examined. The analysis, interpretation, and use of financial statements are also explored. Terms Offered: As Needed

ART-305 Art: Styles and Aesthetics
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None
A presentation of art emphasizing significant periods of stylistic and aesthetic developments in human creative experience. Particular topics, periods and styles may vary from term to term. Terms Offered: All

BINF-310 Introduction to Bioinformatics
Prerequisites: BIOL-241, BIOL-242, CS-102
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: Summer, Fall.

BINF-490 Bioinformatics Capstone
Prerequisites: BINF-310, CHEM-351, CHEM-352, CS-465
Corequisites: None
Minimum Class Standing: SR
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. Terms Offered: As Needed

BIOL-141 General Biology
Prerequisites: None
Corequisites: BIOL-142
Minimum Class Standing: 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. Terms Offered: Summer, Fall

BIOL-142 General Biology Lab
Prerequisites: None
Corequisites: BIOL-141
Minimum Class Standing: 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. Terms Offered: Summer, Fall

BIOL-241 Human Biology
Prerequisites: CHEM-135/136 or CHEM-137/136
Corequisites: BIOL-242
Minimum Class Standing: FRII
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. Terms Offered: Winter, Spring

**BIOL-242 Human Biology Lab**
- **Prerequisites:** CHEM-135/136 or CHEM-137/136
- **Corequisites:** BIOL-241
- **Minimum Class Standing:** FRII

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. Terms Offered: Winter, Spring

**BIOL-341 Anatomy & Physiology**
- **Prerequisites:** BIOL-241/242 or MECH-350, or Permission of Instructor
- **Corequisites:** None
- **Minimum Class Standing:** SO

This course serves as an introduction to Human Anatomy and Physiology. It will cover topics including the organization and regulation of biological tissues, organs and organ systems as well as human development. Terms Offered: Summer, Fall

**BIOL-441 Molecular and Cellular Biology**
- **Prerequisites:** BIOL-241, BIOL-242
- **Corequisites:** BIOL-442
- **Minimum Class Standing:** JRI

This course covers the basic theory and methodology in Molecular and Cellular Biology. The topics covered include the relationship between molecular structure and function, the dynamic character of cellular organelles, the use of chemical energy in running cellular activities, and the mechanisms that regulate cellular activities. Terms Offered: As Needed

**BIOL-442 Molecular and Cellular Biology Lab**
- **Prerequisites:** BIOL-241, BIOL-242
- **Corequisites:** BIOL-441
- **Minimum Class Standing:** None

This laboratory course covers the basic methodologies in Molecular and Cellular Biology. Topics include DNA structure, gene function and expression, molecular cloning, and molecular tools for studying genes and gene activity. This course serves as a requirement for Biochemistry Majors. Terms Offered: As Needed

**BIOL-481 Genetics**
- **Prerequisites:** BIOL-241, BIOL-242
- **Corequisites:** None
- **Minimum Class Standing:** None

This course serves as 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. Terms Offered: As Needed

**BIZ-101 Business Decision Making I**
- **Prerequisites:** None
- **Corequisites:** None
- **Minimum Class Standing:** None

This course enables students to develop basic skills in problems solving, creativity, leadership, project skills, and an introduction to basic business software. Methods applied include lecture, individual and group projects, and simulation games. The course builds skills in the areas listed previously. Terms Offered: Summer, Fall

**BIZ-102 Business Decision Making II**
- **Prerequisites:** None
- **Corequisites:** None
- **Minimum Class Standing:** None

This course provides an introduction to a quantitative approach to common business methods used to plan, organize and manage a successful business. Units of study include the dynamic nature of business in relation to economic systems, ethics and social responsibility, and the legal and regulatory environment of business. Focused study will include methods used to develop a strategic and operational plan, managing people, technology, the business enterprise, marketing research and planning, sales implementation, accounting and financial statements, and finance and international business. Terms Offered: Winter, Spring

**BIZ-150 Business Computational Methods**
- **Prerequisites:** None
- **Corequisites:** None
- **Minimum Class Standing:** None

This course provides a general introduction to information technology tools for solving basic business problems. It covers topics such as Microsoft Excel, Excel Solver, Excel analysis tools pack, Microsoft Access, SQL, computer hardware and software, telecommunications and network. Terms Offered: Summer, Fall
BIZ-210 Management Concepts
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
This course explores the fundamentals of management and leadership in a competitive world. It also teaches the student the basic management theories and prepares them for subsequent undergraduate management courses by providing a broad perspective and rounded background in current and historical management thought. Terms Offered: All

BIZ-212 Organizational Behavior
Prerequisites: BIZ-210
Corequisites: None
Minimum Class Standing: 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. The transformation of products and services for commercialization will be highlighted. Terms offered: Winter, Spring

BIZ-220 Accounting & Finance I
Prerequisites: MATH-100
Corequisites: None
Minimum Class Standing: None
This course presents the principles, practices and procedures used by accountants in processing business data. Units of study include the elements of the accounting cycle plus accounting for cash, accounts receivables, plant and equipment, liabilities, and corporate ownership. Ethical issues are addressed with research into various accounting scandals. Terms offered: Summer, Fall

BIZ-240 Introduction to Marketing
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
This course is an overview of marketing's role in connecting business to consumers. It includes analyzing the external marketing environment and customers needs as a basis for developing a firm’s marketing strategy. Also, marketing research, identifying opportunities, market segmentation, targeting customers, consumer behavior, the business-to-business market, business-to-business buying behavior, products and service planning of existing and new offerings, integrated promotion planning, logistics and channel development, and price planning. SAP exercises will be used in this course. Terms Offered: Winter, Spring

BIZ-260 Statistics for Business
Prerequisites: MATH-100
Corequisites: None
Minimum Class Standing: None
This course focuses on the use of statistics to make managerial decisions under conditions of uncertainty. Students will learn to use descriptive statistics and charts, probability distributions, sampling, hypothesis tests, regression and ANOVA in managerial settings. Use of statistical software will be emphasized. Terms Offered: Summer, Fall

BIZ-265 Quantitative Business Analysis
Prerequisites: BIZ-260 or MATH-408 or MATH-310, and BIZ-150 or IME-211 or CS-101
Corequisites: None
Minimum Class Standing: None
This course focuses on real-world, quantitative situations that you will actually face every day on the job, or in your personal life. The emphasis is on applications to problems in accounting, finance, marketing, production, operations, and economics. Methods applied include linear and non-linear equations, geometric series, time-value of money, cost-volume-profit analysis, linear programming, queueing models, and systems simulation. The course builds skills in the use of spreadsheet software to perform computational procedures. Terms offered: Winter, Spring

BIZ-319 Business Law
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
A foundational understanding of legal issues is presented which relate to the operation of businesses. Topic areas include the protection of intellectual property, fundamentals of contract law, tort law, and criminal activity. Terms Offered: Summer, Fall

BIZ-454 Enterprise Resource Planning
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR
This course will explore the concepts, principles, and the methods in successfully integrating Enterprise Resource Planning (ERP) systems into extant enterprise architectures. Upon completion of this course, the student will understand the challenges associated with managing extant ERP systems. In the process, the students will become familiar with the forces and organizational conditions leading to the acquisition of such enterprise wide systems. A hand-on experience of ERP systems will be covered in this course using the SAP product. Terms Offered: Summer, Fall
BUSN-372 Innovation and New Ventures 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: SO
This inter-disciplinary course focuses on the creation or startup of a new organization based on an innovation in product, process or delivery. Particular emphasis is placed on creating new products or services in response to a human need, testing at several stages of a new product development process, gaining initial customers, gaining distribution, obtaining financial support and managing the new organization. This is a “hands on” course where students will actually develop some new product idea and/or prototype, conduct various types of market research and write initial business plans. The course is flexible to support students interested in a variety of fields including fuel cell, international business and biomedical. Terms Offered: Summer, Fall

BUSN-373 Intrapreneurship and Innovation Development 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: JR
This course provides the student with an understanding of the best practices of product and service development through application to a course project. 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 for 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 the course project. Tools and techniques are presented and practiced by students during the completion of the project requirements. Terms Offered: Winter, Spring

BUSN-451 International Business 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR
This course provides an overview of the expanding role of international business in the world marketplace. Emphasis is placed on exploring the complex differences between domestic and international management. These differences and issues are examined within the context of the global business environment, the national business environment, managing an international business, and managing the operations of an international firm. Terms Offered: As Needed

CE-210 Digital Systems I 302(4)
Prerequisites: ECE-101 or CS-101 or IME-211
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All.

CE-320 Microcomputers I 302(4)
Prerequisites: CE-210
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All.

CE-412 Digital Systems II 302(4)
Prerequisites: CE-210
Corequisites: None
Minimum Class Standing: JR
This digital systems course covers the principles and practices used in the design of modern complex combinational and sequential digital systems. Digital logic design, analysis, simulations, and implementation techniques are covered. 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. Terms Offered: Summer of even years, Fall of odd years.

CE-420 Microcomputers II 302(4)
Prerequisites: CE-320
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Summer/Fall

CE-422 Computer Architecture and Organization 302(4)
Prerequisite: CE-320
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Winter, Spring

CE-424 VLSI Design 302(4)
Prerequisites: CE-320, EE-210
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Winter of odd years, Spring of even years.

CE-426 Real-Time Embedded Systems 302(4)
Prerequisites: CE-320
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Summer, Fall

CE-442 Introduction to Mobile Robotics 302(4)
Prerequisites: CE-320
Corequisites: None
Minimum Class Standing: JR
This course covers the fundamentals of robotics 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. Terms Offered: Winter of odd years, Spring of even years.

CE-460 Massively Parallel Processors 400(4)
(This course is equivalent to CE-660)
Prerequisites: CE-320 or Instructor approval
Corequisites: None
Minimum Class Standing: JR
This course introduces using massively parallel processors utilizing hundreds of processing course, those typically used as graphics processing units, for general purpose scientific computing. Topics include the architectural differences between a GPU and a traditional CPU, a decomposing problems to efficiency utilize GPUs, performance optimization techniques, and case studies. This course contains a directed project that allows the student to compare the performances of CPUs and GPUs on data-parallel algorithms. Terms Offered: Summer of even years, Fall of odd years.

CE-470 Haptic Systems 302(4)
Prerequisites: CS-101
Corequisites: None
Minimum Class Standing: JR
This course provides the required theoretical and practical background to design and development of haptic systems. Haptic technology enables computer users to touch and/or manipulate virtual or remote objects in simulated environments or tele-operation systems. This course aims to cover the basics of haptics through lectures, homework, lab assignments, a term project, and readings on current topics in haptics. Through lab assignments, students learn to create haptic-enabled virtual environments using a haptic device. Topics include current haptic technology and devices, the human haptic system, human haptic perception and psychophysics, haptic rendering of virtual objects. Terms Offered: Winter of even years, Spring of odd years.

CE-480 Computer Networks 302(4)
Prerequisite: CE-320, MATH-408
Organization, analysis, and design of interconnected systems of computers are studied. Topics include the Open System Interconnection model; the Internet reference architecture; network topology; media types; protocol; Ethernet; routing; TCP/IP; HTTP; wireless and mobile networks, multimedia Internet, industrial networks; and Internet applications. Terms Offered: Summer, Fall

CE-482 Distributed Embedded Systems 302(4)
Prerequisites: CE-320
Corequisites: None
Minimum Class Standing: JR
This course addresses the most important topics in embedded systems operating in a network environment. Topics include: typical applications of distributed embedded systems, digital control systems, real-time scheduling and complete commercial hardware and software development environment that supports rapid prototyping, automated code generation, and debugging is used in laboratory assignments and a term project to develop a complete distributed embedded application. Automotive applications are emphasized. Terms Offered: Summer of odd years, Fall of even years.

CE-490 Senior Computer Engineering Design Project 204(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: Senior Thesis Standing in Computer Engineering
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. Terms Offered: Winter, Spring

CHEM-135 Principles of Chemistry 300(3)
Prerequisites: None
Corequisites: CHEM-136
Minimum Class Standing: None
An introduction to fundamental concepts and applications of chemistry, including the Periodic Table and chemical nomenclature, reactions and reaction stoichiometry, atomic structure, chemical bonding and chemical equilibrium. Applied topics include batteries, fuel cells and corrosion, and a description of the chemistry and uses of metals and nonmetals. Terms Offered: Summer, Fall

CHEM-136 Principles of Chemistry Laboratory 002(1)
Prerequisites: None
Corequisites: CHEM-135
Minimum Class Standing: 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. Terms Offered: Summer, Fall

CHEM-137 General Chemistry I 310(3)
Prerequisites: None
Corequisites: CHEM-136
Minimum Class Standing: 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. Terms Offered: Summer, Fall

CHEM-145 Industrial Organic Chemistry 300(3)
Prerequisites: None
Corequisites: CHEM-146
Minimum Class Standing: FRII
An introduction to the important organic reactions used for the industrial synthesis of fuels, lubricants, solvents, fine chemicals and polymeric materials. The relationship between structure and the chemical, physical and spectroscopic properties of organic materials will be emphasized. Terms Offered: Winter, Spring

CHEM-146 Industrial Organic Chemistry Laboratory 002(1)
Prerequisites: None
Corequisites: CHEM-145
Minimum Class Standing: FRII
A laboratory course to accompany and reinforce the theoretical concepts of organic chemistry covered in CHEM-145. The course will cover safety aspects of organic chemistry, the reactions of organic functional groups and identification of organic chemicals and polymers using chromatography, thermal analysis and infrared spectroscopy techniques. Terms Offered: Winter, Spring

CHEM-171 Environmental & Safety Policies 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
An introduction to environmental and safety policy and regulations emphasizing their effects on business and industrial management. Course material includes natural resource, air, water, hazardous materials, waste management and disposal, remediation, haz mat transportation, and safety regulations of the United States; the impact of international issues on U.S. environmental and safety policy and on U.S. business practices; and related current international issues. This course can be used to partially fulfill the requirements for Kettering University’s professional certification program under OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations. Terms Offered: As Needed

**CHEM-221 Materials Characterization**
Prerequisites: CHEM-135 or CHEM-137 and CHEM-145 or CHEM-345
Corequisites: None
Minimum Class Standing: SO

Wet chemical techniques and modern instrumental methods are used to characterize materials. Theory, applications and limitations of characterization techniques will be covered. Laboratory investigation will be emphasized. Topics include differential thermal analysis, atomic absorption, infrared absorption/reflectance, flame and emission spectroscopy, X-ray, mass spectrometry, electrical methods, nuclear magnetic resonance, scanning electron microscopy, gas and gel permeation chromatography, electron spectroscopy, automated analysis, and statistical analysis. Terms Offered: As Needed

**CHEM-223 Introduction to Polymer Science**
Prerequisites: CHEM-135 or CHEM-137
Corequisites: None
Minimum Class Standing: SO

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. Terms Offered: Winter, Spring

**CHEM-225 Adhesive Technology and Applications**
Prerequisites: CHEM-145 and CHEM-146, or CHEM-345 and CHEM-346
Corequisites: None
Minimum Class Standing: SO

This course is an introduction to adhesives and sealants as they are currently used in today’s industry. The design of the course is to highlight the various factors which influence the proper selection of adhesives for specific applications. The scientific principles underlying these factors will be examined. Various test methods, curing mechanisms, delivery systems, and surface preparation methods will be reviewed. Various specific adhesives including acrylics, cyanoacrylates, anaerobics, urethanes, silicones and hot melts will be examined in detail. The laboratory is designed to give students “hands-on” experience working with adhesives. Students will design tests to judge the applicability of specific adhesives to specific problems. Several surface preparation methods, curing systems, and substrates will be explored. Terms Offered: As Needed

**CHEM-227 Industrial Painting Technology**
Prerequisites: CHEM-135 or CHEM-137 and CHEM-145 or CHEM-345
Corequisites: None
Minimum Class Standing: SO

This course is practical rather than theoretical in its coverage. All modern types of paint formulations are thoroughly described, including their advantages and disadvantages. The function of the coating components is discussed and the relationship between structure and physical properties is explained. Application methods are explained in depth, including safety, economic, and ecological considerations. Chemical film cure reactions are studied in conjunction with specific energy requirements for various modes of curing. Future coating trends are discussed. Defects and testing of coatings receive substantial coverage. Terms Offered: As Needed

**CHEM-237 General Chemistry II**
Prerequisites: CHEM-135 or CHEM-137
Corequisite: CHEM-238
Minimum Class Standing: FRII

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. Terms Offered: Winter, Spring

**CHEM-238 General Chemistry II Laboratory**
Prerequisites: CHEM-135 or CHEM-137
Corequisites: CHEM-237
Minimum Class Standing: FRII

This laboratory course, taken concurrently with CHEM-237, is designed to continue exploring the experimental principles of chemistry not covered in CHEM-136 or CHEM-138. 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. Terms Offered: Winter, Spring

**CHEM-245 Applied Chemistry for Engineers**
Prerequisites: CHEM-135 or CHEM-137
Corequisites: None
Minimum Class Standing: None
This course will apply the knowledge gained in CHEM-135, Principles of Chemistry, to real world situations. In addition, topics not covered in CHEM-135 will be introduced along with their applications. New topics include: forms of energy, fuels, nuclear chemistry, corrosion, surfaces, polymers and plastics, ceramics and composites. Fuel cells and their basic chemistry are an important component of this class. Terms Offered: As Needed

**CHEM-247 Survey of Organic Chemistry**
Prerequisites: CHEM-135 or CHEM-137
Corequisites: None
Minimum Class Standing: FRII
This course teaches the basic principles of organic chemistry. Topics covered in detail include bonding, functional groups, nomenclature, molecular structure, and chemical reactivity. Other fundamental properties of organic molecules such as acidity/basicity, stereochemistry, and reaction mechanisms will be covered. Terms Offered: Winter, Spring

**CHEM-251 Environmental Ecology**
Prerequisites: CHEM-135 or CHEM-137
Corequisites: None
Minimum Class Standing: SO
This course examines the dynamics of biosphere through the study of ecosystems. Emphasis is placed on the relationships between organisms and their environment and on managing human, water, air, soil and industrial resources. Terms Offered: As Needed

**CHEM-271 Handling Hazardous Material**
Prerequisites: CHEM-135 or CHEM-137 and CHEM-145 or CHEM-345
Corequisites: None
Minimum Class Standing: SO
The study of the principles and methods of handling hazardous materials in the workplace. Coverage includes: the nature and scope of chemical hazards in the workplace, an overview of regulations of hazardous materials and worker safety, occupational diseases, fundamentals of industrial hygiene, basic concepts of toxicology, transportation of hazardous chemicals, risk assessment, toxic release and dispersion models, process safety management, and emergency planning. Terms Offered: As Needed

**CHEM-337 Chemistry of Fuel Cells**
Prerequisites: CHEM-237, CHEM-238
Corequisites: CHEM-338
Minimum Class Standing: SO
This course will apply the knowledge gained in CHEM-237/238, General Chemistry II, to the chemical and physical properties of fuel cells. In addition, it will emphasize topics such as electrolysis, photochemistry as related to photocells, membrane chemistry, gaseous diffusion, and surface science, all of which are important in understanding properties of hydrogen generation and storage, and the chemistry of fuel cells. Terms Offered: As Needed

**CHEM-338 Chemistry of Fuel Cells Lab**
Prerequisites: CHEM-237, CHEM-238
Corequisites: CHEM-337
Minimum Class Standing: SO
This laboratory course will cover topics such as electrolysis, photochemistry as related to photocells, electrode surface chemistry, membrane chemistry, diffusion, and fuel reformation, all of which are important in understanding chemistry of fuel cells. Terms Offered: As Needed

**CHEM-345 Organic Chemistry I**
Prerequisites: CHEM-237
Corequisites: None
Minimum Class Standing: SO
A thorough coverage of the chemistry of hydrocarbons: valence theory, stereochemistry, structure, addition polymerization, reaction mechanisms and spectroscopy. Appropriate for science majors and environmental Chemistry minors. Terms Offered: Summer, Fall

**CHEM-346 Organic Chemistry I Laboratory**
Prerequisites: CHEM-237, CHEM-238
Corequisites: CHEM-345
Minimum Class Standing: SO
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 4-hour laboratory per week. Terms Offered: Summer, Fall

**CHEM-347 Organic Chemistry II**
Prerequisites: CHEM-345
Corequisites: None
Minimum Class Standing: SOII
A continuation of CHEM-345, with an emphasis on the chemistry of the organic functional groups, and the synthesis of polyfunctional molecules. Appropriate for science majors. Terms Offered: Winter, Spring

**CHEM-348 Organic Chemistry II Laboratory**
Prerequisites: CHEM-345, CHEM-346
Corequisites: CHEM-347
Minimum Class Standing: SOII
A continuation of CHEM-346, with an emphasis on the advanced techniques used to synthesize multifunctional organic compounds. Instrumental methods will be intensively utilized to characterize complex chemical structures. Terms Offered: Winter, Spring

**CHEM-351 Biochemistry I**
Prerequisites: CHEM-345, CHEM-346
Corequisites: CHEM-352
Minimum Class Standing: SO
This course will focus on the basic principles of biochemistry. 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. Terms Offered: Summer, Fall

**CHEM-352 Biochemistry I Lab**
Prerequisites: CHEM-345, CHEM-346
Corequisites: CHEM-351
Minimum Class Standing: SO
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. Terms Offered: Summer, Fall

**CHEM-361 Physical Chemistry I**
Prerequisites: CHEM-237, CHEM-238, PHYS-224, PHYS-225, and MATH-102 or MATH-102X or MATH-102H
Corequisites: CHEM-362
Minimum Class Standing: JR
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. Terms Offered: Summer, Fall

**CHEM-362 Physical Chemistry I Lab**
Prerequisites: None
Corequisites: CHEM-361
Minimum Class Standing: JR
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. Terms Offered: Summer, Fall

**CHEM-363 Physical Chemistry II**
Prerequisites: CHEM-237, CHEM-238, MATH-203, PHYS-224, PHYS-225, CHEM-361 or permission of instructor
Corequisites: CHEM-364
Minimum Class Standing: JRII
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. Terms Offered: Winter, Spring

**CHEM-364 Physical Chemistry II Laboratory**
Prerequisites: None
Corequisites: CHEM-363
Minimum Class Standing: JRII
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. Terms Offered: Winter, Spring

**CHEM-371 Introductory Environmental Chemistry**
Prerequisites: CHEM-135, CHEM-137, CHEM-145 or CHEM-345
Corequisites: CHEM-372
Minimum Class Standing: SO
This course will focus on the basic principles and methods of environmental chemistry. Coverage includes the origin, reactions, distribution, effects and fates of chemistry in the atmosphere, water and soil. Terms Offered: As Needed

**CHEM-372 Introductory Environmental Chemistry Lab**
Prerequisites: CHEM-135 or CHEM-137 and CHEM-145 or CHEM-345
Corequisites: CHEM-371
Minimum Class Standing: SO
This laboratory is designed to reinforce concepts covered in the classroom and deals principally with various methods of classical and instrumental analysis of environmental samples. Terms Offered: As Needed

**CHEM-373 Analytical Chemistry**
Prerequisites: CHEM-237, CHEM-238, CHEM-345, CHEM-346
Corequisites: CHEM-374
Minimum Class Standing: JRII
This course is designed to introduce the student 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. Terms Offered: As Needed
CHEM-374 Analytical Chemistry Laboratory
Prerequisites: CHEM-237, CHEM-238, CHEM-345, CHEM-346
Corequisites: CHEM-373
Minimum Class Standing: JRII
This laboratory course covers the qualitative and quantitative analysis of chemical compounds including gravimetric, volumetric, and spectrophotometric methods. Terms Offered: As Needed

CHEM-437 Advanced Inorganic Chemistry
Prerequisites: CHEM-237, CHEM-345
Corequisites: CHEM-438
Minimum Class Standing: JR
This course includes 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. Terms Offered: As Needed

CHEM-438 Advanced Inorganic Chemistry Lab
Prerequisites: CHEM-238, CHEM-346
Corequisites: CHEM-437
Minimum Class Standing: JR
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 3-hour laboratory per week. Terms Offered: As Needed

CHEM-451 Biochemistry II
Prerequisites: CHEM-351, CHEM-352
Corequisites: CHEM-452
Minimum Class Standing: JRII
This course serves as 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. Terms Offered: As Needed

CHEM-452 Biochemistry II Lab
Prerequisites: CHEM-351, CHEM-352
Corequisites: CHEM 451
Minimum Class Standing: JRII
This course serves as a comprehensive advanced Biochemistry laboratory. It will cover topics related to the isolation and manipulation of DNA and proteins. Including techniques such as PCR, Western blotting, mutagenesis, DNA Fingerprinting, and molecular modeling. Terms Offered: As Needed

CHEM-461 Colloid Science
Prerequisites: CHEM-361 or CHEM-237 and MECH-320 or CHEM-237 and PHYS-452
Corequisites: CHEM-462
Minimum Class Standing: JR
This course is an introduction to Colloid and Surface Chemistry and will cover colloids, micelles, self-assembled monolayers, thin films, foams, polymers, ceramics, gels, emulsions and sols. The physical properties and methods of studying colloids will also be addressed. Terms Offered: As Needed

CHEM-462 Colloid Science Laboratory
Prerequisites: CHEM-362 or CHEM-237 and MECH-320 or CHEM-237 and PHYS-452
Corequisites: CHEM-461
Minimum Class Standing: JR
This laboratory course investigates the preparation, properties and characterization of colloids and colloidal systems. Terms Offered: As Needed

CHEM-475 Environmental Organic Chemistry
Prerequisites: CHEM-351, CHEM-352, CHEM-363, CHEM-364, CHEM-373, CHEM-374
Corequisites: None
Minimum Class Standing: SR
A senior level capstone course with an emphasis on organic and biological compounds of environmental significance. Topics will include the industrial synthesis and use of organic materials, methods used to control and treat waste by-products and the chemical fate of these materials in the environment. Terms Offered: As Needed

CHEM-476 Environmental Organic Chemistry Lab
Prerequisites: CHEM-363, CHEM-364
Corequisites: CHEM-475
Minimum Class Standing: SR
This capstone laboratory will focus on the synthesis, characterization and waste treatment of industrially significant organic chemicals. EPA, OSHA and ASTM instrumental methods for analysis of organic compounds in the atmosphere, groundwater and soil will be emphasized. Two 3-hour laboratories per week. Terms Offered: As Needed

CHEM-477 Advanced Organic Chemistry
Prerequisites: CHEM-363, CHEM-364
Corequisites: CHEM-475
Minimum Class Standing: SR
This course will cover topics in advanced organic chemistry, including the synthesis, characterization and analysis of organic compounds. Terms Offered: As Needed
Prerequisites: CHEM-347, CHEM-348
Corequisites: CHEM-478
Minimum Class Standing: SR
This course serves as senior level chemistry elective. It 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. Terms Offered: As Needed

**CHEM-478 Advanced Organic Chemistry Lab**
Prerequisites: CHEM-347, CHEM-348
Corequisites: CHEM-477
Minimum Class Standing: SR
This course serves as senior level chemistry elective. 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 4-hour laboratory per week. Terms Offered: As Needed

**CHEM-494 Senior Research/Seminar I**
Prerequisites: None
Corequisites: None
Minimum Class Standing: JRII
This course will introduce the student to the techniques for literature search and document retrieval. Students will initiate a research project under the direction of a chemistry or biochemistry faculty member. Each student will prepare and present a seminar based on their research progress. Each student will also prepare a written report on their research project. Terms Offered: All

**CHEM-496 Senior Research/Seminar II**
Prerequisites: CHEM-494
Corequisites: None
Minimum Class Standing: SR
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. Terms Offered: All

**CHEM-561 Physical Chemistry of Energy Conversion**
Prerequisites: CHEM-237 or equivalent and enrollment in graduate engineering program; or permission of instructor
Corequisites: None
Minimum Class Standing: JR
Topics covered in this course include chemical thermodynamics, combustion, solutions, electrochemistry, chemical, electrochemical and phase equilibria, and biofuels. Terms Offered: As Needed

**CHME-100 Introduction to Chemical Engineering**
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
This introductory course for chemical engineering is designed to introduce students 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.

**CHME-200 Mass and Energy Balance**
Prerequisites: CHEM-237, and MATH-102 or MATH-102X or MATH-102H
Corequisite: None
Minimum Class Standing: SO
This introductory course is 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. Terms Offered: Summer, Fall

**CHME-210 Chemical Engineering Thermodynamics I**
Prerequisites: CHME-200
Corequisites: None
Minimum Class Standing: SO
This course is the introductory course in 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 work loads, 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. Terms Offered: Winter, Spring

**CHME-300 Unit Operations**
Prerequisites: CHME-210, and MATH-203 or MATH-203H
Corequisites: CHME-301, and MATH-204 or MATH-204H
Minimum Class Standing: JR
This course demonstrates the application of fluid mechanics, phase transitions, and heat transfer in chemical engineering. 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. Terms Offered: Summer, Fall

CHME-301 Unit Operations Laboratory 002(2)
Prerequisites: CHME-210, and MATH-203 or MATH-203H
Corequisite: CHME-300, MATH-204
Minimum Class Standing: JR
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. Terms Offered: Summer, Fall

CHME-400 Mass Transfer and Separations 310(3)
Prerequisites: CHME-300
Corequisite: CHME-401
Minimum Class Standing: JR
This course will introduce 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, shortcut 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. Terms Offered: Summer, Fall

CHME-401 Mass Transfer and Separations Laboratory 002(1)
Prerequisites: CHME-300
Corequisite: CHME-400
Minimum Class Standing: JR
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. Terms Offered: Summer, Fall

CHME-410 Chemical Engineering Thermodynamics II 400(4)
Prerequisites: CHME-210
Corequisite: CHME-420
Minimum Class Standing: JR
This advanced chemical engineering thermodynamics course is 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.

CHME-420 Applied Transport Phenomena 310(3)
Prerequisites: CHME-300, MATH-204 or MATH-204H
Corequisite: CHME-421
Minimum Class Standing: SR
This advanced chemical engineering course will focus heavily on mathematical interpretations of the principles of heat and mass transfer, steady and transient conduction and diffusion, and radiative heat transfer. Convevtive 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. Terms Offered: Summer, Fall

CHME-421 Applied Transport Phenomenon Laboratory 002(1)
Prerequisites: CHME-300, MATH-204 or MATH-204H
Corequisite: CHME-420
Minimum Class Standing: SR
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. Terms Offered: Summer, Fall

CHME-435 Process Control 310(3)
Prerequisites: CHME-400, MATH-204 or MATH-204H
Corequisite: CHME-436
Minimum Class Standing: SR
This course will provide an understanding of the basic principles and methods underlying the steady state and dynamic characterization of chemical process control. 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
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. Terms Offered: As Needed

CHN-102 Beginning Chinese II  
Prerequisites: CHN-101  
Corequisites: None  
Minimum Class Standing: None  
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. Terms Offered: As Needed
CHN-103 Beginning Chinese III
Prerequisites: CHN-101, CHN-102
Corequisites: None
Minimum Class Standing: None
This course is the third 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 three years of high school Chinese or less than three 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. Terms Offered: As Needed

COMM-101 Written & Oral Communication I
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
This course is designed to help students write and speak effectively in academic settings and in their work organizations. Basic principles underlying practical communication techniques are taught, with an emphasis on skills for conveying technical and business information. Students engage in writing and speaking assignments that familiarize them with appropriate formats for those kinds of communication. Student performance is analyzed as a means of promoting individual improvement. Terms Offered: All

COMM-102 Written & Oral Communication II
Prerequisites: COMM-101
Corequisites: None
Minimum Class Standing: JR
The course prepares students to launch their thesis project and to perform other advanced writing and speaking tasks. Thus students will employ the concepts and skills gained in the foundational course Written & Oral Communication I (COMM101). Emphasis is placed on helping students to communicate effectively in regard to the technologies and business purposes of their own workplace and profession. Students’ development of the required skills is demonstrated in writing assignments and oral presentations. Credit must be received for the course before a student’s Senior Thesis Assignment Proposal will be processed for its approval. Terms Offered: All

COMM-311 Rhetorical Principles of Persuasion
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
Theories of persuasion, techniques of argumentation, and the analysis of persuasive texts. 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. Terms Offered: As Needed

COMM-312 Rhetorical Principles of Public Speaking
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: As Needed

COMM-435 Written & Oral Communication for Overseas Students
Prerequisites: None
Corequisites: None
Minimum Class Standing: 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. Terms Offered: Fall, Spring

CS-101 Computing and Algorithms I
Prerequisites: None
Corequisites: None
Minimum Class Standing: 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, inheritance, and exception handling. Terms Offered: All

CS-102 Computing and Algorithms II
Prerequisites: CS-101
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All

**CS-202 Systems Programming Concepts**
Prerequisites: CS-102
Corequisites: None
Minimum Class Standing: SO
Fundamental system programming concepts are examined using the C programming language. Topics include: machine organization, data representation, interrupt handling, I/O, file management, dynamic structures, parameter passing, memory management, system calls, process creation, process control, interprocess communication, and language interfaces. Terms Offered: Winter, Spring

**CS-203 Computing & Algorithms III**
Prerequisites: CS-102, CS-211
Corequisites: None
Minimum Class Standing: SO
The design and analysis of advanced data structures and algorithms. Algorithm design techniques, algorithm analysis techniques, advanced data structures, advanced sorting, applications to various problem domains. Terms Offered: Summer, Fall

**CS-211 Discrete Mathematics**
Prerequisites: None
Corequisites: MATH-101 or MATH-101X
Minimum Class Standing: None
Propositional and first-order logic; logical equivalence and inference. 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. Truth tables and minimization of Boolean expressions. Terms Offered: All

**CS-300 The Computing Professional**
Prerequisites: CE-210 or CS-102, COMM-101
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: Summer, Fall, alternate years

**CS-312 Theory of Computation**
Prerequisites: CS-102, CS-211
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: Summer, Fall, alternate years

**CS-320 Computer Graphics**
Prerequisites: CS-102, and MATH-101 or MATH-101X
Corequisites: None
Minimum Class Standing: SO
An introduction to computer graphics. Rendering and curve drawing techniques, clipping algorithms, light and reflection models, object transformations. Introduction to three-dimensional graphics. Terms Offered: Winter, Spring, alternate years

**CS-331 Programming Language Design**
Prerequisites: CS-203, CS-312
Corequisites: None
Minimum Class Standing: JR
A study of the principles behind the design of programming languages. Syntactical design, control structures, data structures, naming and environments, language design tools, historical development, implementation issues. Terms Offered: As Needed

**CS-341 Web Software Tools**
Prerequisites: CS-102
Corequisites: None
Minimum Class Standing: None
World Wide Web programming tools. Various markup languages, several scripting languages, web services, web servers and relational databases - all the skills and tools needed to create dynamic web-based applications. Terms Offered: Winter, Spring, alternate years

**CS-385 Introduction to Game Design**
Prerequisite: CS-102
Corequisites: None
Minimum Class Standing: None
This course will study the technology, science, and art involved in the creation and design of computer games. The course will emphasize hands-on development of games and consider a variety of software technologies relevant to games. Terms Offered: Winter, Spring, alternate years
CS-415 Cryptography  
Prerequisites: CS-203  
Corequisites: None  
Minimum Class Standing: JR  
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. Terms Offered: Summer, Fall, alternate years

CS-420 Multimedia Design  
Prerequisites: CS-320  
Corequisites: None  
Minimum Class Standing: None  
This course introduces the basics of multimedia design and development. Topics include 3D mesh modeling, animation, video editing, audio editing, and the development of interactive virtual environments. Terms Offered: Summer, Fall, alternate years

CS-425 Parallel Models and Algorithms  
Prerequisites: CS-102  
Corequisites: None  
Minimum Class Standing: JR  
An introduction to various models for parallel computation, such as PRAM models, vector processors, interconnection networks, trees, meshes, hypercubes, and sorting networks. Performance measures for parallel models and for parallel algorithms. Parallel algorithms for searching, sorting, merging, trees, graphs, and the study of their efficiency. Implementation of some parallel algorithms are on a parallel machine. Terms Offered: As Needed

CS-431 Compiler Design and Construction  
Prerequisites: CS-102  
Corequisites: None  
Minimum Class Standing: JR  
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. Terms Offered: As Needed

CS-435 Functional Languages and Parsing  
Prerequisites: CS-102  
Corequisites: None  
Minimum Class Standing: None  
Introduction to contemporary functional programming languages and techniques: lists, first class and higher order functions, lazy evaluation, and infinite data structures. Introduction to context free languages and parsing techniques: LL(k), LR(k). Construction of hand written parsers and use of automated tools for parser construction. Terms Offered: Winter, Spring, alternate years

CS-451 Operating Systems  
Prerequisites: CS-102  
Corequisites: None  
Minimum Class Standing: None  
Operating system function and implementation: process and thread management, scheduling and synchronization; deadlock; real and virtual memory management, file-system structure and implementation. Case studies of historical and modern operating systems. Terms Offered: Summer, Fall

CS-455 Computer and Network Security  
Prerequisites: CS-102  
Corequisites: None  
Minimum Class Standing: JR  
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. Terms Offered: Winter, Spring, alternate years

CS-458 Computer and Network Forensics  
Prerequisites: None  
Corequisites: CS-102  
Minimum Class Standing: None  
Forensic analysis, evidence collection and data reconstruction for computing systems and networks. Document preparation for use in the legal system. Terms Offered: Summer, Fall, alternate years

CS-459 Secure Software  
Prerequisites: CS-102  
Corequisites: None  
Minimum Class Standing: None  
CS-461 Database Systems
Prerequisites: CS-102
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Winter, Spring, alternate years

CS-465 Information Retrieval and Data Mining
Prerequisites: CS-102
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Winter, Spring, alternate years

CS-471 Software Engineering
Prerequisites: CS-102
Corequisites: None
Minimum Class Standing: JR
Software life cycle including specification, design, coding, testing, and verification of a software project. Stepwise refinement and rapid prototyping. Software portability, reusability and maintenance in the team construction of a large software product. Software quality assurance. Terms Offered: Winter, Spring, alternate years

CS-481 Artificial Intelligence
Prerequisites: CS-203
Corequisites: None
Minimum Class Standing: None
Types of intelligence, knowledge representation, cognitive models, Goal-based systems, heuristic search and games, learning systems. Language understanding, robotics, theorem proving and deductive systems. Terms Offered: Winter, Spring, alternate years

CS-485 Advanced Game Development
Prerequisites: CS-385
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: Summer, Fall, alternate years

CS-541 Web Technology
Prerequisites: CS-461 or permission of instructor.
Corequisites: None
Minimum Class Standing: None
This concepts, principles, issues and techniques for web technology. The main principles and protocols in internet, the key components in XHTML, JavaScript, PERL, CGI, Java Applets, XML. Web database applications using MySQL and PHP. Terms Offered: Summer, Fall

CS-571 Software Requirements Engineering
Prerequisites: CS-471
Corequisites: None
Minimum Class Standing: None
This course is an in-depth investigation of the requirement and specification phase of the software engineering process. Topics include requirement determination, analysis and change techniques, requirement specification modeling with the aid of CASE tools, software quality assurance issues, walkthroughs and inspections. Case studies will also be presented and analyzed. Terms Offered: Summer, Fall

CUE-495C Co-op Thesis
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR
This CUE option is carried out at the student’s co-op employment. It is an individual project providing an opportunity for the senior student to apply his or her academic and co-op experience to a realistic problem. This option requires that a student be advised by a faculty member and employer supervisor. The topic selected is to be submitted to Kettering for approval, specifically the faculty member accepting the topic. The student is required to have a tangible artifact such as a comprehensive final written report. This is a two-term project. This new CUE option is offered as one of four options and will normally be registered in one of the student’s senior work terms. In addition, participation in an annual Kettering Poster Session and/or Presentation of the thesis is highly encouraged.

CUE-495E Intra/Entre/Social E-ship Thesis
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR

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This CUE option requires the student to apply and be accepted through the Center for Culminating Undergraduate Experiences (CCUE). This option requires that a student be advised by a faculty member as well as at least one qualified committee member (normally Director from the Entrepreneurship Across the University). The student is required to have a tangible artifact such as a comprehensive final written report. This is a two-term project. The new CUE option is offered as one of four options and will normally be registered in one of the student’s senior work terms. In addition, participation in an annual Kettering Poster Session and/or Presentation of the thesis is highly encouraged.

CUE-495P Professional Practice Thesis 4 Credits
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR
This CUE option requires the student to apply and be accepted through the Center for Culminating Undergraduate Experiences (CCUE). The project is professional practice in nature, in a group setting and is interdisciplinary providing an opportunity for the senior student to apply his or her academic and co-op experience to a realistic problem at a pre-selected organization. This option requires that a student be advised by a faculty member as well as at least one committee member (normally company liaison). The topic is pre-selected for accepted students pursuing this option. The student is required to have a tangible artifact such as a comprehensive final written report. This is a two-term project. This CUE option is offered as one of four options and will normally be registered in one of the student’s senior work terms. In addition, participation in an annual Kettering Poster Session and/or Presentation of the thesis is highly encouraged.

CUE-495R Research Thesis 4 Credits
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR
This CUE option requires the student to apply and be accepted through the Center for Culminating Undergraduate Experiences (CCUE) in collaboration with the research faculty member. This option requires that a student be advised by a faculty member as well as at least one qualified committee member. The topic is determined by a Kettering faculty member for accepted students pursuing this option and requires topic approval from CCUE. The student is required to have a tangible artifact such as a comprehensive final written report. This is a two-term project. The new CUE option is offered as one of four options and will normally be registered in one of the student’s senior work terms. In addition, participation in an annual Kettering Poster Session and/or Presentation of the thesis is highly encouraged.

ECE-101 MATLAB and C Programming 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
In this course, you will learn the fundamentals of the MATLAB and C programming languages. Special emphasis will be placed on using the tools acquired in this class to solve problems faced by electrical and computer engineers. Terms Offered: All

ECON-201 Economic Principles 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
This course introduces the student to the economic way of thinking. Students 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. Terms Offered: All

ECON-342 Intermediate Microeconomics: Managerial Economics 400(4)
Prerequisites: ECON-201
Corequisites: None
Minimum Class Standing: SO
This course combines microeconomic theory 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. Terms Offered: As Needed

ECON-344 Intermediate Macroeconomics: Economic Growth and Fluctuation 400(4)
Prerequisites: ECON-201
Corequisites: None
Minimum Class Standing: SO
This course covers macroeconomic theory and policy 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. Terms Offered: As Needed

ECON-346 Introduction to Econometrics 400(4)
Prerequisites: ECON-201
Corequisites: None
Minimum Class Standing: SO
This course introduces the application of statistical tools to economic, business, and social phenomenon. Econometrics is a methodology for applied scientific decision making in the social sciences and business. Students learn how to model, estimate, interpret, and forecast quantitative and qualitative processes using statistical methodology. Topics include regression analysis, simultaneous equations models, and analysis of qualitative data. Students conduct applied research using contemporary statistical software packages. Terms Offered: Bi-Annually

ECON-348 History of Economic Thought 400(4)
Prerequisites: ECON-201
Corequisites: None
Minimum Class Standing: SO
This course analyzes the development of economic thinking 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. Terms Offered: Bi-Annually

ECON-350 Comparative Economic Systems 400(4)
Prerequisites: ECON-201
Corequisites: None
Minimum Class Standing: SO
Capitalism, Socialism, Communism and other “isms” that have occupied the history of mankind have all claimed to hold the key to a more rational social order and a better economic future for mankind. Comparative economic systems set the stage for a comparison of contemporary nation-states in terms of national economic goals, the mechanisms chosen for attaining these goals, and the extent of success in matching means and ends. This course includes pure capitalism as an economic system. This will be followed by mixed economies. Countries to be studied under mixed economies include the U.S., United Kingdom, Germany, and France. In looking at the consequences of socialism as an economic system, countries to be studied include the Russian Federation, Poland, Czech Republic, Hungary, and Romania. Finally, problems of the less developed countries will be analyzed including India, Argentina, Brazil, Mexico, Nigeria, and Guinea. Emphasis will be put on economic decision making processes in all the contemporary economic systems. Terms Offered: All

ECON-352 International Economics 400(4)
Prerequisites: ECON-201
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: As Needed

EE-210 Circuits I 300(3)
Prerequisites: MATH-203 or MATH-203H, PHYS-224, PHYS-225
Corequisites: EE-211, MATH-204 or MATH-204H
Minimum Class Standing: None
This is an introductory course presenting fundamental DC and AC circuit analysis techniques. Topics include circuit variables and elements; resistors, inductors, and capacitors; and sinusoidal steady-state analysis with power calculations. Laboratory experience is designed to re-enforce the fundamental analysis techniques discussed in class. Terms Offered: All

EE-211 Circuits I Laboratory 002(1)
Prerequisites: None
Corequisites: EE-210
Minimum Class Standing: None
This is 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. Terms Offered: All

EE-212 Applied Electrical Circuits 310(3)
Prerequisites: PHYS-224, PHYS-225
Corequisites: MATH-204 or MATH-204H, MECH-231L
Minimum Class Standing: None
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. Terms Offered: All

EE-240 Electromagnetic Fields and Applications 400(4)
Prerequisites: EE-210, PHYS-224, PHYS-225
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All
EE-310 Circuits II  
Prerequisites: EE-210, MATH-204 or MATH-204H  
Corequisites: EE-332  
Minimum Class Standing: None  
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. Terms Offered: All

EE-320 Electronics I  
Prerequisites: CE-210, EE-210, EE-211  
Corequisites: EE-321  
Minimum Class Standing: None  
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. Terms Offered: All

EE-321 Electronics I Laboratory  
Prerequisites: EE-210, EE-211  
Corequisites: EE-320  
Minimum Class Standing: None  
This is 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. Terms Offered: All

EE-322 Applied Power Electronics  
Prerequisites: EE-212, MECH-231L  
Corequisites: None  
Minimum Class Standing: None  
Basics of power electronic circuits and applications are studied. Topics include operational amplifiers; diodes; bipolar-junction transistors; metal-oxide semiconductor field-effect transistors; insulated-gate bipolar-junction transistors; thyristors; 555-timer; controlled rectifiers; chopper circuits; inverters; and voltage controllers. Emphasis will be placed upon fuel cell related applications. This course will not satisfy the requirements of an Electrical or Computer Engineering degree. Terms Offered: Summer, Fall

EE-325 Principles of Microelectronics Processing  
Prerequisites: EE-210, EE-211, EE-320, EE-321 or PHYS-342  
Corequisites: None  
Minimum Class Standing: None  
This is an introductory course on the principles of semiconductor processing for modern integrated circuits. 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. Terms Offered: Summer, Fall

EE-332 Signals and Systems  
Prerequisites: EE-210, MATH-204 or MATH-204H  
Corequisites: None  
Minimum Class Standing: None  
Introductory continuous- and discrete-time signals and systems are studied. Topics include linear time-invariant systems, the Laplace transform, and the Z-transform. Emphasis will be placed on applications of the theory to real systems and the use of computer simulation to verify class concepts. Terms Offered: All

EE-336 Continuous-Time Signals and Systems  
Prerequisites: MATH-204 or MATH-204H  
Corequisites: None  
Minimum Class Standing: SO  
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. Terms Offered: All

EE-338 Discrete-Time Signals and Systems  
Prerequisites: MATH-102 or MATH-102X or MATH-102H  
Corequisites: None  
Minimum Class Standing: FRII  
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. Terms Offered: All

EE-340 Electromagnetic Wave Propagation  
Prerequisites: EE-240  
Corequisites: None  
Minimum Class Standing: None
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. Terms Offered: Winter, Spring

**EE-342 Electrical Machines**  
Prerequisites: EE-210, EE-211, EE-240  
Corequisites: EE-310  
Minimum Class Standing: None  
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. Terms Offered: Winter, Spring

**EE-344 Fundamentals of Power Systems**  
Prerequisites: EE-210, EE-211  
Corequisites: None  
Minimum Class Standing: None  
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. Terms Offered: Winter, Spring

**EE-346 High Voltage Generation and Measurement Techniques**  
Prerequisites: EE-210, EE-211, EE-240  
Corequisites: None  
Minimum Class Standing: None  
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. Terms Offered: Summer, Fall

**EE-348 Electromagnetic Compatibility**  
Prerequisites: EE-210, EE-240  
Corequisites: None  
Minimum Class Standing: None  
Issues involved in designing electrical and electronic systems to achieve electromagnetic compatibility are studied. Topics include: interference sources; government regulations limiting conducted and radiated emissions; 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. Terms Offered: Summer, Fall

**EE-420 Electronics II**  
Prerequisites: EE-310, EE-320, EE-321  
Corequisites: None  
Minimum Class Standing: None  
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. Terms Offered: Winter, Spring

**EE-424 Power Electronics and Applications**  
Prerequisites: EE-310, EE-320, EE-321  
Corequisites: None  
Minimum Class Standing: None  
Speed control and dynamic representation of electric motors are studied. Topics include: characteristics of diodes; 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. Terms Offered: Winter, Spring

**EE-427 Semiconductor Device Fundamentals**  
Prerequisites: EE-210, EE-320  
Corequisites: None  
Minimum Class Standing: None  
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. Note: A student cannot receive credit for both EE-426 and EE-427. Terms Offered: Winter, Spring

**EE-430 Communication Systems**  
Prerequisites: EE-310, EE-320, EE-332, MATH-408  
Corequisites: None  
Minimum Class Standing: None  
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. Terms Offered: Summer, Fall

**EE-432 Feedback Control Systems**  
Prerequisites: EE-310, EE-320, EE-321  
Corequisites: None  
Minimum Class Standing: None  
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. Terms Offered: Summer, Fall
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. Terms Offered: Summer, Fall

**EE-434 Digital Signal Processing**
Prerequisites: EE-320, EE-321, EE-332  
Corequisites: None  
Minimum Class Standing: None  
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. Terms Offered: Winter, Spring

**EE-444 Computational Methods in Power Systems**  
Prerequisites: EE-344  
Corequisites: None  
Minimum Class Standing: None  
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. Terms Offered: Summer, Fall

**EE-490 Senior Electrical Engineering Design Project**  
Prerequisites: CE-210, CE-320, EE-210, EE-211, EE-240, EE-310, EE-320, EE-321, EE-332  
Corequisites: None  
Minimum Class Standing: Senior Thesis Standing  
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. Terms Offered: Summer, Fall

**EE-524 Fuel Cell System Integration and Packaging**  
Prerequisites: EE-322 or EE-424, and MECH-325 or MECH-420  
Corequisites: None  
Minimum Class Standing: None  
This course will focus on the conversion, management, and control of electric power produced by 10kw-200kw fuel cells for both mobile and stationary applications. Special considerations will be given to packaging of fuel cells and motor drive circuits, thermal management and heat dissipation, bi-directional energy flow through the electric machines and motor drives, ultracapacitor technology, NiMH batteries, and control of high power motors. Emphasis includes design and packaging of high temperature motor drives for processing power generated by fuel cells and for conditioning, power generated by these same electric motors during regenerative braking. Technical issues that are addressed include: control of the motor drives; heat removal from the fuel cell, motor drive semiconductor switches and magnetics; behavior of power semiconductor switches at elevated temperature; thermal design and analysis of the electronics package; noise generation in control systems by electric power transients and modeling of the power system. This course is presented from the perspective of the systems engineers that are responsible for the overall system design and integration of the power electronics, the fuel cell, the heat removal technology, and the electric machines to make a system that has an acceptable lifetime in a hostile thermal environment. Terms Offered: Summer, Fall

**EE-530 Digital Control Systems**  
Prerequisites: EE-432  
Corequisites: None  
Minimum Class Standing: None  
Control of continuous-time processes using computer-based controllers is studied. Topics include: design of control algorithms for implementation of digital computers; 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 of control systems using state-space methods. Implementation of real-time digital controllers is performed in the lab. Terms Offered: Winter, Spring

**EE-580 Automotive Electronic Systems**  
Prerequisites: EE-320 and EE-432 or MECH-430  
Corequisites: None  
Minimum Class Standing: None  
Practical application of contemporary electronic control techniques to selected automotive systems, including engine control and chassis control systems are studied. Topics include: basic coverage of electronic circuits, microprocessors, and feedback control systems; practical application of these principles to automotive electrical systems including power and signal distribution, electronic ignition, and charging and voltage regulation systems; automotive sensors and actuators, engine management systems, and antilock brake systems. Terms Offered: Winter, Spring

**EE-582 Robot Dynamics and Control**  
Prerequisites: None  
Corequisites: EE-432  
Minimum Class Standing: None  
Principles of robot analysis, design, and operation are presented. Topics include: coordinate systems, kinematics and robot dynamics; feedback, feedforward, and adaptive methods for arm control; vision and intelligence; and mobile robots. Terms Offered: Summer, Fall
EE-584 Wireless Communications
Prerequisites: EE-430
Corequisites: None
Minimum Class Standing: None
This course includes the description, analysis, selection and design of wireless communication systems. The topics of the course include familiarization with practical methods of wireless communications, including propagation, antenna characteristics, and modulation methods, as well as development of skills necessary to assess and select a preferred method. Practicality and analysis of simple systems form the focus of the course. Terms Offered: Winter, Spring

EP-235 Computers in Physics
Prerequisites: PHYS-224, PHYS-225, and permission of instructor
Corequisites: None
Minimum Class Standing: SO
This course exposes applied physics to students to the multiple ways computers are used by professionals in industry, academia, and government laboratories. 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. Terms Offered: Winter, Spring

EP-446 Solid State Physics
Prerequisites: MATH-204 or MATH-204H, PHYS-362
Corequisites: None
Minimum Class Standing: JR
This course covers advanced topics in physics of solids such as 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. Terms Offered: Winter (odd years), Spring (even years)

Prerequisites: MATH-204 or MATH-204H, PHYS-302
Corequisites: None
Minimum Class Standing: None
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 three 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. Terms Offered: Winter

ESL-097 English as a Second Language I
Prerequisite: Placement exam
Corequisites: None
Minimum Class Standing: None
This course is the first in a three-part sequence providing instruction and practice in speaking, reading, listening, and writing in English for students whose first language is not English. It focuses on grammar, vocabulary, and syntax of the English language. A placement exam at the end of this course will determine placement in the next ESL class or in COMM-101. As a basic skills course, it cannot substitute for any of the general education courses required of all students. Credits for ESL-097 do not apply to degree requirements. Terms Offered: As Needed.

ESL-098 English as a Second Language II
Prerequisites: ESL-097 or placement exam
Corequisites: None
Minimum Class Standing: None
This course is the second in a three-part sequence providing instruction and practice in speaking, reading, listening, and writing in English for students whose first language is not English. It develops the grammar, vocabulary, and syntax of the English language based on the foundation established in ESL-097. A placement exam at the end of this course will determine placement in the next ESL class or in COMM-101. As a basic skills course, it cannot substitute for any of the general education courses required of all students. Credits for ESL-098 do not apply to degree requirements. Terms Offered: As Needed.

ESL-099 English as a Second Language III
Prerequisites: ESL-098 or placement exam
Corequisites: None
Minimum Class Standing: None
This course is the third in a three-part sequence providing instruction and practice in speaking, reading, listening, and writing in English for students whose first language is not English. It develops the grammar, vocabulary, and syntax of the English language based on the foundation established in ESL-097 and ESL-098. A placement exam at the end of this course will determine placement in COMM-101 or repetition of ESL-099. As a basic skills course, it cannot substitute for any of the general education courses required of all students. Credits for ESL-099 do not apply to degree requirements. Terms Offered: As Needed.

FINC-310 Financial Markets
Prerequisites: ACCT-212
Corequisites: None
Minimum Class Standing: None
The purpose of this course is to provide students with (1) the theoretical models that underlie the values of stocks and bonds; (2) an understanding of the financial markets where securities are traded and (3) investment alternatives such as mutual funds, options and commodities. The importance of these topics to both the firm and the individual investor will be stressed. Terms Offered: Summer, Fall

**FINC-311 Financial Management**  
400(4)  
Prerequisites: ACCT-212 or ACCT-315 or MATH-350  
Corequisites: None  
Minimum Class Standing: JR  
This course identifies and discusses the role financial management plays in the successful operation of a business enterprise. Subject areas include the capital asset pricing model, bond and stock valuation, and capital structure management. Ethical and legal issues facing financial managers are emphasized by the daily use of *The Wall Street Journal*. Terms Offered: Winter, Spring

**FINC-411 Investments**  
400(4)  
Prerequisites: FINC-311  
Corequisites: None  
Minimum Class Standing: JR  
This course provides an introduction into the fundamentals of investment analysis. A mixture of description and theory provides an overview into security markets, sources of investment information, investment opportunities, and the classic process of analyzing and valuing securities. The concept of portfolio theory in terms of risk and return is also examined.

**FYE-101 First Year Foundations**  
100(1)  
Prerequisites: None  
Corequisites: None  
Minimum Class Standing: None  
This course will provide critical information 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. Terms Offered: All

**GER-101 Beginning German I**  
400(4)  
Prerequisites: None  
Corequisites: None  
Minimum Class Standing: None  
This course is the first 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. Terms Offered: As Needed.

**GER-102 Beginning German II**  
400(4)  
Prerequisites: None  
Corequisites: None  
Minimum Class Standing: None  
This course is the second 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. Terms Offered: As Needed.

**GER-103 Beginning German III**  
400(4)  
Prerequisites: None  
Corequisites: None  
Minimum Class Standing: 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. Terms Offered: As Needed.

**HIST-306 International Relations**  
400(4)  
Prerequisites: COMM-101, HUMN-201, SSCT-201  
Corequisites: None  
Minimum Class Standing: SO  
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. Terms Offered: As Needed

HIST-308 America and the World 400(4)
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: As Needed

HIST-310 Imperialism 400(4)
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course explores historical writing, novels, poetry, film, and primary documents to examine such themes as the meaning of “imperialism;” colonial rule and administration; the technology and economics of empire; the tensions between cultural diversity and political unity; the impact of imperialism on art, architecture and society; decolonization; and the legacies of imperialism for contemporary Africa, Asia, the Americas, and Europe. Terms Offered: As Needed

HIST-312 History of Science 400(4)
Prerequisites: HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course explores selected topics, figures, and ideas in the history of science. Attention is paid to transitions between patterns of scientific thinking; the social, political, and religious dimensions of scientific theory and practice; the relationship between science and technology; and the impact of modern science on understandings of human purpose and identity. (Social Science Credit.) Terms Offered: As Needed

HIST-314 Human Conflict & Conflict Resolution 400(4)
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
A broad comparative study of the central issues and problems in the history of human conflict and of conflict resolution. This course will encompass historical writing, novels, poetry, film and primary documents to examine conflicts involving different states and peoples in different historical eras. Students will explore how and why states have resorted to violence, why people fought and died for those states, and how the violence finally ended. Terms Offered: As Needed

HIST-316 History of the Atlantic World 400(4)
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course examines the creation and development of the Atlantic world from the sixteenth to the twentieth century. Transcending the constraints of national histories and modern state boundaries, the course explores the connections among the various parts of the Atlantic intercontinental world and the important historical forces and processes that transformed it. Through investigations of the experiences of four continents, this course traces the evolution of new institutions in the Americas; addresses issues of ethnic, racial, and religious differences and interactions; and attempts to provide new framework for understanding human diversity. Terms Offered: As Needed

HIST-320 Modern Middle East 400(4)
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course surveys the history of the Middle East from World War I to the Gulf War of 1991. 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. Terms Offered: As Needed

HIST-322 Africa in the World Economy 400(4)
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None
The course examines Africa’s involvement in the changing world economy and its role in the contemporary world. Its goal is to provide students a framework for understanding Africa’s contemporary economic challenges and opportunities. It 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. It also explores the role of external players and ideas and the nature of local initiatives and responses in shaping Africa’s place in the world economy.
HMGT-409 Healthcare Management 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: JR
In this course students gain a broad understanding of organizational, financial and policy issues in healthcare delivery systems in the US. Students will apply core business skills and knowledge of healthcare unique functional areas in analyzing healthcare case studies. Students will critically evaluate healthcare issues and policies and their effect on healthcare system performance. Terms Offered: As Needed

HUMAN-201 Introduction to the Humanities 400(4)
Prerequisites: COMM-101
Corequisites: None
Minimum Class Standing: None
The humanities are disciplines focused on the study of literature, philosophy, and the arts. This course is designed to introduce students to the humanities by the examination of selected works in drama, fiction, poetry, philosophy, and the fine arts. Formal graded writing assignments will be integrated into the course. Terms Offered: All

HUMAN-360 Technology and Culture 400(4)
Prerequisites: COMM-101, HUMAN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None
A study of the deep relationship between culture and technology, drawing on themes in literature, politics, communication, ecology, and ethics. Students study the role of technology in our culture, as well as how we think about technology and how technology changes how (and what) we think. Terms Offered: As needed

HUMAN-362 Global Film Cultures 400(4)
Prerequisites: COMM-101, HUMAN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None
A study of select cinematic traditions from around the world, this course approaches cinema as an artistic form that is at once global, and historically and culturally specific. It explores differences between films produced in a number of different contexts and time periods in terms of their style, political content, and industrial contexts. Terms Offered: As needed

HUMAN-365 Art & Nature in Early Industrial England 400(4)
Prerequisites: COMM-101, HUMAN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None
In this interdisciplinary course we explore, from a humanities perspective, questions regarding art and nature within the social, political, and technical contexts of the period of pre-turbine steam power in England (1770 to 1900). Students interpret paintings and works of poetry and fiction, paying special attention to how those works reflect, and have a role in shaping, ideas and attitudes regarding industrialization and the natural world. In doing so, they develop a sensitivity to the hardships and struggles of people who are disempowered or marginalized within a stratified, industrial society. Terms Offered: As needed

IME-100 Interdisciplinary Design and Manufacturing 204(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
This course introduces 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. Terms Offered: All

IME-211 Algorithms and Computer Programming 302(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: SO
This course introduces students 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 and Access Database using DDE (Dynamic Data Exchange) method. Terms Offered: Summer, Fall

IME-251 Systems Analysis I: Engineering Cost Analysis 400(4)
Prerequisites: MATH-101 or MATH-101X
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: Winter, Spring

IME-301 Engineering Materials 302(4)
IME-321 Systems Modeling I: Deterministic Models
Prerequisites: None
Corequisites: None
Minimum Class Standing: SOII
Deterministic Systems Optimization; Review of linear algebra, linear programming, sensitivity analysis, transportation problems, assignment problems, transshipment problems, network models, integer programming, and dynamic programming. Terms Offered: Summer, Fall

IME-332 Engineering Statistics II: Statistical Inference and Regression
Prerequisites: MATH-310 or MATH-408
Corequisites: None
Minimum Class Standing: SOII
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. Terms Offered: Summer, Fall

IME-333 Engineering Statistics III: Design of Experiments
Prerequisites: IME-332 or MATH-310 or MATH-408
Corequisites: None
Minimum Class Standing: JR
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, Taguchi designs, and response surface methodology. Extensive use of statistical software such as Minitab throughout the course. Terms Offered: Winter, Spring

IME-361 Work Design I: Methods & Standards
Prerequisites: MATH-310 or MATH-408
Corequisites: None
Minimum Class Standing: JR
The design and implementation of a production system is used to provide a fundamental understanding of work design and performance improvement concepts, tools, and techniques. Topics covered include applied anthropometry, charting techniques, work methods and waste analysis, performance measurements and learning curves, workplace organization and visual controls, human factors, and physiological stress. Terms Offered: Winter, Spring

IME-403 Computer Numerical Control Machining
Prerequisites: IME-100, IME-301
Corequisites: None
Minimum Class Standing: JRII
This course introduces the fundamentals of computer numerical control (CNC) programming and computer-aided manufacturing (CAM). 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. Terms Offered: Winter, Spring

IME-404 Sheet Metal Forming
Prerequisites: IME-301
Corequisites: None
Minimum Class Standing: JRII
This course demonstrates the need for thinking one’s way through manufacturing situations rather than calculating. Special material properties important to forming are developed followed by a discussion of strain generation and measurement techniques including Circle Grid Analysis and Forming Limit Diagrams. The fabricating processes of shearing, bending, drawing, and stretching are conducted thoroughly. Special forming processes and simulation testing are also discussed. The interaction of tooling, presses, and lubrication completes the study of sheet metal forming. Laboratory experiences on production-grade presses complement the lecture. Terms Offered: Winter, Spring

IME-405 Casting Processes
Prerequisites: IME-301
Corequisites: None
Minimum Class Standing: None
Green sand casting, lost foam casting, permanent mold casting and die casting are discussed. The interrelationships between part design, solidification mode, casting process parameters and the resulting microstructure and properties are examined. Terms Offered: Winter, Spring, of even numbered years.

IME-408 Robotics in Manufacturing & Service/Healthcare

Prerequisites: IME-100, MECH-100 or approval of instructor
Corequisites: None
Minimum Class Standing: JR
The basic concepts of robot theory and applications are presented. Vision systems and virtual robotics are interfaced with diverse real environments including robotic surgery. Justification of investment and benefits are emphasized for LEAN operations. Computer communication is crafted for equipment integration. Topics include physical robot components and peripherals, integral function of robot and equipment in workcells, safety, end-effector design, work-holding, path planning, motion control, and programming languages. Student may earn an industry-sourced certificate in Robotics. Examples, work problems and Labs are drawn from manufacturing and healthcare systems. Terms offered: Fall (every year) and Winter (even years)

IME-409 Computer Integrated Manufacturing 302(4)
Prerequisites: MECH-100
Corequisites: None
Minimum Class Standing: JRII
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. Terms Offered: Summer, Fall

IME-412 Applied Control Systems Design 302(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR
An introductory course designed to introduce students to the various computer controlled systems used for 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 to solve various assigned problems through individual and/or group efforts. In addition, students will be given assignments to be completed outside of class. By the end of the course the student should have good understanding effective use of computerized control systems. Terms Offered: Winter, Spring

IME-422 System Modeling II: Simulation 400(4)
Prerequisites: MATH-310 or MATH-408
Corequisites: None
Minimum Class Standing: None
In this course, the student will develop an understanding and need for simulation in practice. 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. Terms Offered: Summer, Fall

IME-423 Systems Modeling III: Stochastic Models 400(4)
Prerequisites: IME-321
Corequisites: None
Minimum Class Standing: JRII
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. Terms Offered: Summer, Fall

IME-452 Designing Value in the Supply Chain 310(4)
Prerequisites: MATH-310 or MATH-408
Corequisites: None
Minimum Class Standing: IE Junior or non-IE SR
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. Terms Offered: Winter, Spring

IME-453 Tools for Managing the Supply Chain 400(4)
Prerequisites: IME-452
Corequisites: None
Minimum Class Standing: None
Students gain an understanding of the decision-making process required to design and manage the global supply chain. Building on the fundamental concepts from the introductory course, complexities of uncertain demand patterns and multiple product planning will enable quantitative decision-making by engineering managers. Contemporary topics and tools will be covered. Terms Offered: Summer, Fall

IME-454 Senior Design Project 204(4)
Prerequisites: Final term on campus or Department Head approval
Corequisites: None
Minimum Class Standing: Final Term on Campus
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. Terms Offered: All

IME-456 Engineering for Healthcare Systems 310(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR
This course examines the technical structure of the healthcare delivery system and the role that industrial and systems engineering (ISE) plays in
its design and improvement. Included will be how healthcare systems work in hospitals, medical offices, clinics and other healthcare
organizations. Traditional ISE methods for improving quality, patient safety, and employee productivity and satisfaction will be presented within
a systematic application of value chain engineering designed to produce lean processes. Terms Offered: Summer, Fall

IME-462 Work Design II: Ergonomics 302(4)
Prerequisites: MATH-310 or MATH-408, and MECH-210
Corequisites: None
Minimum Class Standing: None
Fundamentals of work design are built upon to ground the student in human factors and ergonomics of work design. Topics include applied job
design, manual material handling, cumulative trauma disorders, hand tool design, design of controls and displays, and ergonomic and human
factors of product design. Terms Offered: Winter, Spring

IME-471 Quality Systems I: Quality Assurance 400(4)
Prerequisites: IME-332 or MATH-310 or MATH-408
Corequisites: None
Minimum Class Standing: JR
This course covers the basics of modern methods of quality control and improvement that are used in the manufacturing and service industries. 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. Terms Offered: Winter, Spring

IME-474 Design for Manufacture and Assembly 302(4)
Prerequisites: IME-301
Corequisites: None
Minimum Class Standing: SRII
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. Terms Offered: Summer, Fall

IME-476 Lean Six Sigma 310(4)
Prerequisites: IME-332 or MATH-310 or MATH-408
Corequisites: None
Minimum Class Standing: SR
This course examines techniques to maximize production efficiency and to maintain control over each step in the process. The structured
problem-solving methodology DMAIC (Define-Measure-Analyze-Improve-Control) will provide the framework for the course. Terms Offered: Winter, Spring.

IME-563 Safety and Human Factors 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR standing in IE Program
Discussion of the relationship between traditional safety engineering and human factors or ergonomics. Examination of man-machine interfaces
relative to people’s capabilities and limitations. Application of accident modeling or investigation and hazard analysis or control techniques.
Introduction to mandatory and voluntary specification and performance regulations, standards, and guidelines. Terms Offered: Winter, Spring

IME-564 Ethics and Practice of Engineering 310(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR Standing in Industrial Engineering program
The course deals with the professional and ethical considerations of an engineer in contemporary society. Discussions include: the codes of ethics
for engineers, case studies on conflict of interest, team, engineering/management responsibilities, environmental considerations and professional
registration. The format is video lectures with a live weekly discussion. Terms Offered: Summer, Fall

IME-572 Introduction to Reliability 400(4)
Prerequisites: MATH-408
Corequisites: None
Minimum Class Standing: None
This course is to provide basic knowledge and skills of reliability techniques that can be used by practicing engineers. 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.

**IME-573 Advanced Quality Assurance** 400(4)
Prerequisites: IME-333, IME-471
Corequisites: None
Minimum Class Standing: BS
This course covers the advanced topics of modern methods of quality control and improvement that are used in the manufacturing and service industries. It includes statistical methods of quality improvement, concept of variation and its reduction, statistical process control, designed experiments in quality improvement, and quality in the service sector. Taguchi and Deming’s quality concepts will also be discussed. Terms Offered: Summer, Fall

**IME-575 Failure Analysis** 204(4)
Prerequisites: IME-301
Corequisites: None
Minimum Class Standing: SR
An engineering materials analysis course emphasizing the interaction of materials and processing as they relate to product failure. Topic coverage includes fracture path analysis, fracture mode, brittle and ductile behavior, fracture mechanics, physical chemistry, corrosion, and material process analysis. This course requires a laboratory analysis project. Terms Offered: Summer, Fall

**IME-583 Industrial Engineering Concepts** 310(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: Non-IE SR or Graduate student with non-IE undergraduate degree
This course introduces topics pertinent to the practice and management of the profession of industrial engineering. The topics covered may include: Activity-based Costing and Quoting (ABC/Q), Material Requirements Planning (MRP), Decision Making, Ergonomics, Forecasting and Scheduling Techniques, Simulation and its use in Production Planning and Control, Inventory Techniques, Quality and Improvement, Supply Chain Management, and Value Stream Mapping. Terms Offered: Summer, Fall

**ISYS-440 Information Management** 302(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: As Needed

**ISYS-442 Technical Infrastructure** 302(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: JR
Telecommunications fundamentals including data, voice, image, and video. The concepts, models, architectures, protocols, standards, and security for the design, implementation, and management of digital networks. Essentials of local area networks, (LAN), metropolitan area networks, (MAN), and wide area networks (WAN). Transmission and switching efficiency. Regulatory and technical environments. Topics include security and authentication, network operating systems, e-commerce and associated web sites and practices, and middleware for wireless systems, multimedia, and conferencing. Terms Offered: As Needed

**ISYS-444 Systems Analysis** 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: JR
Systems development life cycle: analysis and design techniques; information systems planning and project identification and selection, requirements collection and structuring, process modeling, data modeling, design of interface and data management, system implementation and operation, system maintenance, and change management implications of systems. Globalization issues in systems. Students will use current methods and tools such as rapid application development, prototyping, and visual development. Students will complete a systems development project to demonstrate mastery of concepts. Terms Offered: As Needed

**ISYS-450 Enterprise Information System Models** 400(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: JR
This course overviews information systems based on a process-oriented view of the organization and its relationships with suppliers, customers, and competitors. We view processes as vehicles for achieving strategic objectives and transforming the organization. The major focus of the course is how organizations implement processes globally using enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM) systems and social networks. The course also addresses the role of systems in transforming organizations and markets and a brief infrastructure overview. Terms Offered: As Needed

**KETT-540 Environmentally Conscious Design** 400(4)
Prerequisites: None
This is a multi-disciplinary course that provides students with the perspective and skills (economic, managerial, ethical, scientific, and engineering) needed to critically examine environmental issues in product design and manufacturing and to arrive at viable solutions to these problems. Emphasis is placed on solutions that reduce costs and improve environmental performance. The course is open to engineering, science and management undergraduate and graduate students, and focuses on examples of environmental issues related to the goods and services produced by Kettering University's industrial co-operative education partners. The course uses case studies to introduce new concepts to students which are then reinforced through group discussion, guest speakers, laboratory experiences and other activities. Terms Offered: Winter, Spring

**LANG-297 Language Transfer Course**

Prerequisite: None
Corequisites: None
Minimum Class Standing: None

This course records credit for students transferring to Kettering University. Students may repeat the course up to three times for a maximum of 12 credits. Students receive transfer credit if they have completed language study that meets one of the following requirements:

- Completion of an AP or IB (HL) language exam:
- Language Exam – AP Score of 4 or 5 – 4 credits
- Language Exam – AP Score of 4 or 5 – 4 credits
- IB (HL) Score of 4 or higher – 8 credits

Completion of foreign language study at a regionally accredited university or foreign equivalent with a grade of C or better. Courses taken must be non-remedial and a minimum of 3 semesters hour. Students receive 4 credits at Kettering University for each course taken up to a maximum of 12 credits.

**LIT-304 American Literature and Philosophy**

Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None

Selected topics founded and expressed in literature during the philosophic and the literary development of the Republic. Terms Offered: All

**LIT-307 Poetry: Substance and Structure**

Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None

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. Terms Offered: All

**LIT-309 The Literature of Multicultural America**

Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO

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. literacy 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. Terms Offered: As Needed

**LIT-310 African American Literature**

Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO

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. Terms Offered: As Needed

**LIT-311 Literatures of the African Diaspora**

Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None

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. Terms Offered: As needed

**LIT-315 Literature of the Fantastic**

Prerequisites: HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course examines the fantastic in literature and film. It includes such topics as the role of escapist literature in society, fantasy as satire and social criticism, and the use of both fantasy and horror literature and cinema to explore taboos about mortality, insanity, and sexuality. Terms Offered: As Needed

**LIT-317 Masterpieces of Drama**
Prerequisites: HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course examines several significant works of drama. Topics include the role of stage and cinematic drama in human society, drama as social criticism, and the nature of various kinds of dramatic works including tragedy, comedy, and satire. Terms Offered: As Needed

**LIT-351 Literature in a Foreign Language**
Prerequisites: COMM-101, LANG-103 or equivalent, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course provides an exposure to literature read and discussed in a foreign language. It further develops students’ abilities in reading, speaking and writing a foreign language while providing familiarity with the literary heritage of a foreign culture. Terms Offered: As Needed

**LIT-372 Masterpieces of Literature**
Prerequisites: HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course will concentrate on 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. Terms Offered: As Needed

**LIT-374 Seminar on J.R.R. Tolkien**
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: None
Seminar on J.R.R. Tolkien: This seminar examines a range of J.R.R. Tolkien’s works. These may include his epic, The Lord of the Rings in both the written and film versions (all viewings of the film will occur outside of class), his extended mythology in his unfinished The Silmarillion, his short stories and essays, and his shorter fantasy work The Hobbit. The course focuses on genre, style and themes of the works, with particular emphasis on the elements of myth and epic, and on the complex ways in which his work as a medieval scholar comes to bear on his writings and their interpretation.

**LIT-379 The Plays of Shakespeare**
Prerequisites: HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course will be a concentrated study of selected tragedies, comedies, and history plays by William Shakespeare. The emphasis will be on the universal human dimensions of the plays within the context of the Elizabethan age. Plays such as Hamlet, Twelfth Night, and Richard III will be used. Terms Offered: As Needed

**LS–489 Senior Seminar: Leadership, Ethics and Contemporary Issues**
Prerequisites: COMM-101, COMM-301, ECON-201, HUMN-201, SSCI-201, a 300 level course in either Humanities or Social Science
Corequisites: None
Minimum Class Standing: SR
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. Terms Offered: All

**MATH-100 College Mathematics**
Prerequisites: Placement Test. A sufficient score on the placement exam will result in placement in MATH-101X (Calculus I) or MATH-101 (Calculus I). For students without advanced credit or transfer credit for MATH-101, failure to take the placement exam will result in placement in MATH-100.
Corequisites: None
Minimum Class Standing: 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: Credits for MATH-100 do not apply to degree requirements (except the BBA). Also placement in MATH-100 may delay entry in courses for which calculus is a prerequisite. Terms Offered: All

**MATH-101 Calculus I**
Prerequisites: Sufficient score on the placement exam, or permission of Department Head
Corequisites: None
Minimum Class Standing: 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. Terms Offered: All

MATH-101X Calculus I
Prerequisites: MATH-100, or a sufficient score on the placement exam, or permission of Department Head
Corequisites: None
Minimum Class Standing: None
This course is for students showing a lack of proficiency in algebra and trigonometry on the placement examination. The course contains the same material as MATH-101 but in addition, includes a review of algebraic expressions, trigonometric functions and their inverses, and analytic geometry. Computer software will be used to aid in understanding these topics. Terms Offered: Summer, Fall

MATH-102 Calculus II
Prerequisites: MATH-101 with a minimum grade of C
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All

MATH-102H Calculus II - Honors
Prerequisites: MATH-101 and approval of Department Head
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All

MATH-102X Calculus II
Prerequisites: MATH-101 or MATH-101X
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All

MATH-203 Multivariate Calculus
Prerequisites: MATH-102 or MATH-102X or MATH-102H
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All

MATH-203H Multivariate Calculus – Honors
Prerequisites: MATH-102 or MATH-102X or MATH-102H, and professor’s recommendation
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All

MATH-204 Differential Equations and Laplace Transforms
Prerequisites: MATH-203 or MATH-203H
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: All

MATH-204H Differential Equations and Laplace Transform Honors
Prerequisites: MATH-203H or MATH-203, and professor’s recommendation
Corequisites: None
Minimum Class Standing: FR
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. Terms Offered: All

MATH-205 Applied Probability and Statistics 400(4)
Prerequisites: MATH-203 or MATH-203H
Corequisites: The student may take MATH-203 as a co-requisite but must have permission from the instructor.
Minimum Class Standing: SO
The study of the basic concepts and methods of probability and statistics. Topics covered include sample spaces, counting techniques, laws of probability, conditional probability, and dependence and independence. Broad variety of discrete and continuous distributions are studied, including moment generating functions. Functions of random variables are considered. The central limit theorem and sampling distributions are applied to point and interval parameter estimation. Broad aspects of testing statistical hypotheses for a simple population are included. Some applied statistical techniques are practiced with a statistical package. Terms Offered: Winter, Spring

MATH-305 Numerical Methods and Matrices 400(4)
Prerequisites: MATH-204 or MATH-204H
Corequisites: None
Minimum Class Standing: SOII
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. Terms Offered: All

MATH-307 Matrix Algebra 400(4)
Prerequisites: MATH-101 or MATH-101X
Corequisites: MATH-102 or MATH-102X or MATH-102H
Minimum Class Standing: None
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. Terms Offered: All

MATH-308 Abstract Algebra 400(4)
Prerequisites: MATH-307 or CS-211, and MATH-101 or MATH-101X
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: Summer, Fall

MATH-310 Biostatistics I 302(4)
Prerequisites: MATH-102 or MATH-102X or MATH-102H
Corequisites: None
Minimum Class Standing: SO
Students will learn methods of biostatistics and its applications in life sciences. Topics include: Descriptive Statistics; Elements of Probability theory; Bayes Rule; Discrete and Continuous Probability distributions; One-sample and two-sample estimation and hypothesis testing; Bayesian inference; Nonparametric Methods; Simple Regression Analysis.
Computer packages such as MINITAB will be used for all applications and the analysis of data sets. Terms Offered: All

MATH-313 Boundary Value Problems 400(4)
Prerequisites: MATH-204 or MATH-204H
Corequisites: None
Minimum Class Standing: SOII
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. Terms Offered: Summer, Fall

MATH-317 Advanced Matrix Theory 400(4)
Prerequisites: MATH-307
Corequisites: None
Minimum Class Standing: JR
A study of theory and applications of matrix algebra including determinants, rank, linear transformations, characteristic values, functions of matrices, orthogonality, similarity, and other advanced topics. Terms Offered: As Needed

MATH-321 Real Analysis I 400(4)
Prerequisites: MATH-203 or MATH-203H
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: As Needed

**MATH-327 Mathematical Statistics I**
- Prerequisites: MATH-203 or MATH-203H
- Corequisites: None
- Minimum Class Standing: JR
- A study of random variables and their distribution functions including expectations, transformations, moment generating functions, stochastic independence, and sampling distribution. Also, a study of order statistics and limiting distributions of sample mean. Terms Offered: Winter, Spring

**MATH-328 Methods of Applied Mathematics**
- Prerequisites: MATH-204 or MATH-204H
- Corequisites: None
- Minimum Class Standing: JR
- 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. Terms Offered: Winter, Spring

**MATH-350 Financial Mathematics**
- Prerequisites: MATH-102 or MATH-102X or MATH-102H, and BUSN-226 or MATH-327 or MATH-408
- Corequisites: None
- Minimum Class Standing: JR
- The course will provide an understanding of the fundamental concepts of financial mathematics. Definitions of key terms will be studied, including inflation, rates of interest, term structure of interest rates, yield rate, equation of value, accumulation function, discount function, annuity, perpetuity, stocks, bonds, mutual funds. 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, immunization, and short sales. Key terms of financial economics at an introductory level will be provided: derivatives, forwards, futures, short and long positions, call and put options, spreads, collars, hedging, arbitrage, and swaps. Terms Offered: Winter, Spring

**MATH-360 Life Contingencies I**
- Prerequisites: MATH-350
- Corequisites: None
- Minimum Class Standing: JR
- 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. Terms Offered: Summer, Fall

**MATH-361 Life Contingencies II**
- Prerequisites: MATH-360
- Corequisites: None
- Minimum Class Standing: JRII
- 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 actuarial present value, survival model, life insurance, annuities, and benefit premiums. Terms Offered: Winter, Spring

**MATH-408 Probability and Statistics**
- Prerequisites: MATH-203 or MATH-203H
- Corequisites: None
- Minimum Class Standing: SOII
- This is a course in engineering statistics. Fundamentals of probability are introduced together with examples of discrete and continuous random variables. Descriptive and inferential statistics for one and two populations is covered. Simple linear regression, one-way and two-way and ANOVA DOE including factional designs are discussed. Elements of reliability and SPC are covered. The use of statistical software is a necessary part of this course. A brief introduction to MINITAB (a statistical package) is given. Terms Offered: Winter, Spring

**MATH-410 Biostatistics II**
- Prerequisites: MATH-310
- Corequisites: None
- Minimum Class Standing: SOII
- Design of experiments and data analysis useful in Biostatistics including analysis of variance and covariance, nested designs, multiple regression, logistic regression and log-linear models. Life sciences applications and case-studies. Computer packages such as MINITAB will be used for all applications and the analysis of data sets. Terms Offered: All

**MATH-412 Complex Variables**
- Prerequisites: MATH-203 or MATH-203H
- Corequisites: None
- Minimum Class Standing: SO
- 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. Terms Offered: As Needed
MATH-416 Vector Analysis
Prerequisites: MATH-203 or MATH-203H
Corequisites: None
Minimum Class Standing: SOII
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.
Terms Offered: Winter, Spring

MATH-418 Intermediate Differential Equations
Prerequisites: MATH-204 or MATH-204H, MATH-305
Corequisites: None
Minimum Class Standing: JRI
A study of systems of linear and nonlinear ordinary differential equations (ODE’s). 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. Terms Offered: Summer, Fall

MATH-420 Mathematical Modeling
Prerequisites: MATH-204 or MATH-204H, MATH-205, MATH-305
Corequisites: None
Minimum Class Standing: JRI
A study of the process of translating real-world problems into mathematical models. Various methods of formulation and solution of models will be illustrated by practical examples. Terms Offered: Summer, Fall

MATH-421 Real Analysis II
Prerequisites: MATH-317, MATH-321
Corequisites: None
Minimum Class Standing: JRII
An introduction to the study of real functions including metric spaces, normed linear spaces, Hilbert Spaces, and linear operators. Terms Offered: Winter, Spring

MATH-423 Partial Differential Equations
Prerequisites: MATH-305, MATH-313
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Winter, Spring

MATH-427 Mathematical Statistics II
Prerequisites: MATH-327
Corequisites: None
Minimum Class Standing: JR
A further study of statistics including point and interval estimation, sufficient statistics, Bayes estimates, UMP tests, likelihood ratio tests, goodness of fit tests, an introduction to non-parametric methods. Regression analysis and ANOVA models are included. Terms Offered: Summer, Fall

MATH-428 Sampling Theory
Prerequisites: MATH-426
Corequisites: None
Minimum Class Standing: SR
A study of sampling theory including probability sampling, simple random sampling, sample size estimates, stratified sampling, and cluster sampling. Terms Offered: Winter, Spring

MATH-438 Data Analysis for Engineers and Scientists
Prerequisites: IME-332 or MATH-205 or MATH-408
Corequisites: None
Minimum Class Standing: SR
This course will cover topics in sampling techniques, data analysis and regression, design of experiments, and statistical quality and process control. In this course, the student will be given hands-on experience by combining lectures with laboratory classes involving the use of computers and appropriate statistical packages. The student taking this course is assumed to have taken an introductory course in probability and statistics. Terms Offered: As Needed

MATH-448 Time Series
Prerequisites: MATH-327
Corequisites: None
Minimum Class Standing: SR
This course is designed to provide a working knowledge of time series and forecasting methods as applied in economics, engineering, and the natural and social sciences. Terms Offered: Summer, Fall

MECH-100 Engineering Graphical Communication

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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. Terms Offered: All

**MECH-212 Mechanics of Materials**

Prerequisites: MECH-210
Corequisites: None
Minimum Class Standing: SO

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. Terms Offered: All

**MECH-231L Signals for Mechanical Systems Lab**

Prerequisites: None
Corequisites: EE-212
Minimum Class Standing: SO

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 (3) the amplifiers and other instrumentation used to process the signals from these sensors. Terms Offered: All

**MECH-300 Computer Aided Engineering**

Prerequisites: MECH-100, MECH-212
Corequisites: None
Minimum Class Standing: JR

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. Terms Offered: All

**MECH-310 Dynamics**

Prerequisites: MATH 102 or MATH-102X or MATH-102H, and MECH-210, PHYS-114, PHYS-115
Corequisites: None
Minimum Class Standing: JR

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. Terms Offered: All

**MECH-311 Introduction to Mechanical System Design**

Prerequisites: MECH-100, MECH-210
Corequisites: EE-212, MECH-231L
Minimum Class Standing: None

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. Terms Offered: All

**MECH-312 Mechanical Component Design I**

Prerequisites: MECH-212, MECH-311
Corequisites: None
Minimum Class Standing: None

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 and 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. Terms Offered: All

**MECH-320 Thermodynamics**

Prerequisites: PHYS-224, PHYS-225
Corequisites: None
Minimum Class Standing: SO

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. Terms Offered: All

**MECH-322 Fluid Mechanics**

Prerequisites: MECH-320
Corequisites: None
Minimum Class Standing: SO

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 fluid 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 similarity 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. Terms Offered: All

**MECH-330 Dynamic Systems with Vibrations**

Prerequisites: MATH-204 or MATH-204H, MECH-310
Corequisites: MATH-305 or MATH-307 and EE-210 or EE-212
Minimum Class Standing: None

This is a first course in System Dynamics. The object of this course is to provide an understanding into basic principles and methods underlying the steady state and dynamic characterization of physical systems and components. The focus is on multi-discipline approach. Construction of mathematical models of systems using Bond-graph and computer simulation (both in time and frequency domains) using software tool(s) 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-degree freedom-including applications such as vibration absorber-will be discussed. Terms Offered: All

**MECH-350 Introduction to Bioengineering Applications**

Prerequisites: BIOL-241, and/or CHEM-145, MECH-212
Corequisites: None
Minimum Class Standing: JR

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. Terms Offered: Winter, Spring

**MECH-412 Mechanical Component Design II**

Prerequisites: SME-301, MECH-312
Corequisites: None
Minimum Class Standing: None

This course is an extension of MECH-312, Mechanical Component Design I. Topics to be studies 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. Terms Offered: Directed Study.

**MECH-420 Heat Transfer**

Prerequisites: MECH-320
Corequisites: MECH-322
Minimum Class Standing: SR
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. Terms Offered: All

**MECH-422 Energy Systems Laboratory** 204(4)
- Prerequisites: MECH-320, MECH-322
- Corequisites: MECH-420
- Minimum Class Standing: SR

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. Terms Offered: All

**MECH-430 Dynamic Systems with Controls** 204(4)
- Prerequisites: MATH-305, MECH-330
- Corequisites: None
- Minimum Class Standing: SR

This is a second course, follow-up course, in System Dynamics. The objective of this course is to provide an understanding into basic principles and methods underlying the steady state and dynamic characterization of feedback control systems. The focus is on multi-discipline approach as in the previous course. Construction of mathematical models of systems using Bond-graphs, block diagrams and development of transfer functions and state space models is emphasized. System performance is studied mainly using computer simulation (both in time and frequency domains) software tool(s). Design of control systems is attempted using the same computer simulation tools. Introduction to some advanced topics in control systems is also provided. Terms Offered: All

**MECH-490 Fluid Power Systems** 402(4)
- Prerequisites: MECH-300
- Corequisites: MECH-312
- Minimum Class Standing: JR

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. Terms Offered: As Needed

**MECH-510 Analysis and Design of Machines and Mechanical Assemblies** 400(4)
- Prerequisites: MECH-300, MECH-310, MECH-312
- Corequisites: MECH-330
- Minimum Class Standing: None

The main aim of this course is to integrate the concepts of kinematic and dynamic analysis to the design of machines and mechanical assemblies used in automotive, medical equipment and other applications. These include (but 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 and gearboxes, universal coupling 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. Terms Offered: Directed Study.

**MECH-512 Mechanical Systems Design Project** 400(4)
- Prerequisites: IME-301 or PHYS-342, MECH-300, MECH-312
- Corequisites: None
- Minimum Class Standing: SR

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. Terms Offered: Summer, Fall

**MECH-514 Experimental Mechanics** 204(4)
- Prerequisites: IME-301 or PHYS-342, MECH-300, MECH-312, MECH-330
- Corequisites: None
- Minimum Class Standing: SRII

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. Terms Offered: Winter, Spring

**MECH-515 Failure and Material Considerations in Design** 400(4)
- Prerequisites: None
Corequisites: MECH-412
Minimum Class Standing: JRII

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. Terms Offered: Winter, Spring

MECH-516 Introduction to Finite Element Analysis with Structural Application 400(4)
Prerequisites: MECH-212, MECH-310, MECH-330
Corequisites: None
Minimum Class Standing: SR

The theory of the Finite Element Method will be introduced. Applications of static and dynamic finite element analysis of real world mechanical systems will be performed. Commercial F.E.A. codes such as SDRC/DEAS and MSC/NASTRAN will be utilized. Terms Offered: Summer, Fall

MECH-521 Energy and Environmental Systems Design 400(4)
Prerequisites: IME-301 or PHYS-342, MECH-300, MECH-312, MECH-420
Corequisites: MECH-422
Minimum Class Standing: SRII

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. Terms Offered: Summer, Fall

MECH-522 Engineering Analysis 400(4)
Prerequisites: MATH-204 or MATH-204H, MATH-305, MECH-330, MECH-420
Corequisites: None
Minimum Class Standing: SR

The objectives of this course are to introduce the student to various numerical methods used in the design, analysis, and simulation of linear 1-D transient and 2-D steady state engineering systems. Comparisons with analytical methods and why these methods cannot be used to solve engineering problems will be presented. The theory and application of various numerical methods will be introduced and re-enforced with programming exercises employing various computational tools. Term Offered: As Needed.

MECH-523 Applied Computational Fluid Dynamics 400(4)
Prerequisites: MECH-320, MECH-322 and MATH-313 or MATH-418, or MATH-423, or Permission of Instructor
Corequisites: None
Minimum Class Standing: SRIII

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. Terms Offered: Fall

MECH-525 Introduction to Multiphysics Modeling and Simulation in Fluid Mechanics and Heat Transfer 400(4)
Prerequisites: MECH-322, MECH-420
Corequisites: None
Minimum Class Standing: SRII

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 such 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. Terms Offered: Fall

MECH-526 Fuel Cell Science & Engineering 400(4)
Prerequisites: CHEM-237/238 or CHEM-361 or PHYS-452, MECH-325 or MECH-420
Corequisites: None
Minimum Class Standing: SR

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. Terms Offered: Summer, Fall
MECH-527 Energy and the Environment 310(4)
Prerequisites: None
Corequisites: None
Minimum Class Standing: SR
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. Several laboratory experiments including solar heating, ethanol production and wind energy will be included in this course. Terms Offered: Summer, Fall

MECH-528 Bio and Renewable Energy Laboratory 212(4)
Prerequisites: MECH-320, MECH-322
Corequisites: None
Minimum Class Standing: None
This course provides an opportunity for the students to perform hands-on laboratory experiments in the area of sustainable energy. The fundamental principles required will be provided prior to laboratory experimentation. Topics covered include but are not limited to PEM and solid oxide fuel cells, energy storage in batteries and ultra-capacitors, heat of combustion and calorimetry, solar-thermal energy and photovoltaics, wind energy, ethanol production from corn and sugar and bio-diesel extraction from algae. A field-trip is also included as a part of this course. Terms Offered: Spring, Summer

MECH-529 Design and Modeling of Fuel Cell Systems 400(4)
Prerequisites: MECH-322, MECH-420
Corequisites: MECH-422, MECH-526
Minimum Class Standing: SR
A fuel cell is an electrochemical device that directly converts energy from fuels into electrical power. It has the potential for highly efficient and environmentally-friendly power. Recently, emphasis has been placed into the development of fuel cell systems for power sources including portable, APU, and stationary applications. The fundamental principles applied to fuel cells including the relevant electrochemistry, thermodynamics, and transport processes will be reviewed in this course. The primary focus will be on fundamental principles and processes in proton exchange membrane fuel cells and solid oxide fuel cells including modeling of both types of cells. An introduction to fuel cell stack design and system integration will be presented, in which the analysis and optimization of various components will be discussed. A survey of the cutting-edge issues including the future direction of fuel cell technology will also be conducted. Class projects will focus on the design of a fuel cell system for an application chosen by the students where teamwork will be emphasized. This course is designed to provide the student with the know-how to design a fuel cell system for a specific application of power generation. Terms Offered: Directed Study

MECH-540 Introduction to Internal Combustion Engines and Automotive Power Systems 400(4)
Prerequisites: MECH-320
Corequisites: None
Minimum Class Standing: JR
The fundamentals of internal combustion engines (ICE) is an introduction to engine design with topics that include: air capacity, engine vibration, kinematics and dynamics of the crank mechanism, air cycles, combustion, petroleum and alternative fuels, engine electronics and fuel cells. Automotive emissions, government standards, test procedures, instrumentation, and laboratory reports are emphasized. Terms Offered: Summer, Fall

MECH-541 Advanced Automotive Power Systems 400(4)
Prerequisites: MECH-540
Corequisites: None
Minimum Class Standing: None
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.). Terms Offered: Winter, Spring

MECH-542 Chassis System Design 400(4)
Prerequisites: MECH-330
Corequisites: None
Minimum Class Standing: None
The objective of this course is to provide a comprehensive experience in the area of automotive chassis engineering. Students will work in teams to complete a chassis design project applicable to passenger cars or light trucks. The course covers tires and wheels, brakes, suspensions and steering. A vehicle system approach is used in learning and applications and the logic of vehicle dynamics and the science of improvement are integrated into the course content. Professional computer aided engineering tools are introduced and applied in the areas of suspension design and overall vehicle dynamic performance. Terms Offered: Winter, Spring

MECH-544 Introduction to Automotive Powertrains 400(4)
Prerequisites: MECH-212
Corequisites: MECH-312
Minimum Class Standing: None
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. Terms Offered: Winter, Spring
MECH-545 Hybrid Electric Vehicle Propulsion 400(4)
Prerequisites: None
Corequisites: EE-432 or MECH-430 or Permission of Instructor
Minimum Class Standing: SR
This course is 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.
Terms Offered: Winter, Spring

MECH-546 Vehicle Systems Dynamics 400(4)
Prerequisites: MECH-330
Corequisites: None
Minimum Class Standing: SR
This course begins with an introduction of Ride and Handling concepts followed by the study of mechanics’ of pneumatic tires. Mathematical models for ride and handling are derived and presented. Vehicle ride and handling design criteria are demonstrated. Chassis design factors (CDF) and their effect on ride and handling are emphasized. Static, Dynamic and proving ground testing will be presented and demonstrated. Computer simulation design using software (e.g. Matlab, Mathcad, ADAMS Working model, SSnap, Car-Sim and others) will be used as an integral part of the course and for the two projects assigned during the semester. Overview on state-of-the-art technology and latest developments in the field of vehicle systems dynamics (e.g. SAE, ASME publications) will be part of this course. Term Offered: Summer, Fall

MECH-548 Vehicle Design Project 400(4)
Prerequisites: IME-301 or PHYS-342, MECH-320
Corequisites: None
Minimum Class Standing: SR
This course deals with a comprehensive vehicle design experience progressing from problem definition through ride, handling, chassis design, performance analysis to sketches, alternate design, general design, layout drawings, parts list of the chassis, body, suspension powertrain and culminating with small-scale model of the vehicle and its subsystems. Note: Satisfies ME Senior Design Project requirement. Terms Offered: Summer, Fall

MECH-550 Automotive Bioengineering: Occupant Protection and Safety 400(4)
Prerequisites: MECH-310
Corequisites: None
Minimum Class Standing: None
This course deals with 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. Terms Offered: Winter, Spring

MECH-551 Vehicular Crash Dynamics and Accident Reconstruction 400(4)
Prerequisites: MECH-310
Corequisites: None
Minimum Class Standing: SR
This course deals with 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. Terms Offered: Summer, Fall

MECH-554 Bioengineering Applications Project 400(4)
Prerequisites: IME-301 or PHYS-342, MECH-300, MECH-310, MECH-312, MECH-350
Corequisites: None
Minimum Class Standing: SR
This course deals with 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. Terms Offered: Summer, Fall

MECH-562 Compressible Flow/Gas Dynamics 301(4)
Prerequisites: MECH-320, MECH-322 or Permission of Instructor
Corequisites: None
Minimum Class Standing: JR
The course includes 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. Term Offered: Spring

**MECH-564 Aerodynamics and Wing Theory**  
Prerequisites: MECH-320, MECH-322, MATH-305 or MECH-522, or permission of instructor  
Corequisites: None  
Minimum Class Standing: JR

The course includes 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. Term Offered: Spring

**MECH-570 Computer Simulation of Metal Forming Processes**  
Prerequisites: IME-301, MECH-212, MECH-310  
Corequisite: MECH-300  
Minimum Class Standing: IR

The main aim of this course is to introduce some of the latest techniques for modeling bulk and surface deformation processes through computer simulation. This requires an integration of the knowledge attained in other related courses such as engineering materials, solid mechanics, dynamics, and computer-aided engineering. The computer simulations include sheet metal forming operations, rolling, swaging and the other bulk deformation processes. Modern high-speed computer aided design methodology is introduced to study the behavior of the material during metal forming process, including the study of the strain pattern. Commercially available one-step and incremental software codes such as Quickstamp®, and LS-DYNA® will be used for the course. These solution procedures along with limitations of the software will be discussed with emphasis on techniques in an applied manner. Terms Offered: Directed Study

**MECH-572 CAD/CAM and Rapid Prototyping Project**  
Prerequisites: MECH-100, MECH-300  
Corequisites: None  
Minimum Class Standing: SR

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 stereolithography) and into mold or die design and manufacture, (using CAD/CAM system such as I-DEAS, Solid Edge, and Unigraphics). Terms Offered: Directed Study

**MECH-580 Properties of Polymers**  
Prerequisites: IME-301, MECH-212, MECH-300  
Corequisites: None  
Minimum Class Standing: SR

This course begins with thermo-mechanical properties of commodity thermoplastics and includes a review of structure/nomenclature. The course then addresses polymer shape and size, amorphous and crystalline states, T_g, T_m, rubber elasticity and viscoelasticity (creep). There will be materials’ selection and design projects. Terms Offered: Directed Study

**MECH-582 Mechanics and Design Simulation of Fiber-Reinforced Composite Materials**  
Prerequisites: MECH-212, MECH-300  
Corequisites: None  
Minimum Class Standing: SO

This course focuses on the properties, mechanics, and design simulation aspects of fiber-reinforced composite materials. 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. Terms Offered: Directed Study

**MECH-584 Plastics Product Design**  
Prerequisites: IME-301 or PHYS-342, MECH-300, MECH-310, MECH-312  
Corequisites: None  
Minimum Class Standing: SR

Capstone design class for Plastics Product Design Specialty students. A comprehensive product plastic design experience beginning with problem definition, which leads to material selection and progresses into physical design. Students will perform structural FEA and mold filling simulations on solid models. Computing piece price and tooling costs will complete the design process. Terms Offered: Summer, Fall

**MECH-595 Automotive Seminar I**  
Prerequisites: None  
Corequisites: None  
Minimum Class Standing: 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 4 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. Terms Offered: As Needed

**MECH-596 Automotive Seminar II**  
Prerequisites: None  
Corequisites: None  
Minimum Class Standing: 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 4 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. Terms Offered: As Needed
Corequisites: None
Minimum Class Standing: 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 4 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. Terms Offered: As Needed

**MEDI-221 Elements of Medical Scribing**
- Prerequisites: None
- Corequisites: None
- Minimum Class Standing: None
This course serves as an introduction to medical scribing. It 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. Terms Offered: As Needed

**MGMT-395 Labor Relations**
- Prerequisites: None
- Corequisites: None
- Minimum Class Standing: None
This course examines the development and growth of the labor movement in the United States and beyond. The evolution of the legal framework for collective bargaining in the private sector is reviewed including current laws and administrative procedures. Topics include the growth of labor organizations, conflict resolution through grievance/arbitration and other relevant labor topics. Terms Offered: As Needed

**MGMT-456 Strategic Management**
- Prerequisites: FINC-311, MGMT-350, MRKT-370
- Corequisites: None
- Minimum Class Standing: SR
The capstone business class focuses on the formulation and implementation, and evaluation of organizational policy and strategy from the perspective of the general manager. Consideration is additionally given to information technology, global operations, ethics, and the functional level strategies of the organization. An integrative approach uses the case method to explore executive decision making in the global marketplace. Terms Offered: Summer, Fall

**MGMT-461 Operations Management**
- Prerequisites: MGMT-350
- Corequisites: None
- Minimum Class Standing: JR
The objective of this course is to provide students with a basic understanding of issues in both manufacturing and services as well as to the management of productive resources. The course will expose students to the technical and behavioral sides of operations management, the activities of an operations manager, and the skills set needed to achieve productivity and quality while producing goods and services on time. Topics to be covered are: production objectives, design and improvement of production processes, capacity management, production planning and control, quality control, service operations, JIT, and materials management. Terms Offered: Summer, Fall

**MGMT-469 Fundamentals of Supply Chain Management**
- Prerequisites: None
- Corequisites: None
- Minimum Class Standing: JR
This course provides students with a conceptual framework for understanding 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. Students will use software and case studies to illustrate concepts. Terms Offered: As Needed

**MGMT-546 Project Management**
- Prerequisites: None
- Corequisites: None
- Minimum Class Standing: JR
Managing projects within an organizational context, including the process related to initiating, planning, executing, monitoring, controlling, and closing a project. Coverage of the Project Management Body of Knowledge to support students seeking professional certification. Use of project scheduling software. Development of a project management plan for a student project. Terms Offered: As Needed

**MISC-499 Independent Project**
- Prerequisites: Permission of faculty advisor
- Corequisites: None
- Minimum Class Standing: None
The student completed a self-directed study project in an area not covered by existing academic programs. Each independent study must be based on a written proposal and must be supervised by a faculty advisor. The faculty advisor is responsible for guiding the student in the study and assessing the student’s performance. This course may only be used to satisfy a student’s free elective credit, and it may not serve as a substitute for any existing course. Incoming students may not transfer in credit for this course. Terms Offered: As Needed
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites/Co-requisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRKT-376</td>
<td>Promotional Strategies</td>
<td>400(4)</td>
<td>Prerequisites: MRKT-370</td>
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<td>Corequisites: None</td>
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<td>Minimum Class Standing: JR</td>
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<td></td>
<td>This course provides an in-depth examination of</td>
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<td>the Integrated Marketing Communication alternatives available to a firm. Strategies are</td>
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<td>analyzed in view of a company’s marketing objectives, market conditions, and the competitive</td>
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<td>environment. A basic objective of the course is</td>
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<td>to study the variables that will determine an optimal communication “mix”. Terms Offered: As Needed</td>
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<tr>
<td>MRKT-471</td>
<td>Marketing Management</td>
<td>400(4)</td>
<td>Prerequisites: MRKT-370</td>
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<td>Corequisites: None</td>
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<td>Minimum Class Standing: JR</td>
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<td>This course is a hands-on experiential course in</td>
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<td>which students are able to assimilate both the</td>
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<td>marketing and management roles within a firm.</td>
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<td>With the use of an evolving business world</td>
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<td>marketing and management case computer simulation and classroom activities, small groups (teams)</td>
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<td>of students are given the opportunity to manage</td>
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<td>both the marketing and the related non-marketing aspects of a firm. Emphasis is placed on sorting</td>
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<td>out and organizing key marketing information, interpreting marketing data, identifying, analyzing, and evaluating marketing problems and opportunities, selecting and developing marketing strategies, and making decisions under conditions of uncertainty. Terms Offered: As Needed</td>
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<tr>
<td>MRKT-477</td>
<td>Sales Concepts and Strategies</td>
<td>400(4)</td>
<td>Prerequisite: MRKT-370</td>
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<td>Corequisites: None</td>
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<td>Minimum Class Standing: JR</td>
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<td>A growing demand exists in firms for college-trained sales representatives both in the consumer and business-to-business areas. Thus, this course has two major objectives (a) to explore the variables which must be considered in a relational sales process, and (b) to analyze strategies for developing, implementing, and controlling a company's sales program. Terms Offered: As Needed</td>
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<tr>
<td>MUS-380</td>
<td>Music, the Arts, and Ideas</td>
<td>400(4)</td>
<td>Prerequisites: HUMN-201, SSCI-201</td>
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<td>Corequisites: None</td>
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<td>Minimum Class Standing: SO</td>
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<td>This course is an interdisciplinary study of the</td>
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<td>relation of music to the history of literature,</td>
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<td>the fine arts and ideas during a particular style period. Examples of topics which may be covered include: The Foundations of the Baroque, The Enlightenment and Viennese Classicism, Romanticism and Idealism, or The Birth of Modernism. Terms Offered: As Needed</td>
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<tr>
<td>PHIL-373</td>
<td>Philosophy</td>
<td>400(4)</td>
<td>Prerequisites: HUMN-201, SSCI-201</td>
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<td>Corequisites: None</td>
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<td>Minimum Class Standing: SO</td>
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<td>This course is a study of philosophical inquiry through reading significant works of major philosophers such as Plato, Aristotle, Aquinas, Descartes, Kant, Mill, Buber, and others. The course will cover selected topics in metaphysics and epistemology, morality and ethics, political thought, and aesthetics. The works will be examined from the perspectives of both their historical origin and their contemporary relevance. Terms Offered: As Needed</td>
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<tr>
<td>PHIL-378</td>
<td>Moral and Ethical Philosophy</td>
<td>400(4)</td>
<td>Prerequisites: COMM-101, HUMN-201, SSCI-201</td>
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<td>Corequisites: None</td>
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<td>Minimum Class Standing: SO</td>
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<td>This course is 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. Terms Offered: As Needed</td>
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<tr>
<td>PHYS-114</td>
<td>Newtonian Mechanics</td>
<td>310(3)</td>
<td>Prerequisites: MATH-101 or MATH-101X</td>
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<td>Corequisites: MATH-102 or MATH-102X or MATH-102H, and PHYS-115</td>
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<td>Minimum Class Standing: None</td>
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<td>A calculus-based introduction to classical</td>
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<td>Newtonian mechanics including: vectors,</td>
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<td>translational and rotational kinematics and</td>
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<td>dynamics, work, energy, impulse, and linear and</td>
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<td>angular momentum. Terms Offered: All</td>
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<tr>
<td>PHYS-115</td>
<td>Newtonian Mechanics Laboratory</td>
<td>002(1)</td>
<td>Prerequisites: MATH-101 or MATH-101X</td>
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<td>Corequisites: MATH-102 or MATH-102X or MATH-102H, and PHYS-114</td>
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<td>Minimum Class Standing: None</td>
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<td>Laboratory activities will explore position,</td>
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<td>velocity, and acceleration, force, momentum and</td>
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<td>energy, all as function of time. Applications to</td>
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<td>vehicle crash safety are incorporated. Laboratory skills, including: uncertainty, simple data acquisition and sensor instrumentation, and analysis techniques are essential. Terms Offered: All</td>
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<tr>
<td>PHYS-224</td>
<td>Electricity and Magnetism</td>
<td>310(3)</td>
<td>Prerequisites: MATH-102 or MATH-102X or MATH-102H, and PHYS-114 and PHYS-115</td>
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<td></td>
<td>Corequisites: MATH-203 or MATH-203H, PHYS-225</td>
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<td>Minimum Class Standing: None</td>
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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. Terms Offered: All

**PHYS-225 Electricity and Magnetism Laboratory**
002(1)
Prerequisites: MATH-102 or MATH-102X or MATH-102H, and PHYS-114, and PHYS-115
Corequisites: MATH-203 or MATH-203H, PHYS-224
Minimum Class Standing: None
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. Terms Offered: All

**PHYS-302 Vibration, Sound, and Light**
400(4)
Prerequisites: MATH-203 or MATH-203H, PHYS-224, PHYS-225
Corequisite: MATH-204 or MATH-204H
Minimum Class Standing: SO II
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. Terms Offered: Summer, Fall

**PHYS-342 Materials Science & Nanotechnology**
400(4)
Prerequisites: CHEM-135 or CHEM-137, PHYS-224, PHYS-225
Corequisites: None
Minimum Class Standing: SO
This course describes the relationship between the structure and properties of metals, semiconductors, ceramic and the materials at the micron and nanoscale size. Important crystal structures, imperfections, defects and diffusion in bulk and nano scale materials are discussed. Characterization techniques, such as X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM) are introduced. A brief introduction of quantum mechanics, especially potential well and tunneling through a barrier necessary to understand the behavior of nano size material, is also introduced. Optical properties of the quantum dots, fabrication and applications of MEMS and NEMS, giant magneto resistance (GMR), spintronics, magnetic tunnel junctions and nanophotonics are discussed. Terms Offered: Winter, Spring

**PHYS-354 Medical Physics Principles**
400(4)
Prerequisites: PHYS-224, PHYS-225
Corequisites: None
Minimum Class Standing: SO
This course is designed to give physicists, engineers, chemists, pre-med students, and other technical majors an introduction to the application of physics in 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 be instructed by a clinical medical physicist and cover topics including radiation interactions with matter, the concept of radiation dose, the affect of radiation on biology; 2D x-ray imaging, computed tomography (CT) imaging, MRI-ultrasound, single photon emission computed tomography (SPECT), positron emission tomography (PET), and the treatment of cancer utilizing radiation therapy. Terms Offered: Summer, Fall

**PHYS-362 Modern Physics**
302(4)
Prerequisites: PHYS-224, PHYS-225
Corequisite: MATH-204 or MATH-204H
Minimum Class Standing: SO
This course is an 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. Corequisites: None
Laboratory experiments will accompany topics introduced in lecture. Terms Offered: All

**PHYS-376 Photonics and Optoelectronics**
400(4)
Prerequisites: MATH-203, PHYS-224, PHYS-225
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: Winter (even years), Spring (odd years)

**PHYS-378 Spectroscopy and Microscopy**
400(4)
Prerequisites: PHYS-224, PHYS-225, PHYS-362
PHYS-388 Acoustics in the Human Environment 400(4)
Prerequisites: PHYS-224, PHYS-225
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Summer, Fall

PHYS-412 Theoretical Mechanics 400(4)
Prerequisites: MATH-204 or MATH-204H, PHYS-114
Corequisites: None
Minimum Class Standing: None
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. Terms Offered: Winter, Spring

PHYS-452 Thermodynamics and Statistical Physics 400(4)
Prerequisites: MATH-203 or MATH-203H, PHYS-224, PHYS-225
Corequisites: MATH-204 or MATH-204H, PHYS-362
Minimum Class Standing: SOII
This course is designed to introduce the student 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. Terms Offered: Summer term of even years, Fall term of odd years

PHYS-462 Quantum Mechanics 400(4)
Prerequisites: MATH-204 or MATH-204H, PHYS-362
Corequisites: None
Minimum Class Standing: JR
This course introduces students to the fundamentals of non-relativistic quantum mechanics. Topics include: photons, matter waves, the Bohr model, the time-independent Schrödinger equation (and its application to one dimensional potentials), quantization of angular momentum, spin, the hydrogen atom, multi-electron atoms, and perturbation theory. Terms Offered: Summer (even), Fall (odd)

PHYS-464 Nuclear Physics: Principles and Applications 400(4)
Prerequisites: CHEM-135 or CHEM-137, PHYS-224, PHYS-225, PHYS-362
Corequisites: None
Minimum Class Standing: JR
This course discussed the nuclear structure, nuclear instability, and nuclear reactions. It also discusses 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 course discusses 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. Terms Offered: Winter (even years), Spring (odd years)

PHYS-477 Optics 302(4)
Prerequisites: MATH-204 or MATH-204H, PHYS-302
Corequisites: None
Minimum Class Standing: JR
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. Terms Offered: Summer, Fall

PHYS-495 Scientific Research in Physics I 024(2)
This course is a study of social expectations concerning men’s and women’s behavior, personalities, and abilities. These gendered expectations influence both private, intimate relationships and the roles found in social institutions such as education and work. Several perspectives that explain the origins of these expectations and changes in them are explored. Terms Offered: All

PHYS-496 Scientific Research in Physics II
Prerequisites: PHYS-495, permission of a Physics faculty member
Corequisites: None
Minimum Class Standing: SR
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. Terms Offered: All

SCIE-199 Science Transfer Course
Prerequisites: None
Corequisites: None
Minimum Class Standing: None
This course is intended as a place to record credit for student transferring into Kettering’s Business program. It grants transferring students credit towards a science course if they have completed a course at another institution that meets the following requirement:
- Minimum 4 semester hour course from a regionally accredited college or university or foreign equivalent
- Identifiable lab requirement
- Transfer course cannot be labeled as “developmental” or “remedial” in the transfer school’s catalog.
- Course must be in a “natural science” discipline such as: Anatomy, Astronomy, Biology, Botany, Chemistry, Environmental Science, Geology, Physical Science, Physics, Zoology Terms Offered: None - Transfer only

SOC-332 Contemporary Social Problems
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course analyzes how and why particular issues become identified and defined as a problem in society. Cases investigated are selected from broad areas such as global interconnections, institutional crises, inequalities, and environmentalism. Competing accounts of problems are examined for what they tell us about the causes of, interconnections between and possible solutions to the identified problems. Terms Offered: As Needed

SOC-335 Analysis of Social Dissent
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course provides a sociological analysis of the causes, processes and consequences of social dissent. Emphasis is placed on the impact of dissent in changing society. Examples will be drawn from the U.S. today, from American history and, for comparison, from other times and societies. Terms Offered: As Needed

SOC-336 Sociology of the Family
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course is a sociological study of the American family system in comparative and historical perspective. It deals with connections between the family as an institution and other aspects of U.S. society such as inequalities of social class, race and gender; government policies, the organization of work, and demographic shifts. Terms Offered: All

SOC-337 Religion in Society
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
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. Terms Offered: As Needed

SOC-338 Gender and Society
Prerequisites: COMM-101, HUMN-201, SSCI-201
Corequisites: None
Minimum Class Standing: SO
This course is a study of social expectations concerning men’s and women’s behavior, personalities, and abilities. These gendered expectations influence both private, intimate relationships and the roles found in social institutions such as education and work. Several perspectives that explain the origins of these expectations and changes in them are explored. Terms Offered: As Needed
SSCI-201 Introduction to the Social Sciences  
Prerequisites: COMM-101  
Corequisites: None  
Minimum Class Standing: None  
This course will offer a broad comparative study of the nature of human experience, how social scientists study that experience, and some of their findings. It will consider moral and ethical issues (in society and in studying society). It will examine selected topics for what they teach us about society in general, our present society, or social science. The topics selected will vary from term to term but will include contemporary issues within such areas as science and technology, religion, politics, the environment, and human conflict. Terms Offered: All  

SSCI-314 Technology and Sustainable Development  
Prerequisites: COMM-101, HUMN-201, SSCI-201  
Corequisites: None  
Minimum Class Standing: SO  
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. Terms Offered: As Needed  

THS-2 Thesis Project  
Prerequisites: None  
Corequisites: None  
Minimum Class Standing: None  
This required individual project provides the senior student the opportunity to apply his or her academic and co-op work experience to a realistic problem. A thesis documenting the project must be completed. The project usually is carried out at the student’s employment. The Thesis 1, initiation, carries no credits, and is registered when the project is approved and assigned. The Thesis 2, completion, carries 4 credits and is registered in one of the last two terms of a Kettering student’s educational career.
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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 Chair of Industrial Management was 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 Richard Terrell Chair of Academic Leadership was established by the Kettering Board of Trustees to honor Terrell, a retired vice chairman of General Motors Corporation, who served 19 years on the Board. The Terrell Chair supports academic research and the development of projects and programs designed to enhance teaching excellence.

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 Earle and Lanice Riopelle Fund was established by the Earle Riopelle and his wife Lanice. Earle is a 1937 Kettering/GMI graduate. One of his many contributions to the engineering research industry is his famed patent in 1948 for improvements to the T.C. VanDeGrift Balancing Machine. The fund supports the Department of Business and Graduate Studies.

The Robert and Marcy Oswald Chair of International Exchange was endowed by Robert Oswald and his wife Marcy. Robert is a 1967 graduate of Kettering/GMI and a member of Kettering’s Board of Trustees. He was chairman, president, and CEO of North American Operations for Robert Bosch Corp. until he retired in 2001. The chair increases the number of Kettering students who
can study abroad, encourages the exchange of faculty members with international addresses, ensures the continuing quality of the international exchange program, and enhances a Kettering education with global experience.

**Emeritus Faculty**

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