Kettering University

GRADUATE CATALOG
2013 – 2014

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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

### Summer Term 2013

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 11-14, THU-SUN</td>
<td>A-Section New Student Orientation</td>
</tr>
<tr>
<td>July 11, THU</td>
<td>New Student Convocation</td>
</tr>
<tr>
<td>July 15, (1&lt;sup&gt;st&lt;/sup&gt; week) MON</td>
<td>Classes begin</td>
</tr>
<tr>
<td>July 15-19, (1&lt;sup&gt;st&lt;/sup&gt; week) MON-FRI (5:00 pm)</td>
<td>Late registration and drop/add</td>
</tr>
<tr>
<td>August 9, (4&lt;sup&gt;th&lt;/sup&gt; week) FRI (5:00 pm)</td>
<td>Last day for course withdrawal for partial refund</td>
</tr>
<tr>
<td>August 26, (7&lt;sup&gt;th&lt;/sup&gt; week) MON (12:00 noon)</td>
<td>Undergraduate student midterm grades due</td>
</tr>
<tr>
<td>August 30-September 2, (7&lt;sup&gt;th&lt;/sup&gt;/8&lt;sup&gt;th&lt;/sup&gt; week) FRI-MON</td>
<td>Labor Day break (no classes)</td>
</tr>
<tr>
<td>September 3, (8&lt;sup&gt;th&lt;/sup&gt; week) TUE (5:00 pm)</td>
<td>Last day for &lt;em&gt;undergraduate&lt;/em&gt; course withdrawal – no refund</td>
</tr>
<tr>
<td>September 20, (10&lt;sup&gt;th&lt;/sup&gt; week) FRI (5:00 pm)</td>
<td>Last day for &lt;em&gt;graduate&lt;/em&gt; course withdrawal – no refund</td>
</tr>
<tr>
<td>September 24, (11&lt;sup&gt;th&lt;/sup&gt; week) TUE</td>
<td>Last day of classes (Follow Friday schedule)</td>
</tr>
<tr>
<td>September 25, (11&lt;sup&gt;th&lt;/sup&gt; week) WED</td>
<td>Reading day</td>
</tr>
<tr>
<td>September 26-28, (11&lt;sup&gt;th&lt;/sup&gt; week) THU-SAT</td>
<td>Final exam period</td>
</tr>
<tr>
<td>September 28, (11&lt;sup&gt;th&lt;/sup&gt; 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>
</tr>
</tbody>
</table>

### Fall Term 2013

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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</thead>
<tbody>
<tr>
<td>October 3-6, THU-SUN</td>
<td>B-Section New Student Orientation</td>
</tr>
<tr>
<td>October 3, THU</td>
<td>New Student Convocation</td>
</tr>
<tr>
<td>October 7, (1&lt;sup&gt;st&lt;/sup&gt; week) MON</td>
<td>Classes begin</td>
</tr>
<tr>
<td>October 7-11, (1&lt;sup&gt;st&lt;/sup&gt; week) MON-FRI (5:00 pm)</td>
<td>Late registration and drop/add</td>
</tr>
<tr>
<td>November 1, (4&lt;sup&gt;th&lt;/sup&gt; week) FRI (5:00 pm)</td>
<td>Last day for course withdrawal for partial refund</td>
</tr>
<tr>
<td>November 18, (7&lt;sup&gt;th&lt;/sup&gt; week) MON (12:00 noon)</td>
<td>Undergraduate student midterm grades due</td>
</tr>
<tr>
<td>November 22, (7&lt;sup&gt;th&lt;/sup&gt; week) FRI (5:00 pm)</td>
<td>Last day for &lt;em&gt;undergraduate&lt;/em&gt; course withdrawal – no refund</td>
</tr>
<tr>
<td>November 28-29, (8&lt;sup&gt;th&lt;/sup&gt; week) THU-FRI</td>
<td>Thanksgiving break (no classes)</td>
</tr>
<tr>
<td>December 13, (10&lt;sup&gt;th&lt;/sup&gt; week) FRI (5:00 pm)</td>
<td>Last day for &lt;em&gt;graduate&lt;/em&gt; course withdrawal – no refund</td>
</tr>
<tr>
<td>December 16-17, (11&lt;sup&gt;th&lt;/sup&gt; week) MON-TUE</td>
<td>Follow Thursday/Friday schedule</td>
</tr>
<tr>
<td>December 17, (11&lt;sup&gt;th&lt;/sup&gt; week) TUE</td>
<td>Last day of classes</td>
</tr>
<tr>
<td>December 18, (11&lt;sup&gt;th&lt;/sup&gt; week) WED</td>
<td>Reading day</td>
</tr>
<tr>
<td>December 19-21, (11&lt;sup&gt;th&lt;/sup&gt; week) THU-SAT</td>
<td>Final exam period</td>
</tr>
<tr>
<td>December 21, (11&lt;sup&gt;th&lt;/sup&gt; week) SAT</td>
<td>Term ends</td>
</tr>
<tr>
<td>December 22-January 12</td>
<td>Winter break</td>
</tr>
<tr>
<td>January 6, MON (12:00 noon)</td>
<td>Final grades due (Fall Term 2013)</td>
</tr>
<tr>
<td>Winter Term 2014</td>
<td></td>
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<tr>
<td>------------------</td>
<td></td>
</tr>
<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>
</tr>
<tr>
<td>January 20, (2nd week) MON</td>
<td>Dr. Martin Luther King Jr. Day (no classes)</td>
</tr>
<tr>
<td>February 7, (4th week) FRI (5:00 pm)</td>
<td>Last day for course withdrawal for partial refund</td>
</tr>
<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>
</tr>
<tr>
<td>March 27-29, (11th week) THU-SAT</td>
<td>Final exam period</td>
</tr>
<tr>
<td>March 29, (11th week) SAT</td>
<td>Term ends</td>
</tr>
<tr>
<td>April 4, FRI (12:00 noon)</td>
<td>Final grades due (Winter Term 2014)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Term 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 7, (1st week) MON</td>
</tr>
<tr>
<td>April 7-11, (1st week) MON-FRI (5:00 pm)</td>
</tr>
<tr>
<td>May 2, (4th week) FRI (5:00 pm)</td>
</tr>
<tr>
<td>May 19, (7th week) MON (12:00 noon)</td>
</tr>
<tr>
<td>May 23-26, (7th and 8th week) FRI-MON</td>
</tr>
<tr>
<td>May 27, (8th week) TUE (5:00 pm)</td>
</tr>
<tr>
<td>June 13, (10th week) FRI (5:00 pm)</td>
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<tr>
<td>June 17, (11th week) TUE</td>
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<tr>
<td>June 18, (11th week) WED</td>
</tr>
<tr>
<td>June 19-21, (11th week) THU-SAT</td>
</tr>
<tr>
<td>June 21, (11th week) SAT</td>
</tr>
<tr>
<td>June 22, SUN</td>
</tr>
<tr>
<td>June 27, FRI (12:00 noon)</td>
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<tr>
<td>June 22-July 13</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

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.

**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.
Admission is the process by which a student submits a completed application, sends official transcripts, and fulfills all admission requirements for a specific degree program. Admission into a graduate degree program occurs when the application process is complete. Based upon whether the student meets all admission requirements, the student will either be granted or denied program admission. After being granted program admission, the student may then proceed to register for and take classes.

Kettering University’s admissions process can be completed in three simple steps:

- Determine which Master’s program fits your needs.
- Complete an Admissions Application online at [http://www.kettering.edu/admissions/graduate-admissions](http://www.kettering.edu/admissions/graduate-admissions).
- Request all required materials to be mailed to Kettering University’s Graduate Office.

An admission application may be completed and submitted by U.S. mail, fax, or online along with any other necessary document(s). Please note that academic tests (GMAT, GRE) are not required. The Academic Department Review Committee will not review an admission file until it contains all required materials.

Admission Policies

Kettering University does not discriminate by reason of an individual’s race, color, sex, creed, age, handicap, or national origin. No one is admitted to a Kettering University Graduate Program without a Bachelor’s degree from a regionally accredited U.S. university/college or its International equivalent.

Admission Requirements

**Grade Point Average**
Regular admission requires an individual to possess one of the following minimum undergraduate overall grade point averages:

- 3.0 on a 4.0 Grading System, or International equivalency.
- 85 Overall Grade Point Average on a 100 grade point scale (former Kettering University scale).

**Provisional Admission**
This will allow students to be admitted with one of the following minimum undergraduate grade point averages and will require the individual to achieve a 3.0 minimum grade point average during the first two courses of the program:

- 2.5 on a 4.0 Grading System.
- 80 Overall Grade Point Average on a 100 grade point scale (former Kettering University scale).

Applicants must ensure that all materials are submitted to the Graduate Admissions Office by the admission deadline. Late applicants are assigned to the next starting term for their program.

**NOTE:** Not all programs allow admission every term - see specific program description.

**Transcripts**
All students applying for admission must submit an official copy of their undergraduate transcripts from an accredited U.S. college or university. An “official transcript” is an unopened, original transcript that is mailed directly from the previous college to Kettering University. International students may be required to submit a credential evaluation. The evaluating body must be a member of the National Association of Credential Evaluation Services (NACES). This will be at the expense of the student. Kettering University undergraduate students do not need to submit their Kettering transcripts, but are required to submit transcripts from any other university.

**MBA Applicants**

- **Electrical Engineering Concentration (Power Electronics and Machine Drives):** Applicants for this concentration must have a Bachelor of Science degree in Electrical Engineering (not Engineering Technology) from an approved ABET-accredited engineering program.
- **Mechanical Engineering Concentration (Mechanical Design):** Applicants for this concentration must have a Bachelor of Science degree in Mechanical Engineering (not Engineering Technology) from an approved ABET-accredited engineering program.
- **Industrial & Manufacturing Engineering Concentration (Healthcare Systems Engineering; Manufacturing Engineering):** Applicants for these concentrations must have a Bachelor of Science degree in Engineering (not Engineering Technology and excluding Industrial & Manufacturing Engineering) from an approved ABET-accredited
engineering program. Students taking these technical concentrations cannot select courses that substantially support/duplicate their undergraduate degree.

**Engineering Applicants**

Engineering applicants must submit a completed application, two letters of recommendation, and official transcripts of their Bachelor’s degree in an engineering discipline from an ABET-accredited program. Engineering Technology degrees will not be considered for the Engineering programs.

**Engineering Management Applicants**

Engineering Management applicants must have a Bachelor of Science degree in Engineering from an approved ABET-accredited engineering (not technology) or computing program, or be a Kettering University graduate with a degree other than management or business.

**Lean Manufacturing Applicants (MSLM)**

MSLM applicants must submit a completed application, two letters of recommendation (one from a supervisor) and transcripts of their Bachelor’s degree from a regionally-accredited U.S. university or an international equivalent.

**Operations Management (MSOM) Applicants**

Applicants for the MSOM degree program must submit official transcripts of their Bachelor’s degree from a regionally-accredited U.S. university or an international equivalent.

Use the “Domestic Admissions Checklist” or the “International Admissions Checklist” in the following sections when submitting your materials to ensure your application packet is complete.

**DOMESTIC APPLICANTS**

**Admissions Checklist**

If you are a citizen or Permanent Resident of the United States, use the admissions checklist below to assist you in completing your admission packet. Refer to the specific degree program admission requirements in this catalog to ensure that you include all necessary materials for your desired program.

- **Application for Admission**
  Apply online at: [http://www.kettering.edu/admissions/graduate-admissions](http://www.kettering.edu/admissions/graduate-admissions). There is no application fee for domestic applicants.

- **Official Transcripts**
  Request all official transcripts (unopened, original transcripts from all undergraduate studies) to be mailed directly from your previous college/university to Kettering University.

  Engineering applicants must possess a degree in an engineering discipline from an ABET-accredited program. Engineering Technology degrees will not be considered for engineering programs.

- **Letters of Recommendation**
  Two letters of recommendation are required for the Engineering programs and the Lean Manufacturing program only.

NOTE: Admissions tests (GMAT, GRE) are NOT required.

Mail all materials to:
Office of Graduate Studies
Kettering University
1700 University Avenue
Flint, MI 48504-6214

**For MBA, Engineering Management and Operations Management Programs ONLY**

Students entering these programs must have completed undergraduate courses in specified areas. A course in these areas must have been passed with a C or better. Applicants who do not have this background may either complete the required prerequisite courses through Kettering University in these areas or demonstrate their knowledge by successfully passing appropriate qualifying exams at Kettering University.

**Notification of Admission**

Applicants will be notified by personal letter of the Admissions Committee’s decision. Once Kettering University has received your application and all supporting documents, please allow approximately four weeks for processing and to receive notification.
INTERNATIONAL APPLICANTS

Applicants from Canada and Mexico
Applicants from Canada and Mexico are not required to submit an application fee. Applicants from Canada or Mexico who apply for admission to any of Kettering University’s Distance Learning Graduate Programs must complete/submit the following information:

- Complete Admissions Application online at https://www.kettering.edu/futurestudents/graduate/application.jsp.
- Test of English as a Foreign Language (see below under TOEFL/IELTS).
- Any other admission materials as required by the respective degree program.
- Official transcripts from an accredited U.S. university or equivalent.

International Applicants Admissions Checklist
Please follow these instructions if you are not a citizen or Permanent Resident of the United States, Canada or Mexico. This convenient checklist can assist you in completing your admissions packet. To ensure that you include all necessary materials for your desired program, refer to the specific degree program admission requirements in this catalog. An admission decision will only be made for students who have completed their undergraduate program.

- **Application for Admission**
  Complete and sign the Application Form available online at https://www.kettering.edu/futurestudents/graduate/application.jsp.

- **Application Fee**
  A non-refundable application fee of $50 (U.S. Dollars) is due at the time you submit your application packet. Please make all checks payable to Kettering University. Checks or money orders must be issued in U.S. funds and drawn from a U.S. bank account.

- **Credential Evaluation**
  A Document-by-Document credential evaluation of undergraduate transcripts is required for admission. A Document-by-Document evaluation identifies and describes each credential in terms of its principal elements: name of credential, requirements for entry and program length, and expresses an equivalency in terms of U.S. education. The fee for this service will be at the expense of the student. We accept evaluations from companies that are recognized by the National Association of Credential Evaluating Services (NACES). For this listing please go to www.naces.org/members.htm.

- **Passport (optional)**
  All application packets should contain a copy of your passport if available.

- **TOEFL/IELTS**
  Applicants whose native language is not English and who have not earned a Bachelor’s degree from a U.S. institution are required to take the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS). Please have official scores sent to Kettering University’s Office of Graduate Studies, Code 1246. Photocopies will not be accepted. Our minimum score requirements are: TOEFL: Paper-based: 550, Computer-based: 213, Internet-based: 79; IELTS: Minimum Band score of 6.0.

- **Statement of Financial Support**
  International student applicants must document their ability to meet all educational and living expenses for the entire period of intended study. We require an original certified bank statement in U.S. currency reflecting $43,000 ($54,000 for MBA) in a savings account. Neither scholarship funds nor financial aid are available for international students at Kettering University.

  If your educational expenses will be funded by a parent or family member, you will also need to provide an Affidavit of Financial Support. This form is available by contacting the Graduate Office at gradoff@kettering.edu.

- **Official Transcripts**
  Request all official transcripts (unopened, original transcripts from all undergraduate studies) be mailed directly from your previous college/university to Kettering University. The minimum Grade Point Average (GPA) for provisional admission is 2.5 on a 4.0 grading scale, the minimum GPA for full admission is 3.0 on a 4.0 scale, or the International equivalents.
Engineering program applicants must possess a degree in an engineering discipline from an ABET-accredited program or an international equivalent. A credential evaluation is required for International transcripts and is paid for by the applicant. The Graduate Office will advise applicants as to recommended services.

✔ Letters of Recommendation
Two letters of recommendation are required for the Engineering programs and the Lean Manufacturing Program only. These forms are online at http://www.kettering.edu/admissions/graduate-admissions.

NOTE: Admission tests (GMAT, GRE) are NOT required.

Mail all materials to:
Office of Graduate Studies
Kettering University
1700 University Avenue
Flint, MI 48504-6214 USA

For MBA, Engineering Management, and Operations Management Programs ONLY
Students entering these programs must have completed courses in specified areas. A course in these areas must have been passed with a C or better. Applicants who do not have this background may either complete the required prerequisite courses through Kettering University in these areas, or demonstrate their knowledge by successfully passing appropriate qualifying exams at Kettering University.

International Admission Deadlines
Due to the length of time required to process international admission packets (including receiving an I-20), we recommend that you submit your materials by the following deadlines:

Deadline dates are:
- Summer Term: March 15
- Fall Term: June 15
- Winter Term: September 15
- Spring Term: December 15

Notification of Admission
Applicants will be notified by personal letter of the Admission Committee’s decision. Once all materials are received at Kettering University, please allow approximately six (6) weeks for processing your application and to receive notification.

Note: This decision simply grants or denies admission into the graduate program. Issuing an I-20 is a separate process and may require additional information. For information regarding the I-20 process, contact the Office of International Programs at international@kettering.edu or (810) 762-9801.
FINANCIAL AID

Several financial aid programs exist for on-campus and distance-learning students. Loans and grants may be available; students who contemplate applying for financial aid should contact the Financial Aid Office for further information at: 800-955-4464 ext. 7859 or finaid@kettering.edu.

Students who receive tuition assistance or reimbursement from their employer should contact their financial aid advisor to see how their aid is impacted.

Direct Federal Stafford Loan

Graduate students may be eligible for Direct Federal Stafford Loans. In order to qualify for the Stafford Loan, students must first complete the FAFSA (Free Application for Federal Student Aid) and submit all requested documents to the Financial Aid Office. Payments on these loans are deferred until six (6) months after graduation. Contact the Financial Aid Office for further information.

Alternative Loans

Alternative loans (private student loans offered by various lenders) are another source of financing your educational costs. These loans are based on credit approval, and interest begins accruing upon disbursement of the loan. Each loan has different terms, borrowing limits, interest rates, and other special criteria.

Smart Option Loan: www.salliemae.com
CitiAssist Loan: www.studentloan.com

International Applicants

A non-refundable application fee of $50 (U.S. dollars) is due for all international applicants at the time the student submits application materials to Kettering University. Please make all checks payable to Kettering University. Checks or money orders must be issued in U.S. funds and drawn from a U.S. bank account. Neither scholarship funds nor financial aid through Kettering University are available for international students.

International applicants must demonstrate and provide evidence of their ability to meet all educational and living expenses (tuition, room and board, etc.) for the entire period of their intended stay before Kettering University can issue a Certificate of Visa Eligibility (Form I-20). Evidence may include a statement from a legitimate financial institution reflecting a minimum of $43,000 (MBA $54,000) (U.S. dollars) in a savings account to pay expenses while attending Kettering University. Medical insurance, including repatriation and evacuation coverage, is required for all international students and must be purchased through Kettering University.

Prior to registering for classes, full payment for tuition must be made for the term in which the student is enrolling. Funds remitted or provided for payment must be drawn from a U.S. Bank.

Graduate Assistantship

A limited number of teaching assistantships and research assistantships are available for resident students. These are awarded on a competitive basis.

An applicant must meet all admission requirements and be fully admitted in order to be eligible for an assistantship. The major departments select assistants according to the qualifications of the applicants and the needs of the departments. Applicants who are interested in being considered for a graduate assistantship should contact the degree granting department when notification of full admittance has been received. Kettering University does not discriminate by reason of an individual’s race, color, sex, creed, age, handicap, or national origin.

Please note that not all graduate degree programs are available for assistantships within specific departments. The department sponsoring the assistantship has final approval and may require a specific major.
Graduate Fellowship

Each engineering department may grant a given number of fellowships per year to resident students. Recipients are selected according to each department’s own criteria. The provost makes the final decision on the number of fellowships to be awarded and which candidates receive fellowships. The maximum award for a fellowship covers half of the student’s tuition for two graduate courses (8 credits) per term.

Satisfactory Academic Progress (SAP)

Minimum cumulative grade-point average (GPA): For financial aid consideration, students remain in good standing when they maintain a cumulative grade point average (GPA) of 3.0 or higher. Students falling below the minimum cumulative grade point average of 3.0 and the minimum last term GPA of 3.0 are placed on Financial Aid Probation or Suspension as appropriate.

Maximum timeframe for degree completion: Graduate students are required to complete their program of study within 6 consecutive years.

Financial Aid Warning

Graduate students who fail to meet the minimum 3.0 cumulative grade-point average standard will be placed on Financial Aid Warning for the subsequent semester/period of enrollment. Financial aid can be received during the semester/term of warning. Financial aid disbursements for the next period of enrollment will be held until the grades have been reviewed for the warning semester/period of enrollment of Financial Aid Warning.

Financial Aid Suspension

If at the end of the second evaluation the student is still not meeting the minimum cumulative grade point average (3.00), the student enters Financial Aid Suspension status. Financial aid will be suspended until the student successfully meets the cumulative grade point average standards. The student is responsible for paying his/her own expenses, such as tuition, fees, books, supplies, etc. and will not be reimbursed for the period(s) of financial aid suspension.
TUITION AND FEES

Expenses

The current tuition, fees, and charges are listed below. The Student Accounts Office will send an e-mail notification 2nd week of the term to your Kettering e-mail when your official bill is ready to view on Banner Web/Self Service.

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 3 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 3 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 3 months. The payments will be automatically deducted from whichever account you choose. A $40 late fee will be added to all accounts which have not been settled in full by 4:00 p.m. eighth week Friday of each academic term.

Tuition

Graduate Tuition (per credit hour) ......................................................$771
2-credit course .................................................................$1,542
4-credit course .................................................................$3,084

Business Related Fees

NSF Check Processing Fee .........................................................$25
Graduate Late Payment Fee ......................................................$40
Graduate Credit by Proficiency Exam Fee .................................$30
Graduate Transfer or Credit Posting Fee (per credit hour) ........$5
Graduate Graduation Fee ..........................................................$160
Graduate Application Fee (International Applicants Only) ..........$50

When registering via the web, students acknowledge enrollment in the course(s) selected and authorize Kettering University to bill them for any related tuition and fees. Payment is due 4th week Monday of the term for which you are enrolling. A “hold” will be placed on the account after the online registration period for those students who have not paid their tuition, submitted a voucher, or enrolled in the e-Cashier payment plan; this will prevent future registrations and may result in a late fee, and grade reports and transcripts being withheld.

Employer Assistance

Many employers provide financial assistance for graduate study. Programs differ, so interested students should contact the appropriate office at their place of employment. Depending on company policy, Kettering University may be able to bill the employer directly for tuition. Students whose tuition is to be billed to their employers must submit complete and proper authorization to Kettering University. Students should apply for their employer tuition assistance as soon as possible — since costs and course offerings are known in advance. Any portion of tuition that will not be paid by the employer must be paid by the student. Kettering University will hold the student responsible for payments not received from the employer.
Tuition Refund Policy

When a student withdraws from a course, refunds are made on the following schedule:
Week 1 100%
Week 2 75%
Week 3 50%
Week 4 25%
Week 5 0%

Specific refund dates for each term are available at www.kettering.edu/registrar.

Course withdrawals and associated refunds are initiated by completing a Course Change Form available online at: https://www.kettering.edu/offices/registrar/registrar-office-forms. The date the form is received in the Office of the Registrar determines the refund amount. Students are personally responsible for submitting the forms and verifying their receipt by the University. Refunds are made to the payer of the tuition.
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.
FERPA (Family Educational Rights and Privacy Act) / 16

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 awarded
- Enrollment Status (full or part-time)
- Photo
- Previous institutions attended
- Student classification (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

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 communicate regularly with an academic advisor 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
A graduate student whose cumulative grade point average falls below a 3.0 is automatically placed on academic probation. Probationary status is removed only when a graduate student’s cumulative GPA equals or exceeds the minimum of 3.0 required to earn a Master’s degree.

A graduate student who remains on probation after completing 12 credit hours since being placed on probation may be dismissed from the program. A probationary student whose cumulative GPA falls below 2.5 will automatically be dismissed from the graduate program. Such dismissals may be appealed to the Graduate Academic Review Committee. Advisement regarding the appeal process to return after academic dismissal is provided through the Graduate Office.

Separation
A student may be separated from the University if he/she fails to demonstrate progress toward the degree by successfully completing a class within any consecutive two-year period.

Appeal Process to Return after Academic Dismissal
After academic dismissal through the Graduate Academic Review process, students may appeal to the Graduate Academic Review Committee for readmission by submitting a letter of appeal to the Graduate Academic Review Committee via the Graduate Office one term prior to the term in which they are seeking re-admittance.

This letter of appeal for re-admittance must state the cause(s) of the student’s academic problems, changes in the student’s situation that may rectify those problems and a proposed plan of action to ensure success in the Graduate Studies Program. Students are readmitted on a probationary status for one term.

Decisions of the Graduate Academic Review Committee are final.

Questions: Contact the Office of Graduate Programs

Academic Terms

Kettering University operates on four 11-week terms per year.

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

These options are available only to Kettering University undergraduate students entering the MBA, Operations Management, Engineering or Engineering Management graduate programs.

Kettering University 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 only available to Kettering University undergraduate students and leverages Kettering University’s premier academic programs. 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 (BBA/BS) 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**

- Students must apply before starting their undergraduate thesis (i.e., before submitting their PTA).
- Eight (8) credits granted for the graduate-level thesis, four are applied to the undergraduate degree and four are applied to the graduate degree.
- The student will not receive the bachelor’s degree until completion of the graduate-level thesis.
- 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.
- One course (four credits) will be waived in the graduate program.
- Twenty-eight (28) credits remain to complete the master’s degree (a total of 36 graduate credits).
- The MS thesis will be a more purely academic thesis driven by the faculty, but must be authorized by the student sponsor.

**Grade Requirements**

A minimum GPA of 3.5 is required. Students with a GPA below 3.5 may be considered on an individual basis. The degree-granting department will determine acceptance.

**Other Requirements**

- Both part-time and full-time MBA and MS students may qualify for this program.
- This program is only available to students who will receive (or have received) a Kettering University bachelor’s degree.
In addition to the standard application, students must formally apply to the program. Contact Graduate Admissions at 810-762-7953 or bswitzer@kettering.edu for an Admission Application for the BBA/BS/MBA or BS/MS 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.

**Computer Requirements for Students**

Kettering students are expected to have reliable access to the internet on a computer with the following minimum hardware requirements: a Pentium processor with 512 MB of RAM, a CD/ROM drive, a printer, a color monitor with appropriate graphics card, speaker(s) and appropriate sound card, and a 56K modem, although a broadband internet connection is recommended for viewing video streamed lectures. Software requirements include a word processing package, a spreadsheet package, a Microsoft PowerPoint viewer, Internet Explorer or Mozilla Firefox, and RealPlayer (needed for viewing CD and video streaming lectures). Students in some classes may be required to load software. Administrative computer access may be necessary.

If you plan to use a computer at work, there may be firewalls that prevent the download of a video player such as RealPlayer or Flash.

**Distance Learning Delivery Methods**

- DVD
- Online video streaming
- Internet/Web
- Blackboard

Students must have access to RealPlayer for viewing class lectures on CD and online video streaming formats. Programs are supported by Kettering University’s Online “Blackboard™” system and require a stable broadband internet connection for test administration.

**What to Expect**

Even through distance learning methods, you will receive the same presentations, materials, and information that our on-campus students receive. Each course in the program consists of standard graduate program coursework which may include homework, projects, exams, tests, papers or other work — depending on the course and/or professor. You receive grades for each course. There is no difference or designation between on-campus and off-campus students on your diploma or transcripts.

To help alleviate the distance gap, you will have personal access to your professors through telephone, voice mail, e-mail, fax, Internet bulletin boards and/or chat rooms. Professors provide office hours during which you may contact them to ask questions or discuss course materials.

We want to help you succeed by providing the education, skills and knowledge that you need to excel. That is why we are committed to making our respected Master’s degree programs available to you wherever you are.

Questions: Contact the Office of Graduate Programs

**Concentrations**

A concentration is a specialized area of study within a major 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 must notify the Office of the Registrar to have it added to their record.

Questions: Contact the Office of the Registrar
Course Changes

Students who wish to add an additional course after the deadline for registration and prior to the start of the term must do so in writing. Students may use the “Graduate Program Course Change Form” available on the Kettering University website under the Registrar pages. Tuition payment must be included with the “Graduate Program Course Change Form.”

Questions: Contact the Office of the Registrar

Curricula Restrictions

A student may elect no more than four (4) courses numbered below 600-level to count toward their Master’s degree.

Questions: Contact the program advisor

Distance Learning

Distance learning has allowed Kettering University to eliminate geographic barriers for off-campus students who want to pursue their Master’s degree without ever attending live courses at our Flint, MI campus. Graduate classes offered on Kettering University’s campus are held in a high-tech production studio — where classes are digitally captured and recorded on CD-ROMs, DVDs, and Internet video-streaming formats. The class sessions are sent to off-campus students—allowing them to see and hear the entire class presentation from a remote location. Each on-campus graduate class typically meets once or twice per week for the length of the term.

The convenience of Kettering’s distance learning format enables students to “attend” class from home, work, a vacation spot, the airport, or any other remote location at which they have access to a computer, DVD player, or the Internet. Unlike a typical “text-based” online program, Kettering’s distance learning delivery methods are more technologically diverse—providing off-campus students with the same class experience and materials that on-campus students receive—complete with audio and visuals.

Homework and other coursework are generally submitted by the student to the professor either via e-mail, fax, Blackboard, or by hard copy through the mail.

Students are given the flexibility to take courses at their own pace, provided they complete the program within six years. Students may take as many classes as they wish per term — or even take entire terms off to tend to other responsibilities. Most graduate students take one or two classes per term, which may allow them to complete the program in less than two years.

Questions: Contact the Office of Graduate Programs

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 may be obtained through the Office of the Registrar. Enrollment verifications confirm a student's enrollment status (full-time, half-time, less than half-time) and expected graduation date. Listed below are the enrollment statuses at Kettering University:

Enrollment Status
8 or more credits or THS1 or THS2 = Full Time
4-7 credits = Half Time
1-3 credits or THS3 = Less Than Half Time

Questions: Contact the Office of the Registrar
Grades

Course grades are available after each term via Banner Web. Federal law prohibits communication of grades by telephone. Students may access their grade report and/or print a grade report to provide to their company by logging on to Banner Web.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Outstanding</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>Outstanding</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
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<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>Satisfactory</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>Satisfactory</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>Less than satisfactory</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>Less than satisfactory</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
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<tr>
<td>W</td>
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</tr>
</tbody>
</table>

Questions: Contact the Office of the Registrar

Graduation

Detailed graduation information is available on the Office of the Registrar website at http://www.kettering.edu/offices/registrar 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:

- Successfully complete all prescribed courses within the six-(6) year limit. A student who anticipates not meeting the time limit must notify the Graduate Office at least six (6) months prior to the expiration of the six-(6) year limit.
- Successfully complete ORTN-600 (Graduate Orientation). This is required of students who entered/started Kettering University’s Graduate Program July 1, 2007 or later.
- Achieve a final cumulative grade-point average (GPA) of 3.0 or higher.
- Successful completion of departmental outcome assessment activities. Students in the Department of Business (MBA, MSEM, MSOM degrees) are required to participate in the ETS Major Field Test at the conclusion of their studies. Contact the Department of Business for more information.

Financial Obligations

Diplomas and transcripts are withheld until the student has satisfied all financial obligations with the University.
Final Degree Verification Letter
A final letter is sent to the student 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 are available on the web at http://www.kettering.edu/offices/registrar under “Graduation Information.”

Questions: Contact the Office of the Registrar

Incomplete Grades

The use of Incomplete (I) as a grade is reserved for special cases involving accidents, illnesses, or extenuating circumstances. It is intended for students who have been participating in a course but find themselves, near the end of the term, unable to complete the coursework on time and are in need of an extension. It is not for those who find themselves unable to keep up with the class. A student may not file for an Incomplete before the beginning of the ninth week.

Off-campus students who seek an Incomplete must view all of the class recordings by the end of the term. Kettering University does not maintain a bank of courses past the end of a term. The student must complete a “Request for Incomplete Grade” form and send it to the course professor. It is at the professor’s discretion whether an Incomplete will be granted. The student will be granted an Incomplete for the course if the following conditions are met:

- The professor approves the incomplete grade.
- The professor approves the plan of study for completing the work.
- The request form is signed and submitted before the deadline (the last Friday of the term).

Important: Three months after the official end of the term, an incomplete grade is automatically converted to a grade of F for any student who has not completed the coursework by that time.

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 Graduate Degree Change 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 department(s).

Questions: Contact the Office of the Registrar

**Orientation**
New students admitted into a Kettering University graduate program are required to complete the Graduate Orientation course (ORTN-600). Upon admission into Kettering University, students will automatically be enrolled in this on-line Orientation course in the term they are admitted. This is a non-credit, no-cost graduate course. While this is not a pre-requisite to taking any other course, students are encouraged to complete it during their first term. All new Kettering University graduate students are required to successfully complete this course in order to graduate.

ORTN-600 will be offered all four academic terms. The course will be on Blackboard and will remain available to students throughout their academic career as a resource for answering questions and providing information. Having all students well informed of Kettering University policies, procedures and computing systems will allow faculty to spend more time on academics and less time on blackboard, library or email help.

Questions: Contact the Office of Graduate Programs

**Readmission to Kettering University**
Students who were academically eligible to continue when they became inactive or withdrew may request readmission by contacting the Office of the Registrar.

Questions: Contact the Office of the Registrar

**Registration**
Registration is the process by which a student enrolls in a specific course(s) during a specific term. Registration for courses occurs after the application/admission process is complete and the student has been granted admission. Students cannot receive credit for a course for which they have not registered. Students must register for courses every term they wish to take classes.

**Course Selection**
Selection of courses is each student’s own responsibility. The student is personally responsible for being aware of prerequisite coursework and choosing program courses accordingly. To assist with your planning, program curricula is available online or in this catalog for each Kettering graduate program. Since many of our degree programs are designed for people who have full-time jobs, a normal term course load is one or two courses. Kettering University advises against heavier loads except for resident students who are not employed. The responsibility for deciding how many courses to take in a term is solely the student’s.

**How to Register**
Students must register online via Banner Web. NOTE: Registration instructions can be found online at www.kettering.edu/registrar and through the ORTN-600 class.

**Online Registration**
Students who register for classes via the web will receive an email notification to their Kettering email with instructions on how to log into Banner Web to retrieve their official billing invoice/statement the week following the close of the web registration period. This billing statement will confirm enrollment and denote the required tuition. Payment may be made by check, money order, employer voucher, or through FACTS (e-Cashier), our third-party service provider.

Undergraduates Taking Graduate Courses
Only Kettering's undergraduate students are eligible to take graduate courses at Kettering while still an undergrad. Please refer to the Undergraduate Programs catalog, in the “Registration” section for more information.

Questions: Contact the Office of the Registrar

Repeating a Course
A student who receives a failing grade must retake the course if it is required for their program. Both grades will appear on the transcript but only the second grade is used in the computation of the cumulative grade point average. A student may repeat a course only once to improve his/her cumulative grade point average.

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 Bachelor/Master policy guidelines.

Questions: Contact the Office of the Registrar

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 the undergraduate 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

Academic Misconduct
The mission of Kettering University rests on the premise of intellectual honesty, whether on-campus or off-campus through distance learning. Graduate students are expected to perform ethically under all circumstances. It is the policy of Kettering University to foster the qualities of fairness, openness, and intellectual honesty, and to discourage and punish dishonest behavior in any form.

All students in the Kettering University Graduate Programs or any of its graduate courses (both on-campus and distance learning programs) are bound by the Code of Academic Integrity policy. The Code of Academic Integrity policy can be found in the Kettering University Undergraduate Handbook or on the Kettering University website. Please reference this Code for guidance regarding behavior and conduct, as well as for information regarding academic misconduct procedures.

Questions: Contact the Office of Graduate Programs
Thesis

Thesis Option - MS in Engineering
A thesis option is available for designated graduate programs. The thesis replaces one or two courses, which are specified by the degree department. The thesis is required for on-campus mechanical engineering research assistants.

Master’s Thesis
Students must be participants in classes on campus during at least two of the terms in which they are working on the thesis. The degree department will specify which course(s) will be replaced by the thesis. Criteria for topic selection are up to the degree department, as are thesis-option prerequisites, if appropriate. Information about the administrative requirements for a Master’s Thesis may be obtained from the Graduate Office.

A thesis committee of at least three (3) faculty members is required. Students must obtain the written consent of the individuals who will serve on the committee, starting with the professor who will be the major advisor and chair of the committee. If a student is unable to find a professor to be the major advisor, then the student will not be able to elect the thesis option. Students are urged to form the advisory committee and gain approval of a written research proposal during their first year of graduate study and should begin work on the thesis project as soon as the proposal is approved. Registration for thesis credits requires the approval of the chair of the thesis committee. This approval is contingent upon prior approval of the research proposal by the thesis committee.

Master's theses are theory-based and goal-oriented. The criteria for success are achievement of the research goal and production of a written thesis of publishable quality.

Questions: Contact the program advisor

Transfer Credit

The maximum number of graduate credits for which a person may receive transfer credit is eight (8) credit hours. Credit is considered for transfer for classes with grades of B or better. All requests for transfer credit should be for graduate-level courses (taken for graduate credit) significantly similar to a specific course within the student’s program.

To apply for transfer credit, the student must complete a Transfer Credit Application and furnish an official transcript from an accredited institution, plus a course description and syllabus. There is a processing fee of $5.00 (U.S.) per credit hour for transfer credit (i.e., the processing fee to transfer a 4-credit course is $20.00). A student wishing to transfer credit(s) should begin by completing an Application for Transfer Credit available online at https://www.kettering.edu/offices-administration/registrar/registrar-office-forms.

NOTE: Programs through the Department of Business have additional transfer credit guidelines. Refer to the individual program sections of this catalog for more information.

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 Withdrawals
When circumstances occur whereby a student feels that completion of a course is not possible or in the student’s best interest, the student may request a non-punitive grade of W (Withdrawn) be issued by the Registrar’s Office. Such requests will be accepted and honored if submitted before 5:00 p.m., Friday of the eleventh week of the respective term. After that date, the student may not withdraw from the course and is committed to receiving a Kettering University letter grade.

A student who wishes to withdraw from a course must submit a written request. The student may use the Course Change Form (available on the Kettering University web site under the Registrar pages). Withdrawal past eleventh week is not permitted.
Refunds or reduction of tuition will not be made after the fourth week of the term. Refer to the Tuition and Fees section of this catalog for the tuition refund policy.

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.

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 accounts are valid for the duration of each student’s active enrollment. 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 either 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.
LIBRARY SERVICES

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 reveal 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 work stations 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 Breakfats,” 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.
Kettering University’s graduate programs include several Master’s degrees that are offered in a variety of delivery formats to both on- and off-campus students. While many of our programs are available through distance learning methods to off-campus students, on-campus graduate students can select from many top-quality programs available at our campus in Flint, Michigan. Students can select from programs that are available as part-time evening classes, full-time day classes, or Bachelor/Master offerings that allow Kettering University undergraduates to earn a graduate degree.

Kettering University has been offering graduate programs to on- and off-campus students since 1982. Each program is designed to prepare future leaders for a global workplace with “first-class education that reflects the real world.” Many students are able to complete a program in less than two years since most programs only require ten core classes for completion (prerequisites and other criteria may apply to some programs). Our graduate programs leverage nationally-ranked faculty who are recognized for their commitment to practical education. Kettering University has long been admired by educational peers and businesses as a leader in developing top engineers and corporate managers.

Master’s Degree Programs and Concentrations

1. Master of Business Administration (MBA)
   - Non-engineering Concentrations
     - General
     - Healthcare Systems Management
     - Information Technology
     - Leadership
     - Supply Chain Management
     - Technology Management
   - Engineering Concentrations
     - Healthcare Systems Engineering
     - Manufacturing Engineering
     - Mechanical Design
     - Power Electronics and Machine Drives

2. Master of Science in Engineering (MSEN)
   - Concentrations
     - Automotive Systems
     - Computer Engineering
     - Electrical Engineering
     - Electrical & Computer Engineering
     - Manufacturing Engineering
     - Mechanical Cognate
     - Mechanical Design
     - Sustainable Energy and Hybrid Technology

3. Master of Science in Engineering Management (MSEM)
4. Master of Science in Lean Manufacturing (MSLM)

Certificate Programs

- Global Leadership
- Green Business
- HealthCare System Engineering
- HealthCare Systems Management
- Supply Chain Management

Continuing Education/Professional Development Programs

Kettering University offers a variety of seminars and certificate programs. For more information, visit our website at [http://www.kettering.edu/news/continuing-education-new-ways-customize-profits](http://www.kettering.edu/news/continuing-education-new-ways-customize-profits), or email kraup@kettering.edu.
MASTER OF BUSINESS ADMINISTRATION (MBA)

Home Department: Department of Business

Program Advisor/Contact: Vacant:
Contact the Department of Business
business@kettering.edu

Program Overview
Kettering University’s MBA program provides students with an educational experience that enable students to perform as effective management professionals and leaders in modern organizations. The MBA consists of 9 core courses (36 credit hours). Students pursuing the MBA must select an area of concentration (3 classes, 12 credit hours) that allows them to customize their MBA program to suit their professional needs. Students may start this program in any term. Also, this program does not have a thesis option.

Program Educational Objectives and Outcomes
The Business Faculty have established the following Objectives and Outcomes for the MBA:

Objective 1:
- Graduating Students will have an integrated knowledge of business management and demonstrated ability to perform as management professionals. They will be prepared for continued learning throughout their careers.

Intended Outcome:
- Students graduating from the MBA are academically prepared for a business career.

Objective 2:
- Students will have the positive perspectives and skills that create productive employees and managerial leaders.

Intended Outcomes:
- Students graduating from the MBA program demonstrate skills required to be productive managerial leaders.
- Students graduating from the MBA program develop a portfolio consistent with their concentration.

PROGRAM CURRICULUM REQUIREMENTS

The Curriculum for the MBA: 12 courses totaling 48 credit hours including nine core courses for 36 credits, plus three concentration courses for 12 credits.

Prerequisites
Students entering this program must have completed courses in specified business areas. Students without this background will either be required to complete some or all of the following courses or demonstrate equivalent knowledge by passing an exam. Course Grades are included in the GPA calculation.
- ACCT-518 Accounting/Financial Concepts
- ECON-513 Micro/Macro Economic Concepts and Applications
- MGMT-521 Statistical and Quantitative Methods for Managerial Decisions
- MGMT-550 Management Concepts & Applications
- MRKT-570 Marketing Concepts & Applications

Students should review course descriptions for prerequisites and select courses carefully to avoid lacking a prerequisite in future terms. The student is responsible for ensuring prerequisite requirements are satisfied and for completing all courses required for each degree area. Students may wish to test out of these prerequisites. Each test is $30.00. Students may attempt each test one time only.

Required Courses
- ORTN-600 Graduate Orientation (no credit course)
- ACCT-639 Managerial Accounting
- BUSN-659 International Business
- FINC-619 Financial Management
- ISYS-669 Enterprise Information System Models
- MGMT-639 Managing People and Organizations
- MGMT-659 Strategy
- MGMT-661 Operations Management
- MRKT-679 Marketing Management
- BUSN-779 MBA Capstone: Innovation and New Ventures
BUSINESS CONCENTRATIONS

General
BUSN-689 Organizational Behavior
Plus select (2) 600-level or above electives from any graduate course in ISYS, IME, MFGO, or MGMT

Healthcare Systems Management
HMGT-609 Healthcare Management
IME-656 Engineering for Healthcare Systems
Plus one from the following:
IME-676 Lean Six Sigma
MGMT-669 Supply Chain Operations
Healthcare management course taken by concurrent enrollment at another institution

Information Technology
ISYS-629 Managing an IT Infrastructure
ISYS-659 Integrated Information System Capstone
Plus one elective course (4 credits) in management (MGMT)

Leadership
BUSN-689 Organizational Behavior
MGMT-649 Business Ethics and Leadership
MGMT-679 Leadership

Supply Chain Management
IME-654 Enterprise Resource Planning
MGMT-669 Supply Chain Operations
IME-652 Designing Value in the Supply Chain

Technology Management
MGMT-609 Technology Management
MGMT-619 Project and Change Management or MGMT-546 Project Management
Plus one 500 level or above elective course (4 credits) in an engineering field (IME, MECH, ECE, CHEM, CHME)

NOTE: Students admitted to the BBA/BS/MBA program can double count MGMT-546 and one elective course (500-level) taken as an undergraduate in their graduate program.

ENGINEERING CONCENTRATIONS

Applicants to the following engineering concentrations must have a Bachelor Science degree from an approved, ABET-accredited engineering program.

Healthcare Systems Engineering
HMGT-609 Healthcare Management
IME-656 Engineering for Healthcare Systems
Plus one from the following:
IME-676 Lean Six Sigma
MGMT-669 Supply Chain Operations
Healthcare management courses taken by concurrent enrollment at another institution

Manufacturing Engineering
Select three from the following:
IME-564 Ethics & Practice of Engineering
IME-601 Fundamentals of Manufacturing Engineering
IME-674 Quality Assurance & Reliability
IME-683 Elements of CIM for Management

Mechanical Design
MECH-610 Mechanics of Materials I: Linear Elasticity
MECH-611 Mechanics of Materials II: Nonlinear Elastic-Plastic Behavior
MECH-615 Engineering Optimization
Power Electronics and Machine Drives
ECE-610  Modeling of Dynamic Systems
ECE-642  Electric Machine Drives
EE-524   Fuel Cell System Integration and Packaging

All courses (live and video replay) are available via internet video streaming and DVD. Select courses are offered on-campus.

Refer to the Graduate Course Offering Matrices (Department of Business) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.

DEPARTMENT OF BUSINESS PROGRAM POLICIES

Participation in Outcome Assessment
As part of the Department of Business Outcome Assessment, students are required to participate in various measurement activities. These include (but are not limited to) taking the ETS Major Field Test at the conclusion of one’s academic program.

Pursuing a Second Masters Degree in the Department of Business
The Department of Business encourages interested graduates of Kettering University’s MS and MBA programs to pursue a second master’s degree subject to the following policies (effective July 1, 2010):

- Students pursue a single master’s degree at a time. Students desiring a second master’s degree must apply online at http://www.kettering.edu/futurestudents/graduate/.
- To earn a second master’s degree, students must complete all degree requirements for the degree. In so doing, students must complete additional credit hours equal to a minimum of 40% of the second degree’s requirements:
  - For MBA (or MS) graduates pursuing a 10 course MS degree – minimum of four additional courses (16 credits).
  - For MS graduates pursuing a 12 course MBA degree – minimum of five additional courses (20 credits).
- In order to gain maximum advantage from prior course work, graduates must apply for their second master’s degree within three years of graduating from their first degree program. The admission committee will review applicants beyond the three-year time limit to establish the currency of their course work. Students in this case may be required to complete more than 40% of the second degree’s requirements.
- Students can transfer a maximum of 8 credits to Kettering University for use in their graduate studies. Pursuit of a second master’s degree does not raise this limit.

Co-Op Work Experience
Co-op work experience is an optional experience for students in any graduate degree program in the Department of Business, subject to the following policies. Co-op work experiences are not required for graduation in any graduate degree program of the Department of Business. For more information on this program, please contact the Department of Business at 810-762-7966, or business@kettering.edu.

- First term – Students can register for co-op work for up to one term after admission to the graduate program and prior to enrolling in their first graduate course.
- Subsequent terms – Students can register for up to two co-op work terms back to back during their graduate studies.
- Final term – Upon completion of course requirements, students can continue to register as a co-op student for one final term.

Transfer Credits
The Department of Business evaluates transfer credits consistent with other sections in this catalog. In addition, the department adheres to the following policies:

- Transfer credits cannot be more than two years old.
- Transfer credits must not have been used for a degree at another institution.
MASTEr OF SCIENCE IN ENGINEERING
Concentration in Automotive Systems

Home Department: Mechanical Engineering

Program Advisor/Contact: Raghu Echempati, Ph.D.
                        810-762-7835
                        rechempa@kettering.edu

Program Overview
The Master of Science in Engineering is a professional master’s program that builds on an undergraduate engineering program by offering additional depth and greater mastery in a number of technical areas.

Program Objectives
All graduates of the Master of Science in Engineering program will:

- Deepen their knowledge and increase their mastery of technical areas that match their personal career goals.
- Be better prepared to advance in positions of technical and/or managerial leadership.
- Develop their ability to sustain a life-long career in engineering, through continuing self-directed learning and professional development activities.

The Automotive Systems specialty is intended for individuals who desire a deeper understanding and knowledge of the engineering operations of various systems on vehicles. Courses range from powertrain and engine components to design for safety and comfort. Students select courses from a structured framework in order to customize a program that best meets their individual and career needs. This program has a thesis option.

PROGRAM CURRICULUM REQUIREMENTS

Completion of 40 credits as follows:

Required Courses:
- ORTN-600  Graduate Orientation (no credit course)
- MECH-600  Engineering Mathematics with Applications

Select up to four from the following (course prerequisites must be observed):
- MECH-526  Fuel Cell Science & Engineering
- MECH-540  Introduction to Internal Combustion Engines & Automotive Power Systems
- 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 System Dynamics
- MECH-550  Automotive Bioengineering: Occupant Protection & Safety
- MECH-551  Vehicular Crash Dynamics & Accident Reconstruction

Select at least four from the following (course prerequisites must be observed):
- EE-580  Automotive Electronic Systems
- FINC-619  Financial Management
- MECH-516  Introduction to Finite Element Analysis with Structural Applications
- MECH-621  Applied Transport Phenomena
- MECH-641  Combustion and Emissions
- MECH-643  Noise, Vibration & Harshness
- MECH-6xx  Other 600-level electives with approval

Select One:
- Thesis or one 600-level elective

Refer to the Graduate Course Offering Matrices (Mechanical Engineering) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.
MASTER OF SCIENCE IN ENGINEERING
Concentration in Computer Engineering

Home Department: Electrical and Computer Engineering

Available: On Campus Only

Program Advisor/Contact: David Foster, Ph.D.
810-762-9651
dfoster@kettering.edu

Program Overview
The Master of Science in Engineering is a professional master’s program that builds on an undergraduate engineering program by offering additional depth and greater mastery in a number of technical areas.

Program Objectives
All graduates of the Master of Science in Engineering program will:

- Deepen their knowledge and increase their mastery of technical areas that match their personal career goals.
- Be better prepared to advance in positions of technical and/or managerial leadership.
- Develop their ability to sustain a life-long career in engineering, through continuing self-directed learning and professional development activities.

The Computer Engineering concentration is a research-intensive on-campus program designed for individuals who wish to deepen their understanding of computer engineering principles and applications and to develop their skills in independent research.

PROGRAM CURRICULUM REQUIREMENTS
Completion of 40 credits as follows:

Required Course:
ORTN-600 Graduate Orientation (no credit course)

Select four elective courses from the following:
CE-612 Digital Systems Design
CE-620 Microcomputer Systems
CE-622 Computer Architecture and Organization
CE-624 VLSI Design
CE-626 Real-Time Embedded Systems
CE-630 Logic Systems
CE-642 Mobile Robotics
CE-670 Haptic Systems
CE-680 Computer Networks
CE-682 Distributed Embedded Systems
CE-691 Graduate Special Topics in Computer Engineering
CE-699 Graduate Independent Study in Computer Engineering

Eight credits of:
Any 500-600 graduate level elective courses

16 credits of:
Graduate research (CE-695 Graduate Research in Computer Engineering)

AND
Completion and successful defense of a master’s thesis

Undergraduate-level coursework might also be required for some students as a prerequisite for either graduate-level coursework or research, depending on the student’s background and the nature of the coursework or research. If required, undergraduate-level credit cannot be used to satisfy the graduate-level credit requirements given above.
Graduate Assistantships
Financial support in the form of tuition reductions or waivers and stipends for living expenses is available on a competitive basis. Students who receive financial support may be required to serve as research or teaching assistants for up to 20 hours per week (depending on the level of financial support) during terms in which they are registered.

Plan of Study
The program operates on a calendar similar to a conventional quarter system: Fall, Winter, and Spring terms are “regular” academic terms during which students normally enroll full-time, and the Summer term is optional. The nominal plan of study calls for a total of six terms of study over 21 months:

<table>
<thead>
<tr>
<th>First Year</th>
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<tbody>
<tr>
<td></td>
<td>Fall</td>
<td>8 credits coursework</td>
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<tr>
<td></td>
<td>Winter</td>
<td>8 credits coursework</td>
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<tr>
<td></td>
<td>Spring</td>
<td>8 credits coursework</td>
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<td>Summer</td>
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</table>

<table>
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<th>Second Year</th>
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<tbody>
<tr>
<td></td>
<td>Fall</td>
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</tr>
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</tr>
<tr>
<td></td>
<td>Spring</td>
<td>Thesis defense and submission</td>
</tr>
</tbody>
</table>

Many variations of this plan are possible. In particular, students may begin the program in any term, not just Fall, and may elect to register for coursework or research during Summer. Students may not, however, register for more than eight credits in a term.
MASTER OF SCIENCE IN ENGINEERING
Concentration in Electrical Engineering

Home Department: Electrical and Computer Engineering
Available: On Campus Only
Program Advisor/Contact: Ravi Warrier, Ph.D.
                        810-762-7847
                        kravi@kettering.edu

Program Overview
The Master of Science in Engineering is a professional master’s program that builds on an undergraduate engineering program by offering additional depth and greater mastery in a number of technical areas.

Program Objectives
All graduates of the Master of Science in Engineering program will:

- Deepen their knowledge and increase their mastery of technical areas that match their personal career goals.
- Be better prepared to advance in positions of technical and/or managerial leadership.
- Develop their ability to sustain a life-long career in engineering, through continuing self-directed learning and professional development activities.

The concentration in Electrical Engineering is a research-intensive on-campus program designed for individuals who wish to deepen their understanding of electrical engineering principles and applications and to develop their skills in independent research.

PROGRAM CURRICULUM REQUIREMENTS

Completion of 40 credits as follows:

Required Courses:
- ORTN-600 Graduate Orientation (no credit course)
- ECE-610 Modeling of Dynamic Systems

Select three elective courses from the following:
- CE-612 Digital Systems Design
- CE-624 VLSI Design
- ECE-630 Advanced Digital Signal Processing
- ECE-642 Electric Machine Drives
- ECE-648 Electromagnetic Compatibility
- 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 Communication for Automotive Applications
- EE-691 Graduate Special Topics in Electrical Engineering
- EE-699 Graduate Independent Study in Electrical Engineering

Eight credits of:
- Any 500-600 graduate level elective courses

16 credits of:
- Graduate research (EE-695 Graduate Research in Electrical Engineering)

AND
- Completion and successful defense of a master’s thesis

Undergraduate-level coursework might also be required for some students as a prerequisite for either graduate-level coursework or research, depending on the student’s background and the nature of the coursework or research. If required, undergraduate-level credit cannot be used to satisfy the graduate-level credit requirements given above.
Graduate Assistantships

Financial support in the form of tuition reductions or waivers and stipends for living expenses is available on a competitive basis. Students who receive financial support may be required to serve as research or teaching assistants for up to 20 hours per week (depending on the level of financial support) during terms in which they are registered.

Plan of Study

The program operates on a calendar similar to a conventional quarter system: Fall, Winter, and Spring terms are “regular” academic terms during which students normally enroll full-time, and the Summer term is optional. The nominal plan of study calls for a total of six terms of study over 21 months:

<table>
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<tr>
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<th>Fall</th>
<th>8 credits coursework</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Winter</td>
<td>8 credits coursework</td>
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<tr>
<td></td>
<td>Spring</td>
<td>8 credits coursework</td>
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<td>Summer</td>
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<tr>
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<td>Fall</td>
<td>8 credits coursework</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>Spring</td>
<td>Thesis defense and submission</td>
</tr>
</tbody>
</table>

Many variations of this plan are possible. In particular, students may begin the program in any term, not just Fall, and may elect to register for coursework or research during Summer. Students may not, however, register for more than eight credits in a term.
MASTER OF SCIENCE IN ENGINEERING
Concentration in Electrical & Computer Engineering

Home Department: Electrical and Computer Engineering

Program Advisor/Contact: Ravi Warrier, Ph.D.
810-762-7847
kravi@kettering.edu

Program Overview
The Master of Science in Engineering is a professional master’s program that builds on an undergraduate engineering program by offering additional depth and greater mastery in a number of technical areas.

Program Objectives
All graduates of the Master of Science in Engineering program will:
- Deepen their knowledge and increase their mastery of technical areas that match their personal career goals.
- Be better prepared to advance in positions of technical and/or managerial leadership.
- Develop their ability to sustain a life-long career in engineering, through continuing self-directed learning and professional development activities.

The concentration in Electrical & Computer Engineering is designed for individuals who wish to acquire a deeper understanding and applied knowledge of engineering principles. This program affords a possibility for students to specialize in modern applications of electronics, electrical systems, and computer networking. In addition, the program provides an opportunity to learn business and financial management concepts which are valuable to practicing engineers. This program has a thesis option.

PROGRAM CURRICULUM REQUIREMENTS
Completion of 40 credits as follows:

**Required courses:**
- ORTN-600 Graduate Orientation (no credit course)
- ECE-610 Modeling of Dynamic Systems

**Select six elective courses from the following:**
- ECE-630 Advanced Digital Signal Processing
- ECE-642 Electric Machine Drives
- ECE-648 Electromagnetic Compatibility
- ECE-682 Mobile and Wireless Computing
- 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

**Select two of the following non-engineering elective courses:**
- BUSN-659 International Business
- ECON-513 Micro/Macro Economic Concepts & Applications
- FINC-619 Financial Management

**Select one:**
- Additional course taken as a free elective

**NOTE:** five of the elective courses must be at the 600-level.

A student may opt to do an MS thesis for four credits in lieu of a 600-level ECE elective.

Refer to the Graduate Course Offering Matrices (Electrical & Computer Engineering) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.
MASTER OF SCIENCE IN ENGINEERING
Concentration in Manufacturing Engineering

Home Department: Industrial and Manufacturing Engineering

Program Advisor/Contact: Vacant:
Contact the Industrial and Manufacturing Engineering Department
810-762-7941

Program Overview
The Master of Science in Engineering is a professional master’s program that builds on an undergraduate engineering program by offering additional depth and greater mastery in a number of technical areas.

Program Objectives
All graduates of the Master of Science in Engineering program will:
- Deepen their knowledge and increase their mastery of technical areas that match their personal career goals.
- Be better prepared to advance in positions of technical and/or managerial leadership.
- Develop their ability to sustain a life-long career in engineering, through continuing self-directed learning and professional development activities.

PROGRAM CURRICULUM REQUIREMENTS
Completion of 40 credits as follows:

Required courses:
ORTN-600 Graduate Orientation (no credit course)

Select ten 4-credit courses:
IME-563 Safety & Human Factors
IME-564 Ethics & Practice of Engineering
Advanced Materials Elective
Management Elective
Manufacturing Process Elective(s)
Industrial and Manufacturing Engineering (IME) Elective(s)
Technical Elective
Free Elective or IME-698 Master’s Project

Current courses meeting elective requirements are listed below. Students may consult their advisor for additional courses.

Advanced Materials Electives
IME-575 Failure Analysis
IME-684 Materials and Processes Seminar

Management Electives
Any MGMT course numbered 500 or higher

Process Electives
IME-601 Fundamentals of Manufacturing Engineering
IME-603 Computer Numerical Control Machining
IME-604 Sheet Metal Forming
IME-660 Design for Manufacture and Assembly
IME-680 Computer Integrated Manufacturing

IME Electives
Any IME course numbered 500 or above

Technical Electives
Any engineering or mathematics course numbered 500 or above

Free Electives
Any graduate course numbered 500 or above

- A student may elect no more than four (4) courses numbered 500-599 to count toward the degree.
- Students following a BS/MS plan will work with their academic advisor to ensure that all requirements are met.
- Refer to the Graduate Course Offering Matrices (Manufacturing Engineering) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.
MASTER OF SCIENCE IN ENGINEERING
Concentration in Mechanical Cognate

Home Department: Mechanical Engineering

Program Advisor/Contact: Raghu Echempati, Ph.D.
810-762-7835
rechempa@kettering.edu

Program Overview
The Master of Science in Engineering is a professional master’s program that builds on an undergraduate engineering program by offering additional depth and greater mastery in a number of technical areas.

Program Objectives
All graduates of the Master of Science in Engineering program will:

● Deepen their knowledge and increase their mastery of technical areas that match their personal career goals.
● Be better prepared to advance in positions of technical and/or managerial leadership.
● Develop their ability to sustain a life-long career in engineering, through continuing self-directed learning and professional development activities.

This program allows students to develop their own curriculum within a structured framework for the purpose of customizing a degree to meet his/her own needs and career objectives. The student will receive a Master’s degree upon completion of ten (10) courses within the program. This program has a thesis option.

PROGRAM CURRICULUM REQUIREMENTS

Completion of 40 credits as follows:

Required courses:
ORTN-600  Graduate Orientation (no credit course)
MECH-600  Engineering Mathematics with Applications

Plus nine additional Graduate courses:

a) Any five (5) Mechanical Engineering Graduate Courses
b) Additional three (3) Cognate Courses (see example below)
c) One (1) additional elective or a program thesis

NOTE: Students can take no more than four (4) 500-level courses.

Example Cognate Courses
If a student desires a cognate in Fuel Cell, the student may select the following courses to satisfy the three cognate courses:
MECH-526  Fuel Cell Science & Engineering
MECH-544  Introduction to Automotive Powertrains
MECH-545  Hybrid Electric Vehicle Propulsion
OR,
If a student desires a cognate in Polymers, the student may select the following courses to satisfy two of the cognate courses:
CHEM-635  Multicomponent Polymer Systems
MECH-580  Properties of Polymers

Note: Courses must be pre-approved by the Mechanical Engineering Department.

Refer to the Graduate Course Offering Matrices (Mechanical Engineering) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.
MASTER OF SCIENCE IN ENGINEERING
Concentration in Mechanical Design

Home Department: Mechanical Engineering

Program Advisor/Contact: Raghu Echempati, Ph.D.
810-762-7835
rechempa@kettering.edu

Program Overview
The Master of Science in Engineering is a professional master’s program that builds on an undergraduate engineering program by offering additional depth and greater mastery in a number of technical areas.

Program Objectives
All graduates of the Master of Science in Engineering program will:
- Deepen their knowledge and increase their mastery of technical areas that match their personal career goals.
- Be better prepared to advance in positions of technical and/or managerial leadership.
- Develop their ability to sustain a life-long career in engineering, through continuing self-directed learning and professional development activities.

Students in this program will be provided the skills and knowledge needed to be engineering leaders in modern industry. This program has sound engineering practices supported by the extensive industrial experience of the faculty. The student will receive a Master’s degree upon completion of ten (10) courses within the program. This program has a thesis option.

PROGRAM CURRICULUM REQUIREMENTS

Completion of 40 credits as follows:

**Required courses:**
- ORTN-600 Graduate Orientation (no credit course)
- FINC-619 Financial Management (contact your academic advisor if you have prerequisite issues)
- IME-660 Design for Manufacture and Assembly
- MECH-516 Introduction to Finite Element Analysis with Structural Applications
- MECH-600 Engineering Mathematics with Applications
- MECH-610 Mechanics of Materials I, Linear Elasticity
- MECH-615 Engineering Optimization
- MECH-643 Noise, Vibration & Harshness
  - Thesis or 600-Level Elective
  - Technical Elective (the technical elective in his program may consist of a 500-level course)

Refer to the Graduate Course Offering Matrices (Mechanical Engineering) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.
MASTER OF SCIENCE IN ENGINEERING
Concentration in Sustainable Energy and Hybrid Technology

Home Department: Mechanical Engineering

Program Advisor/Contact: Raghu Echempati, Ph.D.
810-762-7835
rechempa@kettering.edu

Program Overview
The Master of Science in Engineering is a professional master’s program that builds on an undergraduate engineering program by offering additional depth and greater mastery in a number of technical areas.

Program Objectives
All graduates of the Master of Science in Engineering program will:
- Deepen their knowledge and increase their mastery of technical areas that match their personal career goals.
- Be better prepared to advance in positions of technical and/or managerial leadership.
- Develop their ability to sustain a life-long career in engineering, through continuing self-directed learning and professional development activities.

PROGRAM CURRICULUM REQUIREMENTS
Completion of 40 credits as follows:

Required courses:
- ORTN-600 Graduate Orientation (no credit course)
- MECH-600 Engineering Mathematics with Applications
- MECH-526 Fuel Cell Science and Engineering
- MECH-527 Energy and the Environment
- MECH-545 Hybrid Electric Vehicle Propulsion
- MECH-626 Hydrogen Generation, Storage and Safety
- MECH-627 Green Energy Conversion
- MECH-641 Combustion and Emissions

Select three elective courses from the following:
- BUSN-659 International Business
- EE-524 Fuel Cell System Integration and Packaging
- KETT-540 Environmentally Conscious Design and Manufacturing
- MECH-521 Energy and Environmental Systems Design
- MECH-528 Bio and Renewable Energy Laboratory
- MECH-529 Design and Modeling of Fuel Cell Systems
- MECH-615 Engineering Optimization
- MECH-621 Applied Transport Phenomena

Refer to the Graduate Course Offering Matrices (Mechanical Engineering) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.
MASTER OF SCIENCE IN ENGINEERING MANAGEMENT

Home Department: Department of Business

Program Advisor/Contact: Vacant:
Contact the Department of Business
business@kettering.edu

Program Overview
Kettering University designed the Engineering Management program to prepare graduates to manage technical professionals. It blends education in traditional business topics with technical coursework in engineering. Enrollment is limited to graduates of ABET accredited engineering programs or Kettering University graduates with majors other than management or business.

The Bachelor/Master option is available only for the traditional engineering management option. Kettering University BS/MS rules apply. Students in the Kettering University BS/MS Program can NOT study abroad.

Program Educational Objectives and Outcomes
The Business Faculty have established the following Objectives and Outcomes for the MSEM:

Objective 1:
- Graduating students will have an integrated knowledge of engineering management and demonstrated ability to perform as management professionals. They will be prepared for continued learning throughout their careers.

Intended Outcome:
- Students graduating from the Master of Science in Engineering Management degree program are academically prepared for a business career.

Objective 2:
- Students will have the positive perspectives and skills that create productive employees and managerial leaders.

Intended Outcome:
- Students graduating from the Master of Science in Engineering Management degree program demonstrate skills required to be productive managerial leaders.

PROGRAM CURRICULUM REQUIREMENTS

Completion of 40 credits as follows:

Prerequisites
Students entering this program must have completed courses in specified business areas. Students without this background will either be required to complete some or all of the following courses or demonstrate equivalent knowledge by passing an exam. Course Grades are included in the GPA calculation.

ACCT-518 Accounting/Financial Concepts
ECON-513 Micro/Macro Economic Concepts and Applications
MGMT-521 Statistical and Quantitative Methods for Managerial Decision
MGMT-550 Management Concepts & Applications
MRKT-570 Marketing Concepts & Applications

Students should review course descriptions for prerequisites and select courses carefully to avoid lacking a prerequisite in future terms. The student is responsible for ensuring prerequisite requirements are satisfied and for completing all courses required for each degree area. Students may wish to test out of the prerequisite area. Each test will cost $30.00. Students may attempt each test one time only.

Required Courses (not Study Abroad)
ORTH-600 Graduate Orientation (no credit course)
BUSN-659 International Business
FINC-619 Financial Management
ISYS-669 Enterprise Information System Models
MGMT-639 Managing People & Organizations
MGMT-659 Strategy
MRKT-679 Marketing Management
Engineering Management Program Options
Select two from the following:
- BUSN-779 MBA Capstone: Innovation and New Ventures
- IME-564 Ethics and Practice of Engineering
- IME-583 Industrial Engineering Concepts
- KETT-540 Environmentally Conscious Design
- MGMT-609 Technology Management
- MGMT-619 Project and Change Management
- MGMT-629 Management Science

Science/Engineering Electives
Students select two courses from CHEM, CS, ECE, IME, ISYS, MATH, MECH, MFGO. Students in the BS/MS program can count up to two 500-level courses taken as an undergraduate if they apply and are admitted to the BS/MS program.

The MSEM degree program is available on- and off-campus. The degree also has a study-abroad option that allows students to experience German culture and receive up to 16 credits of graduate course work.

Refer to the Graduate Course Offering Matrices (Department of Business) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.

STUDY ABROAD

<table>
<thead>
<tr>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
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<tbody>
<tr>
<td>Co-op</td>
<td>Reutlingen, Germany (16 credits)</td>
<td>Co-op and MGMT-659</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Esslingen, Germany (16 credits)</td>
<td>Kettering University (20 credits)</td>
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</tbody>
</table>

Tuition
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.

Maximum Enrollment
The study abroad program is designed for a maximum of 20 students to attend courses in Germany each spring. Students that attend Kettering University as MSEM students in the fall will have precedence over new enrollees for spring. Admission is handled on first-come, first-served basis, so early application is encouraged.

Accommodations and Expenses in Germany
Housing pricing is comparable to what a student would pay at Kettering University. Students are responsible for all expenses associated with travel and entertainment.

DEPARTMENT OF BUSINESS PROGRAM POLICIES

Participation in Outcome Assessment
As part of the Department of Business Outcome Assessment, students are required to participate in various measurement activities. These include (but are not limited to) taking the ETS Major Field Test at the conclusion of one’s academic program.

Pursuing a Second Masters Degree in the Department of Business
The Department of Business encourages interested graduates of Kettering University’s MS and MBA programs to pursue a second master’s degree subject to the following policies (effective July 1, 2010):

- Students pursue a single master’s degree at a time. Students desiring a second master’s degree must apply online at http://www.kettering.edu/futurestudents/graduate/.
- To earn a second master’s degree, students must complete all degree requirements for the degree. In so doing, students must complete additional credit hours equal to a minimum of 40% of the second degree’s requirements:
  - For MBA (or MS) graduates pursing a 10 course MS degree – minimum of four additional courses (16 credits).
  - For MS graduates pursuing a 12 course MBA degree – minimum of five additional courses (20 credits).
- In order to gain maximum advantage from prior work, graduates must apply for their second master’s degree within three years of graduating from their first degree program. The admission committee will review applicants beyond the three-year time limit to establish the currency of their course work. Students in this case may be required to complete more than 40% of the second degree’s requirements.
- Students can transfer a maximum of 8 credits to Kettering University for use in their graduate studies. Pursuit of a second master’s degree does not raise this limit.
Co-Op Work Experience
Co-op work experience is an optional experience for students in any graduate degree program in the Department of Business, subject to the following policies. Co-op work experiences are not required for graduation in any graduate degree program of the Department of Business. For more information on this program, please contact the Department of Business at 810-762-7966, or business@kettering.edu.

- First term – Students can register for co-op work for up to one term after admission to the graduate program and prior to enrolling in their first graduate course.
- Subsequent terms – Students can register for up to two co-op work terms back to back during their graduate studies.
- Final term – Upon completion of course requirements, students can continue to register as a co-op student for one final term.

Transfer Credits
The Department of Business evaluates transfer credits consistent with other sections in this catalog. In addition, the department adheres to the following policies:

- Transfer credits cannot be more than two years old.
- Transfer credits must not have been used for a degree at another institution.
MASTER OF SCIENCE IN LEAN MANUFACTURING

Home Department: Office of Graduate Studies

Program Advisor/Contact: Vacant
    Contact the Department of Business or the Office of Graduate Studies
    business@kettering.edu

Program Overview
The Master of Science in Lean Manufacturing program concentrates on the key elements of lean agile manufacturing operations. Students in this program can expect to complete in-depth studies of systems, processes and practices in manufacturing facilities. This discipline gives students exposure to many elements of manufacturing including lean production systems, work analysis, materials handling, quality systems, manufacturing and management metrics, as well as cutting-edge practices such as lean and agile manufacturing. The degree aims to enhance the student’s technical skills with lean methodology and analysis techniques as well as management skills to complement their technical ability, enabling the student to take a broader perspective on the manufacturing industry as a whole.

Program Educational Objective
- Develop and implement lean and competitive manufacturing facilities
- Apply appropriate quality systems tools
- Implement and evaluate suitable production control systems
- Identify and implement the requirements of a successful supply chain
- Develop a skill set to identify and manage ‘change’ effectively

Program outcomes
The program is intended for individuals in manufacturing who aspire to have a more comprehensive knowledge in lean and agile manufacturing operations and practices. Graduates of this program can expect to possess a thorough understanding of manufacturing methods, analytical methods to make decisions within a manufacturing facility, and innovation skills to adapt to changes within the global/cross-cultural environment. This program does not require a thesis.

PROGRAM CURRICULUM REQUIREMENTS
Completion of 40 credits as follows:

Required Courses
ORTN-600 Graduate Orientation (no credit course)
MFGO-601 The Globally Integrated Manufacturing Company
MFGO-619 Six Sigma for Manufacturing
MFGO-633 Lean Production Systems
MFGO-635 Work Analysis for Lean Production Applications
MFGO-639 Quality Assurance and Reliability
MFGO-649 Metrics for Lean Production Improvement
MFGO-659 Integrative Capstone Project

Plus three 4-credit courses in one of the three concentration areas listed below:

Supply Chain Management Concentration Elective Courses
MFGO-605 Global Human Resources & Supply Chain
MGMT-669 Fundamentals of Supply Chain Management
IME-654 Enterprise Resource Planning * (Requires BSE/BSSci degree)
IME-652 Designing Value in the Supply Chain * (Requires BSE degree)

Operations Management Concentration Elective Courses
MGMT-639 Managing People and Organizations’
MGMT-629 Management Science
MGMT-661 Operations Management

Manufacturing Concentration Elective Courses
IME-601 Fundamentals of Manufacturing Engineering
IME-625 Business Dynamics
IME-654 Enterprise Resource Planning * (Requires BSE degree)
IME-683  Elements of CIM for Management
Refer to the Graduate Course Offering Matrices (Lean Manufacturing) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.

Dual Degree Option (MSLM - Kettering University / MBA - University of Michigan-Flint)
The Dual Masters Degree Program between Kettering University and the University of Michigan-Flint is a unique blend designed to provide students with a broad foundation of business knowledge and the in-depth and specialized expertise of lean production systems. For information on the Dual Degree Option, please contact:

MSMO - Kettering University
Dyan Robinson, drobins1@kettering.edu, 810-762-9893

MBA - UM-Flint
Craig Gomolka, cgomolka@umflint.edu, 810-237-6676

For more information on this program, please contact Dyan Robinson at drobins1@kettering.edu or 810-762-9893.
MASTER OF SCIENCE IN OPERATIONS MANAGEMENT

Home Department: Department of Business

Program Advisor/Contact: Vacant:
Contact the Department of Business
business@kettering.edu

Program Overview
The Master of Science in Operations Management program focuses on the management skills, knowledge, and attitudes required to lead organizations that create goods and services. Students in this program will gain expertise in general business management areas, as well as a firm understanding of methods and practices in modern operations management. Students currently in this program possess a wide variety of backgrounds and undergraduate degrees. The Department of Business designed this program for people who currently are in — or desire to enter — a management position within a manufacturing or services company. This program does not require a thesis.

Program Educational Objectives and Outcomes
The Business Faculty have established the following Objectives and Outcomes for the MSOM:

Objective 1:
- Graduating students will have an integrated knowledge of operations management and demonstrated ability to perform as management professionals. They will be prepared for continued learning throughout their career.

Intended Outcome:
- Students graduating from the Master of Science in Operations Management degree program are academically prepared for a business career.

Objective 2:
- Students will have the positive perspectives and skills that create productive employees and managerial leaders.

Intended Outcome:
- Students graduating from the Master of Science in Operations Management degree program demonstrate skills required to be productive managerial leaders.

PROGRAM CURRICULUM REQUIREMENTS

Completion of 40 credits as follows:

Prerequisites
Students entering this program must have completed courses in specified business areas. Students without this background will either be required to complete some or all of the following courses or demonstrate equivalent knowledge by passing an exam. Course grades are included in the GPA calculation.

- ACCT-518 Accounting/Financial Concepts
- ECON-513 Micro/Macro Economic Concepts & Applications
- MGMT-521 Statistical and Quantitative Methods for Managerial Decisions
- MGMT-550 Management Concepts & Applications
- MRKT-570 Marketing Concepts & Applications

Students should review course descriptions for prerequisites and select courses carefully to avoid lacking a prerequisite in future terms. The student is responsible for ensuring prerequisite requirements are satisfied and for completing all courses required for each degree area. Students may wish to test out of these prerequisites. Each test is $30.00. Students may attempt each test one time only.

Required Courses
- ORTN-600 Graduate Orientation (no credit course)
- FINC-619 Financial Management
- ISYS-669 Enterprise Information System Models
- MGMT-629 Management Science
- MGMT-639 Managing People and Organizations
- MGMT-659 Strategy
- MGMT-661 Operations Management
Plus one from the following:
BUSN-659  International Business
MRKT-679  Marketing Management

**ELECTIVES**

Students choose three courses from the following list of electives. Courses can come from more than one category.

**Business**
Select one from the following:
BUSN-659  International Business
MRKT-679  Marketing Management

**Healthcare**
IME-656  Engineering for Healthcare Systems
HMGT-609  Healthcare Management
Additional healthcare courses taken by dual enrollment at other institutions

**Manufacturing**
IME-601  Fundamentals of Manufacturing Engineering
IME-674  Quality Assurance and Reliability
IME-683  Elements of CIM for Management
MFGO-633  Lean Production Systems

**Operation Management Tools**
IME-583  Industrial Engineering Concepts
IME-676  Lean Six Sigma
KETT-540  Environmentally Conscious Design
MGMT-609  Technology Management
MGMT-619  Project and Change Management

**Supply Chain and ERP (using SAP)**
IME-652  Designing Value in the Supply Chain
IME-654  Enterprise Resource Planning
MGMT-669  Supply Chain Operations

Refer to the Graduate Course Offering Matrices (Department of Business) section of this catalog for a listing of when courses are offered. This will allow you to plan when you take each course and complete the program. Check the schedule each term for availability.

**DEPARTMENT OF BUSINESS POLICIES**

**Participation in Outcome Assessment**
As part of the Department of Business Outcome Assessment, students are required to participate in various measurement activities. These include (but are not limited to) taking the ETS Major Field Test at the conclusion of one’s academic program.

**Pursuing a Second Masters Degree in the Department of Business**
The Department of Business encourages interested graduates of Kettering University’s MS and MBA programs to pursue a second master’s degree subject to the following policies (effective July 1, 2010):

- Students pursue a single master’s degree at a time. Students desiring a second master’s degree must apply online at [http://www.kettering.edu/futurestudents/graduate](http://www.kettering.edu/futurestudents/graduate).

- To earn a second master’s degree, students must complete all degree requirements for the degree. In so doing, students must complete additional credit hours equal to a minimum of 40% of the second degree’s requirements:
  - For MBA (or MS) graduates pursuing a 10 course MS degree – a minimum of four additional courses (16 credits).
  - For MS graduates pursuing a 12 course MBA degree – a minimum of five additional courses (20 credits).

- In order to gain maximum advantage from prior work, graduates must apply for their second master’s degree within three years of graduating from their first degree program. The admission committee will review applicants beyond the three-year time limit to establish the currency of their course work. Students in this case may be required to complete more than 40% of the second degree’s requirements.

- Students can transfer a maximum of 8 credits to Kettering University for use in their graduate studies. Pursuit of a second master’s degree does not raise this limit.
Co-Op Work Experience
Co-op work experience is an optional experience for students in any graduate degree program in the Department of Business, subject to the following policies. Co-op work experiences are not required for graduation in any graduate degree program of the Department of Business. For more information on this program, please contact the Department of Business at 810-762-7966, or business@kettering.edu.

- First term – Students can register for co-op work for up to one term after admission to the graduate program and prior to enrolling in their first graduate course.
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Transfer Credits
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CERTIFICATE PROGRAMS

Kettering University has designed a set of graduate certificate programs for students that want to update their skill set in a new area of study. For students who do not have a graduate degree in hand, a graduate certificate can be the beginning of work toward a master’s degree. For students who already hold a masters degree, a certificate program can provide graduate level education in an additional area of concentration.

All graduate certificates require a minimum of three graduate level courses. No more than two five hundred (500) level courses may be included in the certificate. The three courses must apply to a particular graduate degree and all count for credit in that degree. (Note: An engineering department may elect to have the certificate as part of the MBA concentrations instead of a specific engineering concentration.)

Students must meet admission requirements for a graduate program to be accepted to the graduate certificate.

Pre-requisite requirements must be met for the courses in a graduate certificate or must be waived by the offering department. If pre-requisites are waived for the graduate certificate program, they will also be waived if the student decides to pursue a complete graduate degree, however, there may be other pre-requisites required for a complete program admission.

Undergraduate students who complete a course that is included in the graduate certificate may count a maximum of two of these courses toward completion of the certificate. HOWEVER, students must meet the department criteria for BBA/BS/MBA or BS/MS to count the course toward a graduate degree. If a student does not meet the BBA/BS/MBA or BS/MS criteria for the department, the student will be required to complete all graduate work for that particular degree. (Note: Currently a student who does not qualify for the BBA/BS/MBA or BS/MS and has courses that would count is required to take the full 40 credit hours.)

Graduate tuition will be paid for graduate certificate programs. Students may take the classes through on-campus or distance learning offerings as available. (Note: The exception may be undergraduate Kettering students who might take the classes for either graduate or undergraduate credit. They would be paying undergraduate tuition rates.)

GLOBAL LEADERSHIP (DEPARTMENT OF BUSINESS)
Admissions basis: MBA
BUSN-659 International Business
MGMT-639 Managing People and Organizations
Plus one from the following:
BUSN-689 Organizational Behavior
MGMT-649 Business Ethics and Leadership
MGMT-679 Leadership

GREEN BUSINESS (DEPARTMENT OF BUSINESS)
Admissions basis: MBA/MSOM
KETT-540 Environmentally Conscious Design
MECH-527 Energy and the Environment
MRKT-679 Marketing Management

HEALTHCARE SYSTEM ENGINEERING (DEPARTMENT OF INDUSTRIAL & MANUFACTURING ENGINEERING)
Admissions basis: MBA
IME-652 Designing Value in the Supply Chain
IME-656 Engineering for Healthcare Systems
IME-676 Lean Six Sigma
HMGТ-609 Healthcare Management

HEALTHCARE SYSTEMS MANAGEMENT (DEPARTMENT OF BUSINESS)
Admissions basis: MBA/MSOM
IME-656 Engineering for Healthcare Systems
HMGТ-609 Healthcare Management
Plus one from the following:
IME-676 Lean Six Sigma
MGMT-669 Supply Chain Operations
Healthcare management course taken by concurrent enrollment at another institution
SUPPLY CHAIN MANAGEMENT (DEPARTMENT OF BUSINESS)
Admissions basis: MBA/MSOM
IME-654  Enterprise Resource Planning
MGMT-669  Supply Chain Operations
IME-652  Designing Value in the Supply Chain
GRADUATE COURSE OFFERING MATRICES

Listed below are course offering matrices, by department, which indicate when courses are offered and the method of delivery.

Please note:
- The listed matrices are for the current 2013-2014 academic year.
- Use this list of class offerings to develop a plan of study and determine when you will complete each required course. This will allow you to track when you will take each course and complete the program.
- Course offerings may change without notice. Check the online class schedule each term for availability or contact the department for more information.

LEC = Live offering, on campus.
NET = Distance learning, via DVD, online video streaming, internet/web, Blackboard.

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### ENGINEERING – Electrical and Computer Engineering

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1 Capstone: Graduate students can take this (or other eligible capstone courses) but (these) may not be double counted for the BS/MS degree

## LEAN MANUFACTURING AND MANUFACTURING OPERATIONS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tr>
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<td>July – September</td>
<td>October - December</td>
<td>January – March</td>
<td>April - June</td>
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<td>MFGO-601</td>
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<td>MFGO 619</td>
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The course numbers 591 and 691 shall be used to describe special topics courses. Special topics courses are one-time offerings whose content is determined by current faculty interest. These courses may be repeated for credit when the course is run with different content.

The course numbers 597 and 697 shall be used to admit credit for transfer or guest courses that are not equivalent to existing Kettering courses within a discipline. These course numbers are not used for study abroad transfer credit.

The course numbers 598 and 698 shall be used to describe transfer courses taken as part of a Kettering University International Studies Program.

The course numbers 599 and 699 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.

**ACCT-518 Accounting /Financial Concepts**  
4 credit hours  
Prerequisite: Graduate Admission  
This course provides students with an understanding of how accounting data is developed and used by managers in making decisions. The course is divided into three sections. First, the Financial Accounting section discusses how basic financial events are recorded and presented in the accounting statements. Second, the Cost Accounting section discusses the nature and recording of manufacturing costs, development of overhead rates, job and process costing, budgeting, and control of manufacturing cost. Third, the Managerial Accounting section discusses profit volume analysis, relevant cost analysis, time value of money concepts, and capital budgeting.

**ACCT-639 Managerial Accounting**  
4 credit hours  
Prerequisites: ACCT-212 or ACCT-315 or ACCT-518  
This course is a study of the use of managerial accounting information for planning and control. Case studies emphasize the role of accounting information in the decision making process. Designing, implementing, and the use of planning and control systems to achieve the firm's strategies are emphasized. Ethics issues are also addressed throughout the course.

**BUSN-659 International Business**  
4 credit hours  
Prerequisites: Second Year Standing or Instructor permission  
This course provides an overview of the expanding role of international business in the world marketplace. Emphasis is placed on exploring the complex issues relating to the best practices in International Business. This course will use case studies to illustrate the major topics.

**BUSN-689 Organizational Behavior**  
4 credit hours  
Prerequisites: MGMT-639  
This class will conduct a comprehensive examination of different organizational behavior theories including the analysis at individual, group and organizational levels. Individual levels include perception, personality, and motivation. Group levels will include decision making, group dynamics and team building. Organizational levels will include communications, empowerment, leadership, diversity and cross-cultural issues. Experiential activities will include class exercises such as case studies, videos, and survey instruments as well as team and individual assignments.

**BUSN-779 MBA Capstone: Innovation and New Ventures**  
4 credit hours  
Prerequisites: MGMT-659  
This capstone 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 a new products or services in response to a human need, testing at several stages of the 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.

**CE-612 Digital Systems Design**  
4 credit hours  
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.  
Minimum Class Standing: Graduate  
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, simulation, and implementation techniques are covered. Fundamental algorithms underlying computer-aided design (CAD) tools are studied. Schematic diagrams, hardware description languages (HDL), and system-on-programmable chip (SoPC) design tools are used to specify designs targeted for implementation in technologies ranging from discrete ICs to programmable logic devices, ASICs and SoPCs. Topics in testing of logic circuits and hardware-software co-design will be covered. The course is accompanied by laboratory component that allows students to exercise the principles and practices learned.

**CE-620 Microcomputer Systems**  
4 credit hours  
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.  
Minimum Class Standing: Graduate  
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. Students will also complete independent projects or research assigned by the instructor on topics such as low-power micro architectures and power-aware computing.
CE-622 Computer Architecture and Organization 4 credit hours
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.
Minimum Class Standing: Graduate
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. An independent study or project will be completed.

CE-624 VLSI Design 4 credit hours
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.
Minimum Class Standing: Graduate
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; layout techniques using CAD tools; circuit extraction and analysis. An advanced project is completed.

CE-626 Real-Time Embedded Systems 4 credit hours
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.
Minimum Class Standing: Graduate
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 research-oriented final project.

CE-630 Logic Systems 4 credit hours
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.
Minimum Class Standing: Graduate
This course introduces several types of logic systems and their applications. Topics in asynchronous logic are covered, including design and analysis of asynchronous sequential networks, races, and various types of hazards. The course also covers ladder logic and its implementation in programmable logic controllers. Additionally, an introduction to fuzzy logic is studied, including membership functions, rule creation and evaluation, and applications. This course has a laboratory component that allows students to implement the various logic systems in hardware and software, culminating in a directed design project.

CE-642 Mobile Robotics 4 credit hours
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.
Minimum Class Standing: Graduate
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 explored. The course aims to provide both theoretical and practical experience to students through lectures and hands-on experience with real robots and simulation software. Students will also complete independent projects or research on current topics covering mobile robotics technologies and related fields.

CE-660 Massively Parallel Processors 4 credit hours
(This course is equivalent to CE-460)
Prerequisites: Graduate standing in CE or EE, or instructor approval
Minimum Class Standing: Graduate
This course introduces using massively parallel processors utilizing hundreds of processing cores, those typically used as graphics processing units, for general purpose scientific computing. Topics include the architectural differences between a GPU and a traditional CPU, decomposing problems to efficiently utilize GPUs, and performance optimization techniques, and case studies. This course contains a research project that allows the student to identify a data-parallel algorithm and compare the performance of its CPU and GPU implementations. Terms Offered: Even summers/odd falls.

CE-670 Haptic Systems 4 credit hours
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.
Minimum Class Standing: Graduate
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. Students will be required to complete projects or independent review of research topics with approval of the instructor.

CE-680 Computer Networks 4 credit hours
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.
Minimum Class Standing: Graduate
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; protocols; Ethernet; routing; TCP/IP; HTTP; wireless and mobile networks, multimedia Internet, industrial networks; and Internet applications. Students will be required to complete projects or independent review of research topics with approval of the instructor.
CE-682 Distributed Embedded Systems
Prerequisites: Graduate standing in CE or EE, or instructor’s approval.
Minimum Class Standing: Graduate
This course addresses the most important topics in embedded systems operating in a network environment. Topics include: typical applications of distributed embedded systems, control systems, real-time embedded software, microcontrollers, sensors, actuators, rapid prototyping, network-based software, and dependability concepts. A complete commercial hardware and software development environment that supports rapid prototyping, and debugging is used in laboratory assignments and a term project to develop a complete distributed embedded application. Students will be required to complete projects or independent review of research topics with approval of the instructor.

CE-695 Graduate Research in Computer Engineering
Prerequisites: Graduate standing in CE
Minimum Class Standing: Graduate
This course is directed research towards a master’s thesis. Students must take this course under the direction of a faculty advisor, and it is graded pass or fail. This course may be repeated for credit.

CHEM-561 Physical Chemistry of Energy Conversion
Prerequisite: CHEM-237 or equivalent and enrollment in graduate engineering program; or permission of instructor
Topics covered in this course include chemical thermodynamics, combustion, solutions, electrochemistry, chemical, electrochemical and phase equilibria, and biofuels.

CHEM-635 Multi-component Polymer Systems
Prerequisites: Undergraduate organic chemistry, thermodynamics, polymer science, rheology or Instructor permission
This course promotes understanding of physical property synergism in multicomponent polymer systems for material selection and design purposes. Examination of both qualitative and quantitative chemorheological properties relationships for multicomponent thermoplastic systems. I. Mechanical, rheological, thermal, optical, electrical, chemical, surface and morphological properties of linear and branched copolymer molecular architectures, as well as polymer blends and alloys to meet specific performance criteria. II. Chemical interactions, rheological changes and engineering properties resulting from small molecular weight additives to polymers including plasticizers, stabilizers, fillers and reinforcements. III. Processing methods used in polymer additive compounding and polymer blend manufacturing including melt, solution and dispersion mixing, as well as reactive compatibilization.

CS-541 Web Technology
Prerequisites: CS-461
The 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.

CS-571 Software Requirements Engineering
Prerequisites: CS-471
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.

ECE-610 Modeling of Dynamic Systems
Prerequisites: Linear algebra and difference and differential equations, or Instructor’s permission
This course covers modeling, simulation, and analysis of multivariable dynamic systems. Increasingly, practitioners are called upon to develop and to analyze realistic mathematical models of electromechanical or other dynamic systems. Approaches to modeling a variety of dynamic physical systems are discussed using examples of dynamic systems taken from a variety of fields. These systems are simulated using appropriate simulation tools. Most of the course is devoted to the analysis of linear systems using now classical techniques: linear algebra, state-space representations, and the state transition matrix. The material on nonlinear systems emphasizes modeling and simulation.

ECE-620 CMOS Analog Design
Prerequisite: Knowledge of multi-stage amplifier design.
Minimum Class Standing: BSEE
This course explains the methodology of high performance analog integrated circuit design. Topics include: design of basic cells such as active loads, current mirrors, current and voltage reference; differential and cascade amplifiers; output stages; high speed, low noise, micropower, and chopper stabilized op-amps, co-amp frequency compensation, stitched-capacitor circuits, analog multipliers.

ECE-630 Advanced Digital Signal Processing
Prerequisites: EE-434, MATH-408, or instructor’s permission
Principles of optimum filtering, signal analysis, and spectral estimation are presented. Topics include: review of signal processing systems, the Discrete Fourier Transform, the Fast Fourier Transform, digital filter structures, optimum filters, multirate signal processing, adaptive signal processing, linear prediction, vibration analysis, wavelet theory, and signal processing applications.

ECE-642 Electric Machine Drives
Prerequisites: EE-342, EE-424, or instructor’s approval
Methods of controlling electric machines and their applications are discussed. Topics include solid-state devices; various switching schemes; types of drives; characteristics of motors; controlling motors including vector control; braking of motors; and dynamics of electric drives and applications.

ECE-648 Electromagnetic Compatibility
Prerequisites: Basic topics in electromagnetic compatibility or permission of the instructor
This course studies in-depth classical and currents topics in the field of electromagnetic compatibility (EMC). This includes signal integrity, high-speed digital design matching techniques, passive filter design, single and multilayer shielding, electrostatic discharge, high-frequency measurements, circuit board layout, and grounding methodology.

**ECE-680 Robot Motion Planning for Industrial Automation**
Prerequisite: EE-582
Minimum Class Standing: BSEE
Robots are widely used in many modern industrial automation applications, which demands effective and optimized robot motion planning. This course introduces students to the world of robot motion planning with a focus on robotic applications in industrial automation. Students will obtain fundamental knowledge in robot motion planning as well as state-of-the-art technologies in this area. Hands-on experience will also be gained through simulation and programming practices.

**ECE-682 Mobile and Wireless Computing**
Prerequisites: CE-480 or Instructor’s permission
This course focuses on the topics of mobile, pervasive, and wireless computing and networking. Students acquire hands-on experience with wireless and portable technology, and learn about its applications and limitations. The course covers network protocols including mobile networks (Mobile-IP), and ad-hoc networks. Newly emerging computing models such as mobile client/server, wireless thin client, disconnected operation, and proximity computing are also covered. The course requires project work.

**ECON-513 Micro/Macro Economic Concepts & Applications**
Prerequisite: None
This course consists of two modules: One in managerial economics and another in intermediate macroeconomics. The course is designed to serve as a prerequisite course for students entering graduate programs in management and related fields. Terms Offered: See course offering matrix

**EE-524 Fuel Cell System Integration and Packaging**
Prerequisites: EE-424 or EE-322 and MECH-325 or MECH-420
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.

**EE-530 Digital Control Systems**
Prerequisites: EE-432
Control of continuous-time processes using computer-based controllers is studied. Topics include: design of control algorithms for implementation on 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.

**EE-580 Automotive Electronic Systems**
Prerequisites: EE-320, EE-432 or MECH-430
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.

**EE-582 Robot Dynamics and Control**
Corequisite: EE-432
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.

**EE-584 Wireless Communications for Automotive Applications**
Prerequisites: EE-430
This course includes the description, analysis, selection and design of wireless communication systems, particularly those for automotive applications. The topics of the course include familiarization with practical methods of wireless communications 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.

**EE-695 Graduate Research in Electrical Engineering**
Prerequisite: Graduate standing in EE
Minimum Class Standing: Graduate
This course is directed research towards a master’s thesis. Students take the course under the direction of a faculty advisor. This course may be repeated for credit.

**FINC-619 Financial Management**
Prerequisite: None
This course covers the description, analysis, selection and design of wireless communication systems, including mobile wireless networks and ad-hoc networks. It is designed to serve as a prerequisite course for students entering graduate programs in management and related fields. Terms Offered: See course offering matrix.
Prerequisites: ACCT-212 or ACCT-315 or ACCT-518
The purpose of this course is to provide the student with an overview of the role in the firm that is performed by financial management. The first half of the course focuses on the theoretical valuation of stocks and bonds and the capital markets in which they are traded. The second half of the course focuses on both the use of financial leverage by the firm and working capital management. The need for financial managers to provide both ethical and legal leadership for the firm is stressed throughout the course.

HMGT-609 Healthcare Management 4 credit hours
Prerequisite: Graduate Admission
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 polices and their effect on healthcare system performance.

IME-563 Safety and Human Factors 4 credit hours
Prerequisites: Admission to an engineering graduate program or Instructor’s permission
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.

IME-564 Ethics & Practice of Engineering 4 credit hours
Prerequisites: Admission to an engineering graduate program or Instructor’s permission
The course deals with the professional and ethical consideration of an engineer in contemporary society. Discussions include the code of ethics for engineers, case studies on conflict of interest, team, engineering/management responsibilities, environmental considerations and professional registration. This class requires live weekly discussion.

IME-572 Introduction to Reliability 4 credit hours
Prerequisites: MATH-408
Corequisites: 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 4 credit hours
Prerequisites: IME-333, IME-471
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.

IME-575 Failure Analysis 4 credit hours
Prerequisites: IME-301
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, corrosion, and material process analysis. This course requires a laboratory analysis project.

IME-583 Industrial Engineering Concepts 4 credit hours
Prerequisite: 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.

IME-601 Fundamentals of Manufacturing Engineering 4 credit hours
Prerequisites: Admission to Graduate Program
This course provides a general overview of the field of Manufacturing Engineering. Topics introduced include: various manufacturing processes, materials, quality assurance, quality control, safety, ISO/QS 9000, process and facilities planning, project management, and lean manufacturing. This course is delivered entirely via the internet.

IME-603 Computer Numerical Control Machining 4 credit hours
Prerequisites: IME-100, IME-301 or equivalent
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.

IME-604 Sheet Metal Forming 4 credit hours
Prerequisites: IME-301 or equivalent
This course is directed at the forming of sheet metal components including the materials and their properties, strain circle analysis, shearing, forming and special forming processes. Also included are discussions of lubrication, press design and operation, simulated forming processes, and tool materials. Students will be able to design sheet processing steps and identify sheet forming operations from stamped parts.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>IME-605</td>
<td>Applied Statistics</td>
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<td>(This course is equivalent to MATH-605)</td>
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<td></td>
<td>Prerequisites: Undergraduate (calculus based)</td>
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<td>course in probability and statistics</td>
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<td>Students will study wide variety of probability</td>
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<td>models, e.g. Poisson process, Gamma, Weibull,</td>
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<td>and Gompertz distributions, their</td>
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<td>interrelationships, and applications to quality</td>
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<td>control and reliability. Inferential statistics</td>
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<td>for one-sample and two-samples will include</td>
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<td>methods of point estimation (such as m.l.e.),</td>
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<td>interval estimation and power and sample size</td>
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<td>analysis for hypothesis testing. One-way ANOVA</td>
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<td>and multiple regression analysis will be</td>
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<td>thoroughly discussed. Non-parametric methods</td>
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<td>and categorical data analysis will be</td>
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<td>studied time permitting.</td>
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<td>Computer packages such as MINITAB will be used</td>
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<td>for all applications and the analysis of data</td>
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<td>sets. Terms Offered: As needed.</td>
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<td>IME-620</td>
<td>Design of Experiments</td>
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<td>Prerequisites: IME-605 or MATH-605</td>
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<td>Corequisites: None</td>
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<td>This course covers topics in design of</td>
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<td>experiments. It includes linear regression</td>
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<td>analysis, ANOVA, introduction to DOE, basic</td>
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<td>designs, factorial designs, blocking, Taguchi</td>
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<td>designs, and response surface methodology.</td>
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<td>Statistical software such as MINITAB is used</td>
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<td>throughout the course. Terms Offered: At least</td>
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<td>once on a live/tape basis and the rest via</td>
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<td>tape-delay basis. This is out of necessity and</td>
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<td>flexibility expected of the master’s program.</td>
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<tr>
<td>IME-625</td>
<td>Business Dynamics</td>
<td>4</td>
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<td></td>
<td>Prerequisites: None</td>
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<td></td>
<td>In this course, the student will study the</td>
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<td></td>
<td>dynamics of complex systems, particularly as</td>
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<td></td>
<td>they relate to contemporary Industrial</td>
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<td></td>
<td>Engineering and Manufacturing problems. Included</td>
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<td>in the topics covered will be systems thinking</td>
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<td>and the systems dynamics worldview, reliability</td>
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<td></td>
<td>of forecasts, and supply chains and</td>
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<td></td>
<td>transportation policies, all as they relate to</td>
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<td>contemporary manufacturing and lean manufacturing.</td>
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<tr>
<td>IME-627</td>
<td>Simulation of Facilities</td>
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<td></td>
<td>Prerequisites: Admission to an engineering</td>
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<td>graduate program</td>
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<td>In this course, the student will study how</td>
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<td>several simulation tools can be applied to</td>
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<td>contemporary facility problems. Included in the</td>
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<td>topics covered will be integration of production</td>
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<td></td>
<td>flow from supplier to customer, with emphasis</td>
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<td></td>
<td>on Goldratt concepts, Quick Response Manufacturing,</td>
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<td>and Lean Manufacturing. The course will apply</td>
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<td></td>
<td>concepts of manufacturing to service facilities.</td>
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<tr>
<td>IME-630</td>
<td>Quality Systems Management</td>
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<td></td>
<td>Prerequisites: IME-605 or MATH-605</td>
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<td>Corequisites: None</td>
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<td></td>
<td>Introduction to quality, the management system</td>
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<td></td>
<td>(focusing on customers, leadership, strategic</td>
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<td></td>
<td>planning, human resource practices, process</td>
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<td>management, performance measurement and strategic</td>
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<td>information management, building and sustaining</td>
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<td></td>
<td>total quality organizations), and six sigma</td>
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<td></td>
<td>(principles, statistical thinking, design for</td>
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<td></td>
<td>six sigma, tools).</td>
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<td>IME-652</td>
<td>Designing Value in the Supply Chain</td>
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<td></td>
<td>Prerequisite: A first course in Probability and</td>
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<td></td>
<td>Statistics</td>
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<td></td>
<td>Minimum Class Standing: Admission to Graduate</td>
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<td>Program</td>
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<td></td>
<td>Students gain an understanding of the</td>
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<td>decision-making tools necessary to design value</td>
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<td>in the global supply chain from concept to</td>
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<td></td>
<td>customer. Quantitative methods are employed to</td>
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<td>aid the decision-making process of demand</td>
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<td>forecasting and enterprise planning for the</td>
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<td>purpose of increased profit and value to</td>
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<td></td>
<td>stakeholders. Basic concepts in strategy,</td>
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<td></td>
<td>forecasting, demand planning, inventory control</td>
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<td>and value stream mapping will be taught and</td>
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<td>utilized to enable the decision-making process</td>
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<td></td>
<td>to be based on quantitative metrics.</td>
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<tr>
<td>IME-654</td>
<td>Enterprise Resource Planning</td>
<td>4</td>
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<tr>
<td></td>
<td>Prerequisites: Admission to a graduate program</td>
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<td>or Instructor’s permission This course provides</td>
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<td></td>
<td>an understanding of the integrated approach to</td>
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<td></td>
<td>enterprise planning and its evolution from</td>
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<td>MRP I and MRP II. It describes the core</td>
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<td>structure of ERP systems and highlights the</td>
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<td>characteristics of emerging ERP based</td>
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<td>organizations. Various ERP tools and techniques</td>
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<td>are described and compared. The fundamental</td>
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<td>success factors in moving from traditional</td>
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<td>business functions to an integrated process-based</td>
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<td>ERP environment are introduced.</td>
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<td>IME-656</td>
<td>Engineering for Healthcare Systems</td>
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<td></td>
<td>Prerequisite: None</td>
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<td></td>
<td>Minimum Class Standing: Admission to Graduate</td>
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<td>Program</td>
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<td></td>
<td>This course examines the technical structure of</td>
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<td>the healthcare delivery system and the role</td>
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<td></td>
<td>that industrial and systems engineering (ISE)</td>
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<td>plays in its design and improvement. Included</td>
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<td>will be how healthcare systems work in hospitals,</td>
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<td>medical offices, clinics and other healthcare</td>
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<td>organizations. Traditional ISE methods for</td>
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<td>improving quality, patient safety, and employee</td>
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<td>productivity and satisfaction will be presented</td>
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<td>within a systematic application of value chain</td>
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<td>engineering designed to produce lean processes.</td>
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<td>IME-660</td>
<td>Design for Manufacture &amp; Assembly</td>
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<td></td>
<td>Prerequisites: IME-601 or instructor’s permission</td>
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<td>A study of the current methodologies associated</td>
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<td>with product design for manufacture and</td>
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<td></td>
<td>assembly. Topics include DFMA overview, Design</td>
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<td>for Function, Design for Assembly Principles,</td>
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<td>BDI-DFA Manual Methodology, Creative Concept</td>
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<td>Development, and Concept Selection Methodologies.</td>
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<td>Note: Students who have taken IME-474, Design</td>
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<td>for Manufacture, or its equivalent are not</td>
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<tr>
<td></td>
<td>eligible to enroll in this course but must</td>
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<td></td>
<td>substitute another engineering course approved</td>
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<td></td>
<td>by their faculty advisors.</td>
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<tr>
<td>IME-674</td>
<td>Quality Assurance</td>
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<td></td>
<td>Prerequisites: IME-605 or MATH-605</td>
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<td>Corequisites: None</td>
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This course covers topics in quality assurance. Specifically, it includes introduction to quality and quality philosophy, statistical methods of quality improvement, concept of variation and its reduction, statistical process control, and acceptance sampling. Statistical software such as MINITAB is used throughout the course. Terms Offered: At least once on a live/tape basis and the rest via tape-delay basis. This is out of necessity and flexibility expected of the master’s program.

**IME-676 Lean Six Sigma** 4 credit hours
Prerequisites: A first course in Probability and Statistics
Minimum Class Standing: Admission to Graduate Program
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.

**IME-680 Computer Integrated Manufacturing** 4 credit hours
Prerequisites: IME-601 or instructor’s permission
CIM is defined with current terminology and recent concepts. It includes the relationships among the three major functions - design, manufacturing and business. CIM examples, obstacles to development and future trends are covered. Flexible manufacturing is highlighted. Key components of CIM are explored with special emphasis on robotic automation and control through interaction with the environment, CAD-CAM link with numerical control, process planning and quality assurance. Concurrent Engineering will be used in process and product quality selection. Lean manufacturing principles will be applied. Communication and networking, the artery of CIM, will be studied in the context of data compatibility and hierarchical control. Manufacturing analysis tools will be used to plan and implement a CIM system.

**IME-683 Elements of CIM for Management** 4 credit hours
Prerequisites: IME-601 or MFGO-633
This course is an overview of computer integrated manufacturing (CIM) systems and how they are managed. Topics include management of computer-aided design and manufacturing, group technology and process planning, integrative shop floor management, and networking and database issues in CIM systems. Strategies for planning, implementing, justifying, and managing CIM systems are studied.

**IME-684 Materials & Processes Seminar** 4 credit hours
Prerequisites: IME-301 or equivalent
The first third of the course will be devoted to a review of the principles of materials, property measurement and management. The coverage will include the four major groups of materials metals, polymers, ceramics and composites. The second portion of the course will address traditional processing methods/materials interface and the technologies of contemporary manufacturing. The last third of the course will be devoted to exploring new and emerging technologies for the processing of materials.

**IME-698 Master’s Project** 4 credit hours
Prerequisites: At a minimum, must be in final term of classes for the program, and permission of advisor.
This course is the final project for M.S. programs in IME requiring a master’s project as the capstone of the program. The project — as opposed to a thesis — will generally be performed for the benefit of the student’s cooperative education employer. It will generally involve the application of knowledge acquired in the student’s program and most likely will not require original research. A faculty member will serve as project advisor and will be the evaluator of the student’s project proposal and final report.

**ISYS-629 Managing an IT Infrastructure** 4 credit hours
Prerequisites: ISYS-669
The student will learn about telecommunication fundamentals including data, voice, image and video. The course covers IT subject matter such as the concepts, models, architectures, protocols, standards, and security for the design, implementation, and management of digital networks. Other areas covered are the essentials of local area networks (LAN), metropolitan area networks (MAN), and wide area networks (WAN). Topics covered include security and authentication, network operating systems, e-commerce and associated web sites and practices, and middleware for wireless systems, multimedia and conferencing.

**ISYS-659 Integrated Information System Capstone** 4 credit hours
Prerequisites: ISYS-669, MGMT-619
This course focuses on the design and management of an overall organizational system consisting of three interacting subsystems: (1) the enterprise itself - its structure, core processes, and relationships with external entities such as customers, suppliers, and outsourcers; (2) the IS function and its role in marshalling information technologies and information assets to support the strategy of the organization, and (3) the information technology architecture consisting of the organization’s networks, hardware, data, and applications. The student will learn how to integrate and synthesize these three aspects of the enterprise, how IT must be aligned with the strategy of the organization, and how to make appropriate choices about architecture in relationship to overall organization goals. Special emphasis will be given to the role of Service Oriented Architectures as a means of integrating multiple organizations.

**ISYS-669 Enterprise Information System Models** 4 credit hours
Prerequisite: None
Minimum Class Standing: Graduate Standing
This course overviews information systems (IS) viewed at two levels: the strategic role of IS and 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) Product Lifecycle Management (PLM) and social networks. The course also provides a brief IS infrastructure overview and addresses key IS management topics. Students learn about the ethical and legal implications of information systems.

**KETT-540 Environmentally Conscious Design** 4 credit hours
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.

MATH-601 Advanced Engineering Mathematics 4 credit hours
Prerequisite: Undergraduate Mathematical Review
This course begins with a brief introduction to the complex number system. It continues with a study of linear algebra including vector and matrix algebra, systems of equations, eigenvalues, vector spaces, independence, basis and dimension, inner products and orthogonality, linear transformations, and norms. Several useful and important decompositions such as QR, SVD, and Schur will be studied, applications of linear algebra from various engineering fields are presented. It includes the usage of appropriate software.

MATH-602 Applied Statistics 4 credit hours
Prerequisites: Undergraduate Engineering Math Review
This course covers introductory topics in applied probability and statistics. Specifically various but useful probability distributions such as normal, binomial and Poisson will be covered. Statistical process control covering all basic control charts and gage R & R studies will be introduced. The statistical software MINITAB will be extensively used throughout the course.

MATH-605 Applied Statistics 4 credit hours
(This course is equivalent to IME-605)
Prerequisites: Undergraduate (calculus based) course in probability and statistics
Students will study a wide variety of probability models, e.g. Poisson process, Gamma, Weibull and Gompertz distributions, their interrelationships, and applications to quality control and reliability. Inferential statistics for one-sample and two-samples will include methods of point estimation (such as m.l.e.), interval estimation and power and sample size analysis for hypothesis testing. One-way ANOVA and multiple regression analysis will be thoroughly discussed. Non-parametric methods and categorical data analysis will be studied time permitting. Computer packages such as MINITAB will be used for all applications and the analysis of data sets. Terms Offered: As needed.

MECH-510 Analysis & Design of Mechanical Assemblies 4 credit hours
Prerequisites: MECH-300, MECH-310, MECH-312, or equivalent, as approved by the professor
The main aim of this course is to integrate the concepts of kinematic & dynamic analyses to the design of machines and mechanical assemblies used in automotive, medical equipment and other applications. These include (but are not limited to) the analysis and design of reciprocating engine sub-systems such as, piston cylinder mechanism, steering linkages, window and door-lock mechanisms, over-head valve linkage system, flywheel, gears & gearboxes, universal couplings and automotive differential. Synthesis of mechanism systems used in medical equipment area will also be covered. Kinematic and dynamic characteristics such as displacement, velocity, acceleration and forces are analyzed by graphical and analytical methods. CAE tools will be used to perform kinematic, dynamic and stress analyses and fatigue design of these systems using CAE tools. Temperature effects will also be included wherever appropriate in the design. Several practical design projects will be assigned during the term of this course.

MECH-514 Experimental Mechanics 4 credit hours
Prerequisites: IME-301 or PHY3-342, MECH-300, MECH-312, MECH-330
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 covered. 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.

MECH-515 Failure and Material Considerations in Design 4 credit hours
Prerequisite: None
Designing components that are safe and reliable requires efficient use of materials and assurance that failure will not occur. Even still, components do fail. In this course, students will be introduced to the techniques of designing for life and material considerations involved in that process. In addition, students will also study how to analyze those components which do fail, and evaluate safe-life and remaining life in a design through the study of real-life component design and current failures.

MECH-516 Introduction to Finite Element Analysis with Structural Applications 4 credit hours
Prerequisites: MECH-212, MECH-310, MECH-330
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/I-DEAS and MSC/NASTRAN will be utilized.

MECH-521 Energy and Environmental Systems Design 4 credit hours
Prerequisites: IME-301 or PHYS-342, MECH-300, MECH-312, MECH-420
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.
MECH-523 Applied Computational Fluid Dynamics 4 credit hours
Prerequisites: MECH-322, MECH-420, MATH-313 or MATH-418, or MATH-423, or Permission of Instructor
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.

MECH-525 Introduction to Multiphysics Modeling and Simulation in Fluid Mechanics and Heat Transfer 4 credit hours
Prerequisites: MECH-322, MECH-420, Graduate Standing
Corequisites: None
This course covers a variety of engineering problems with the aid of computational software mainly in the field of fluid mechanics and heat transfer. The objectives of this course are to introduce the students to and provide an extensive experience in the engineering 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.

MECH-526 Fuel Cell Science & Engineering 4 credit hours
Prerequisites: CHEM-237/238 or CHEM-361 or PHYS-452, MECH-325 or MECH-420
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.

MECH-527 Energy and the Environment 4 credit hours
Prerequisite: None
This course covers energy conversion and conservation, fossil fuels, renewable and bio-fuels, solar, geothermal and nuclear energy, alternative energy (wind, water, biomass), hydrogen as an energy carrier, historical context of the technology, the role of energy in society (economic, ethical, and environmental considerations), energy forecasts and the trend toward a hydrogen economy. Public policy, global warming and CO₂ footprints and offsetting are also discussed. Several laboratory experiments including solar heating, ethanol production and wind energy will be included in this course.

MECH-528 Bio and Renewable Energy Laboratory 4 credit hours
Prerequisite: MECH-320, MECH-322
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.

MECH-529 Design and Modeling of Fuel Cell Systems 4 credit hours
Prerequisites: MECH-322, MECH-420
Corequisites: MECH-422, MECH-526
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.

MECH-540 Introduction to Internal Combustion Engines and Automotive Power Systems 4 credit hours
Prerequisite: MECH-320
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.

MECH-541 Advanced Automotive Power Systems 4 credit hours
Prerequisite: MECH-540
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 injection [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.).

**MECH-542 Chassis System Design**
**Prerequisite:** Dynamics and Vibrations

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 application 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.

**MECH-544 Introduction to Automotive Powertrains**
**Prerequisite:** MECH-212

An introduction to the performance of motor vehicles 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.

**MECH-545 Hybrid Electric Vehicle Propulsion**
**Prerequisite:** None
**Corequisites:** EE-432 or MECH-430 or permission of instructor

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.

**MECH-546 Vehicle System Dynamics**
**Prerequisites:** MECH-330

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.

**MECH-550 Automotive Bioengineering: Occupant Protection and Safety**
**Prerequisite:** MECH-310

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.

**MECH-551 Vehicular Crash Dynamics and Accident Reconstruction**
**Prerequisites:** MECH-310

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 crash 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.

**MECH-562 Compressible Flow/Gas Dynamics**
**Prerequisites:** MECH-320, MECH-322 or Permission of Instructor
**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.

**MECH-564 Aerodynamics and Wing Theory**
**Prerequisite:** MECH-320, MECH-322, MATH-305 or MECH-522, or permission of instructor

This 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.

MECH-570 Computer Simulation of Metal Forming Processes 4 credit hours
Prerequisites: IME-301, MECH-212, MECH-310
Corequisite: MECH-300
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 Quicksnap®, and LS-DYNA® will be utilized for the course. These solution procedures along with limitations of the software will be discussed with emphasis on techniques in an applied manner.

MECH-572 CAD/CAM and Rapid Prototyping Project 4 credit hours
Prerequisites: MECH-100, MECH-300
Capstone design project course in which students acquire an integrating experience leading them from CAD of a part (designed using sculptured surface and solid modeling techniques), through rapid prototyping of that part (using stereolithography) and into mold or die design and manufacture, (using CAD/CAM system such as I-DEAS, Solid Edge, and Unigraphics).

MECH-580 Properties of Polymers 4 credit hours
Prerequisites: IME-301, MECH-212, MECH-300
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, Tg, Tm, rubber elasticity and viscoelasticity (creep). There will be materials' selection and design projects.

MECH-582 Mechanics and Design Simulation of Fiber-Reinforced Composite Materials 4 credit hours
Prerequisites MECH-212, MECH-300
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.

MECH-595 Automotive Seminar I 4 credit hours
Prerequisite: 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. This course is not open to undergraduates.

MECH-596 Automotive Seminar II 4 credit hours
Prerequisite: 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. This course is not open to undergraduates.

MECH-600 Engineering Mathematics with Applications 4 credit hours
Prerequisites: MATH-204, MATH-305 or MATH-307, MECH-420
The objectives of this course are to introduce students to various analytical and numerical methods used in the modeling, analysis, and design of engineering systems. The theory and application of these methods will be introduced. Applications to real-world mechanical and thermal-fluid systems will be performed.

MECH-610 Mechanics of Materials I: Linear Elasticity 4 credit hours
Prerequisite: None
This course introduces the general model of deformation and displacements; and, their application to linear elastic solids. The formulation of deformation gradients, displacement gradient, strain, and stress tensors will be discussed. The derivation of the general equation of motion of a deforming solid will be conducted. The general constitutive relation of elastic materials will be introduced. The linearized general deformation measures and constitutive relation will be utilized with the general equation of motion and compatibility conditions to develop the general theory of linear elasticity. The developed theory will then be applied to solve for the deformation and stresses of elastic solids under plane strain, plane stress and beam theory conditions.

MECH-611 Mechanics of Materials II: Nonlinear Elastic-Plastic Behavior 4 credit hours
Prerequisites: MECH-610
This course deals with the general nonlinear theory of deformation and its application to elastic-plastic behavior of materials. The linear elastic behavior will be reviewed along with its application to deformation of plates and shells. The geometric nonlinear deformation measures will be discussed. The application of the general equation of motion to nonlinear deformation of solids will be conducted. The nonlinear theories of elasticity and plasticity materials will be introduced. The nonlinear deformation measures and constitutive relation will be utilized with the
MECH-613 Nonlinear Finite Element Analysis 4 credit hours
Prerequisites: MECH-611
This course introduces the theory and application of nonlinear finite element analysis in engineering design. The classification and formulation of different nonlinear behaviors and computational techniques will be discussed. Material and geometric nonlinear behaviors will be studied. The computational techniques for solving the different classes of nonlinear problems will be formulated. These techniques include implicit and explicit methods. Commercial software will be used to apply the formulated algorithms to the analyses of nonlinear crash and metal forming engineering problems.

MECH-615 Engineering Optimization 4 credit hours
Prerequisites: MECH-522
This course introduces the general model of numerical optimization and its application to engineering design. The formulation and classification of the optimization problems will be discussed. The computational search techniques for solving the different classes of optimization problems will be studied. These techniques include single and multi variable, zero and first order constrained and unconstrained, linear and nonlinear search algorithms. The developed algorithms will be used to find the optimum solutions for a variety of engineering design problems.

MECH-621 Applied Transport Phenomena 4 credit hours
Prerequisites: MECH-322, MECH-420
The objective of this course is to introduce concepts normally not covered in undergraduate Heat Transfer and Fluid Flow. Concepts relating to advanced heat convection and mass diffusion, turbulent and laminar boundary layer flows with heat transfer and mass transfer will be introduced. Topics in advanced heat conduction and droplet evaporation will also be introduced. Heat transfer for internal and external flow problems will be considered. The relationship between fluid flow, heat, and mass transfer in engineering systems will be discussed. Analytical and approximate solutions to these problems will be presented.

MECH-622 Computational Heat & Mass Transfer 4 credit hours
Prerequisites: MATH-601, MECH-522
The objective of this course is to introduce the student to the use of numerical methods that are commonly used to solve transient, non-linear, three-dimensional engineering problems with complicated geometries. Analytical methods that could be used to solve these types of problems will be presented. Some of these analytical methods can only be used to solve problems with simple geometries and simple boundary conditions. However, numerical methods can be used to solve problems with complicated geometries and boundary conditions. Engineering problems involving several different physical phenomena simultaneously, such as fluid flow with heat transfer and mass transfer, will be considered. In this case, the governing differential equations are coupled and should be solved simultaneously. Methods on how to treat non-linear terms will be discussed. Moreover, the method of staggered grids and upwind schemes that are used to solve fluid flow problems will be presented. For transient problems, implicit and explicit methods will also be presented. The student will be required to write his or her own computer code to implement these methods to solve engineering problems. For very complicated geometries, the student will be required to use a commercial or existing code. The student will be able to relate the computer output to the performance/behavior of the physical system. The limitations and convergence/stability issues associated with these numerical methods will be discussed.

MECH-626 Hydrogen Generation, Storage and Safety 4 credit hours
Prerequisite: Undergraduate Chemistry, Fuel Cell Science and Technology or Instructor’s Permission
This course covers various methods of hydrogen production: water electrolysis using photovoltaics, steam reformation and partial oxidation techniques of various types of conventional and alternative fuels. Various methods of hydrogen storage – compressed gas, liquefied gas, metal and chemical hydrides and nanotubes are included. Codes for underground and above ground pressurized hydrogen gas storage systems and safety aspects are covered. A comparison is made between hydrogen properties and known conventional fuels such as, methane (natural gas), gasoline, methanol and ethanol. Infrastructure design studies, dispensing transportation, codes and standards are covered. A hydrogen storage/production/safety laboratory for experimental studies is planned to be a major component of this course.

MECH-627 Green Energy Conversion 4 credit hours
Prerequisites: MECH-320, MECH-322, MECH-420
This course covers radiant energy transfer from the sun and its application to solar exchangers. Basic theory, energy balances for solar exchangers, economics, and practice of solar energy applications are included. The concepts are applied to renewable energy systems such as solar heating and cooling systems for homes, businesses, and industry. Windmill theory and applications as well as system design are also covered. Data obtained on large scale solar and windmill systems will be analyzed and discussed.

MECH-641 Combustion & Emissions 4 credit hours
Prerequisites: MECH-322, MECH-420
This course introduces the student to the basic principles of combustion and how to apply them to basic engineering problems. Various technologies of this field will be explored. However, a large portion of the course will cover the fundamentals of combustion. Topics relating to flame speed, flame thickness, flame spread, flame quenching, blow-off, stabilization, ignition energy, flammability limits, and flashback will be presented. Laminar and turbulent premixed and diffusion flames will be discussed. These topics will be related to combustion and emissions in spark-ignition and diesel engines.

MECH-643 Noise, Vibration & Harshness 4 credit hours
Prerequisites: Graduate Standing
An integrated approach to the analysis of Noise, Vibration and Harshness of automotive engineering is presented. Techniques for evaluating the vibration and acoustic characteristics of vehicle systems are discussed. Then the principles of noise and vibrations control are presented through automotive applications.

MFGO-601 The Globally Integrated Manufacturing Company 4 credit hours
Prerequisite: None

This course is an integrated overview and introduction to contemporary global manufacturing operations. The focus of this course is the application of attitudes, skills, and knowledge required of managers, supervisors, and team leaders and manufacturing professionals in a cross-functional and cross-cultural manufacturing operation. After a brief historical overview of global, manufacturing, this course covers the following topics: global leadership, cross-cultural business communication, customers-across-continents, empowerment and cross-cultural teamwork, continuous process improvement, manufacturing metrics, policy deployment, ISO and QS 9000, computer integrated manufacturing, process re-engineering, international supply chain management, and theory of constraints. This foundation leads up to a discussion on the lean and agile manufacturing management. Students are required to use the concepts from the class to analyze their own work environment.

**MFGO-603 Data Analysis for Problem Solving**
4 credit hours

Prerequisite: Knowledge of MINITAB software required

This course teaches the principles and techniques for collecting, analyzing, interpreting, and communicating information based on data. Data analysis emphasizes the fundamentals behind designing data collection strategies that lead to useful information for problem solving and product improvements. Data analysis techniques include descriptive statistics, statistical inference, hypothesis testing, quality control, regression analysis, Chi-square testing, and experimental design. Use of statistical software will be made to illustrate important data analysis concepts with a focus on understanding the computer output. The project requirement is expected to enable students apply the data analysis concepts learned in the class.

**MFGO-605 Global Human Resources and Supply Chains**
4 credit hours

Prerequisites: MFGO-601

This course focuses on three primary topics: cross-cultural business communication, international human resource management, and global supply chain management. Students will gain knowledge and develop skills in intercultural business relations and assess their own competency. International human resource issues include selection, placement, evaluation, training, leadership development, labor relations and expatriation. The final month of the course is dedicated to understanding global supply chains, how to make them successful, and defining the role of the supply chain manager.

**MFGO-619 Six Sigma for Manufacturing**
4 credit hours

Prerequisites: A first course in Probability and Statistics
Minimum Class Standing: Admission to Graduate Program

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.

**MFGO-633 Lean Production Systems**
4 credit hours

Prerequisites: (MFGO-601, and MFGO-603 or MFGO-619) or (MATH-205 or MATH-337 or MATH-408 or MGMT-521) and (IME-601)

This course starts from the discussion of the evolution of the production systems, from craft to mass and to lean production. Principles of systems thinking and business dynamics applied to production systems are also studied. Contemporary lean thinking principles, lean enterprise development, and value stream mapping are studied and used in student projects. Modern enterprise improvement techniques such as Six Sigma, Theory of Constraints and Business Process Reengineering are also discussed.

**MFGO-635 Work Analysis for Lean Production Applications**
4 credit hours

Prerequisites: MFGO-633

A critical issue facing most manufacturers of a product is the design of a competitive and low-cost manufacturing operation. In this course, work analysis will consist of the application of process analysis, methods improvement, and work measurement and ergonomic techniques to meet the competitive goals of a manufacturing company or office environment. The intent of this course is to survey the basic techniques of methods design, work measurement, business process analysis, and ergonomics. The student will be expected to solve fundamental and open-ended problems encountered during the design, analysis, or operation of a manufacturing facility (or an office) that produces a discrete product (or service).

**MFGO-637 Quality Systems for Zero Defects**
4 credit hours

Prerequisites: MFGO-633

This course will provide manufacturing professionals with a variety of tools necessary for continuous improvement of processes. The course project will examine the student’s personal processes and apply the tools to make concrete improvements in their day-to-day activities. The course then extends these personal experiences to the entire manufacturing and business environment.

**MFGO-639 Quality Assurance and Reliability**
4 credit hours

Prerequisites: None

This course covers topics in quality assurance. Specifically, it includes introduction to quality and quality philosophy, statistical methods of quality improvement, concept of variation and its reduction, statistical process control, and acceptance sampling. Statistical software such as MINITAB is used throughout the course.

**MFGO-649 Metrics for Lean Production Improvement**
4 credit hours

Prerequisites: (MFGO-635) and (MFGO-637 or MFGO-639)

This course provides the manufacturing operations professional with an understanding of the data typically available within a manufacturing environment and how to use this information for improving those operations within the lean paradigm. The course covers basic financial accounting, activity based metrics, links to strategy, trend analysis and decision making. Student teams operate simulated companies in competition with other student teams to gain experience in applying the concepts covered.

**MFGO-659 Integrative Capstone Project**
4 credit hours

Prerequisites: MFGO-605, MFGO-649
The course will establish a business-focused, project-oriented perspective applicable to the integrated manufacturing operating (IMO) environment. Learning about the principles and techniques that are within the discipline of Project Management will involve a focus on the body of knowledge recognized by the Project Management Institute. The IMO environment will be the basis for projects by student teams as they integrate their knowledge gained from other courses and professional experience. The project requirement is expected to enable students to apply the Project Management concepts and techniques learned in the class. In summary, this course will assist the students to become knowledgeable about and practice Project Management, its applications, and limitations.

**MGMT-521 Statistical & Quantitative Methods for Managerial Decisions**  
Prerequisite: Graduate Admission  
4 credit hours

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.

**MGMT-550 Management Concepts & Applications**  
Prerequisite: Graduate Admission  
2 credit hours

Both the art and the science of management will be introduced and examined through multiple perspectives within a global and ethical context. An examination of the functions of a manager builds upon the elements of organizational and behavioral theory. Principles of organizational structure and design will also be discussed. The importance of management in dealing with the complexity of modern organizations will be emphasized throughout.

**MGMT-609 Technology Management**  
Prerequisite: Admission to graduate program  
Minimum Class Standing: None  
4 credit hours

This course is an overview of Management of Technology and Innovation (MTI) and its impact on contemporary management practices. The focus of the course is on the application of skills and knowledge required of managers and technology professionals responsible for technology implementation in a product development environment. The course analyzes the critical aspects of the management of technology and innovation at the product line, business unit, and corporate levels. Case studies and simulations are used to bring to life the critical challenges confronting managers of technology.

**MGMT-619 Project and Change Management**  
Prerequisites: ACCT-212 or ACCT-315 or ACCT-518  
4 credit hours

Managing projects within an organizational context, including the processes related to initiating, planning, executing, controlling, reporting, and closing a project. Project integration, scope, time, cost, quality control, and risk management. Managing the changes in organizations resulting from introducing or revising information systems. Identifying project champions, working with user teams, training, and documentation. The change management role of the IS specialist.

**MGMT-629 Management Science**  
Prerequisites: MATH-205 or MATH-337 or MATH-408 or MFGO-603 or MGMT-521  
4 credit hours

This course provides the manager with a variety of quantitative techniques to facilitate the decision-making process. Both optimization techniques such as linear programming and stochastic techniques such as waiting-line models and Markov processes are covered. Emphasis is placed on the application of these quantitative techniques to a variety of managerial decision areas.

**MGMT-639 Managing People & Organizations**  
Prerequisites: MFGO-605 or MGMT-350 or MGMT-550  
4 credit hours

The purpose of this course is to begin preparing students for management positions in high tech and manufacturing companies. In this overview course, students will be introduced to the most important concepts and issues concerning the management and leadership of high technology staff. Subjects include high tech leadership and communication, change management, lean thinking, HR issues, ethics and persuasion.

**MGMT-649 Business Ethics and Leadership**  
Prerequisite: MGMT-639  
4 credit hours

The course prepares students for leadership roles in the workplace and in society by giving them knowledge of management and leadership from an ethical perspective. This course will focus on the evolution of ethical theories and the role of the leader within the business context. Students will use their understanding of business, leadership and the processes of moral reasoning to examine contemporary issues relating to organizations. Through lecture and case method, students will apply their knowledge of leadership to contemporary situations.

**MGMT-659 Strategy**  
Prerequisites: BUSN-659, FINC-619, MGMT-639, MRKT-679  
4 credit hours

The capstone business class focuses on the formulation, implementation, and evaluation of organizational policy and strategy from the perspective of the senior manager/strategy planner. Consideration is additionally given to information technology, global operations, ethics, legal perspectives and the functional level strategies of the organization. An integrative approach uses the case method to explore executive decision making in the global marketplace.
MGMT-661 Operations Management
Prerequisites: MATH-205 or MATH-337 or MATH-408 or MFGO-603 or MGMT-521 or MFGO-619
This course will provide students with an exposure to and an understanding of the core concepts and tools of operations management. These concepts and tools will be presented in a manner that will allow students to understand the fundamental importance of coordinated operational activities. The class will examine how to effectively integrate operations across all functional areas of the organization in delivering the combination of service and manufactured value required to satisfy customers. Recognition of the importance of adding value and customer satisfaction to the long-term viability of both for-profit and not-for-profit firms will be emphasized.

MGMT-669 Supply Chain Operations
Prerequisite: None
Minimum Class Standing: Graduate Admission
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.

MGMT-679 Leadership
Prerequisite: None
This course will be a comprehensive examination of different leadership theories, with emphasis on relevant empirical evidence and application of the theories to case studies that involve leadership and group functioning. Students will thoroughly examine a professional review of concepts and apply their understanding through a variety of means. Ethics and persuasion are covered.

MRKT-570 Marketing Concepts & Applications
Prerequisite: Graduate Admission
Corequisite: MGMT-550
This course provides an overview of consumer marketing’s role in business. Marketing Concepts and Applications are integrated into a marketing discipline that enables students to become effectively engaged in consumer to customer product and service related endeavors.

MRKT-679 Marketing Management
Prerequisites: MRKT-370 or MRKT-570
This course provides an overview of marketing’s role in connecting businesses to other businesses. While this course will cover the basic Business Management topics, a special emphasis is placed on the best practices in market relationship management, supply chain management, and strategy development. Cases will be used throughout the course to illustrate various concepts and issues.

ORTN-600 Graduate Orientation
Prerequisite: Graduate Acceptance
As a graduation requirement, all Kettering University graduate students are required to successfully complete this course. Terms Offered: All
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Mr. Charles F. Kettering III (chair), President, Ridgeleigh Management Company, Denver CO
Ms. Cynthia A. Niekamp (vice chair), Senior Vice President, Automotive Coatings, PPG Industries Inc, Troy MI
Ms. Jacqueline A. Dedo ’84 (secretary), Chief Strategy Officer, Dana Holding Corporation, Van Buren Township MI
Dr. Robert K. McMahan, Jr., President, Kettering University, Flint MI

Mr. Henio R. Arcangeli, Jr. ’86, President, Motorsports Group Company, Yamaha Motor Corp USA, Cypress CA
Ms. Lizabeth A. Ardisana, CEO, ASG Renaissance, Dearborn MI
Ms. Mary T. Barra ’85, Senior Vice President, Global Product Development, General Motors Company, Detroit MI
Ms. Jane E. Boon ’90, New York NY
Mr. Walter G. Borst ’85, President and CEO, Asset Management, General Motors Company, New York NY
Mr. Bruce D. Coventry ’75, CEO, Nostrum, New Brunswick NJ
Mr. Gary L. Cowger ’70, Chairman and CEO, GLC Ventures LLC and Group Vice President Emeritus, Global Manufacturing & Labor, General Motors Corporation, Bloomfield Hills MI
Mr. Cornelius (Neil) De Koker ’67, President & CEO, Original Equipment Suppliers Assn, Troy MI
Mr. Gregory S. Deveson ’84, Senior Vice President, Driveline & Chassis Controls Systems, Magna Powertrain USA, Troy MI
Mr. Vincent G. Dow, Vice President, DTE Energy Company, Detroit MI
Mr. Phillip C. Dutcher ’74, COO, NCH Healthcare System, Naples FL
Mr. David S. Hoyte ’71, President, Transformation Management LLC, Fort Lauderdale FL
Mr. Jesse M. Lopez, CEO, BAE Industries, A Marisa Company, Auburn Hills MI
Dr. Dane A. Miller ’69, President and CEO Emeritus, Biomet, Winona Lake IN
Mr. John W. Moyer, President, Asahi Kasei Plastics, Fowlerville MI
Mr. Christopher M. Nielsen ’87, President, Toyota Motor Manufacturing, Texas Inc, San Antonio TX
Mr. Robert S. Oswald ’64, Chairman Emeritus, Bendix Commercial Vehicle Systems LLC, Elyria OH
Mr. Jeffrey J. Owens ’78, CTO and Senior Vice President, Delphi Automotive, Troy MI
Mr. Frank J. Perna, Jr. ’60, Chairman Emeritus, MSC Software, Santa Ana CA
Mr. J. Donald Rice, Jr. ’81, President and CEO, Rice Financial Products Company, New York NY
Dr. Heinz P. Schulte, Vice President, Strategy and Business Development & University Relations, P3 Engineering North America Inc, Troy MI
Mr. Raymond E. Scott, Executive Vice President and President, Seating Operations, Lear Corporation, Southfield MI
Ms. Marjorie Sorge, Executive Director, Detroit Regional News Hub, Detroit MI
Ms. Lyn St. James, Lyn St. James Foundation, Phoenix AZ
Mr. Randy Stashick, Vice President of Engineering, UPS, Atlanta GA
Ms. Diana D. Tremblay ’82, Global Chief Manufacturing Officer, General Motors Company, Warren MI
Senior Administration

Dr. Robert K. McMahan, Jr., President
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Ms. Susan L. Davies, Vice President for University Advancement and External Relations
Ms. J. Betsy Homsher, Vice President for Student Life and Dean of Students
Ms. Viola M. Sprague, Vice President for Instructional, Administrative and Information Technology

Academic Department Heads

Dr. Leszek Gawarecki, Department of Mathematics
Dr. John Geske, Department of Computer Science
Dr. Craig J. Hoff, Department of Mechanical Engineering
Dr. James McDonald, Department of Electrical & Computer Engineering
Dr. Kathryn Svinarich, Department of Physics
Dr. W.L. Scheller, Department of Business (Interim)
Dr. W.L. Scheller, Department of Industrial & Manufacturing Engineering
Dr. Stacy Seeley, Department of Chemistry, Biochemistry and Chemical Engineering
Dr. Karen Wilkinson, Department of Liberal Studies

FACULTY

The Kettering University faculty listed below have been designated to teach the graduate courses for our programs. The majority hold doctorates and nearly all of them have consulting experience in industry and business.

BASEM ALZAHABI, Professor of Mechanical Engineering
  B.S. 1981, Damascus University, Syria; M.S. 1986, M.S. 1988, Ph.D. 1995, University of Michigan

PATRICK J. ATKINSON, Professor of Mechanical Engineering

PINHAS BARAK, Professor of Mechanical Engineering
  B.S. 1967, M.S. 1973, Technion, Israel Institute of Technology; Ph.D. 1984, Wayne State University

JUEL BJERKE; PE,MS,BS,CQE,CMfgE, (Adjunct) Quality Engineering, California State University, University of Michigan

KAREN E. CAYO, Lecturer, Marketing
  B.B.A. 1979, M.A. 1980, Western Michigan University

SRINIVAS R. CHAKRAVARTHY, Professor of Industrial Engineering
  B.Sc. 1973, M.Sc. 1975, University of Madras, India; Ph.D. 1983, University of Delaware

DAVID R. CLARK, Adjunct Professor of Industrial Engineering

GREGORY W. DAVIS, Professor of Mechanical Engineering
  B.S. 1982, University of Michigan; M.S. 1986, Oakland University; Ph.D. 1991, University of Michigan

RICHARD E. DIPPerY, JR., Professor of Mechanical Engineering

RAGHU ECHEMPATI, Professor of Mechanical Engineering

MOHAMED E. M. EL-SAYED, Professor of Mechanical Engineering

JOHN G. GESKE, Department Head, Computer Science, Associate Professor of Computer Science
  B.S. 1974, M.S. 1979, Ph.D. 1987, Iowa State University

JAMES E. GOVER, Professor of Electrical Engineering
  B.S. 1963, University of Kentucky; M.S. 1965; Ph.D. 1971, University of New Mexico

RAJIV GUPTA, Adjunct
  Ph.D. Industrial Engineering, Purdue University

HUSEYN R. HIziROGLU, Professor of Electrical Engineering
  B.S. 1975, Gazi University, Ankara, Turkey; M.S. 1979, Middle East Technical University, Turkey; Ph.D. 1982, Wayne State University
CRAIG J. HOFF, Department Head, Mechanical Engineering, Professor of Mechanical Engineering
B.S. 1979, Michigan State University; M.S. 1981, Michigan State University; Ph.D. 1992, University of Michigan, P.E., Michigan

PETROS IOANNATOS, Associate Professor of Economics
B.A. 1979, The Athens Graduate School of Economics and Business Science, Greece; M.A. 1982, University of Windsor, Canada; Ph.D. 1989, Wayne State University

NORMAN IRISH, Visiting Professor of Business
B.A. 1969, Olivet College; M.A. 1972, Eastern Michigan University; Ph.D. 1984, Wayne State University

BEVERLY JONES, Associate Professor of Management

KENNETH L. KAISER, Professor of Electrical Engineering
B.S. 1983, M.S. 1984, Ph.D. 1989, Purdue University, P.E. Michigan

LUCY SUI-BIK KING, Professor of Manufacturing Engineering
B.S. 1968, University of Illinois; Ph.D. 1972, University of California-Berkeley

VENU LAKSHMANAN, Adjunct
B.S. 1983, Metallurgical Engineering, Indian Institute of Technology; M.S. 1984, Mechanical and Aerospace Sciences, University of Rochester; Ph.D. 1990, Materials Science & Engineering, University of Rochester

CHERNG-TARNG (TONY) LIN, Professor of Industrial Engineering
B.S. 1972, Tamkang University, Taiwan; M.S. 1976, Villanova University; Ph.D. 1983, Iowa State University

RICHARD R. LUNDSTROM, Professor of Mechanical Engineering
B.S.M.E. 1964, University of Illinois; M.S.M.E. 1967, University of Michigan; Ph.D. 1984, Oakland University

TERRI M. LYNCH-CARIS, Associate Professor of Industrial Engineering
B.SIE 1988, Kettering University; MSIE 1990, Purdue University; Ph.D. 2000, University of Michigan

NEIL T. MC CARTHY, Associate Professor of Finance
B.M.E. 1965, General Motors Institute; M.B.A. 1967, University of Miami; M.S. 1971, Ph.D. 1977, Rensselaer Polytechnic Institute

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