COLLEGE OF ENGINEERING
COURSE AND CURRICULUM CHANGES

Approved at the College of Engineering Course and Curriculum Meeting

April 4, 2014
Seaton Hall 224
12:30
Undergraduate/Graduate
EXPEDITED

Contact Person: James Goddard
532-3569
e-mail: goddard@ksu.edu
Units that may be directly impacted by these changes:

Electrical and Computer Engineering

Please provide the sponsors of a proposal change with any information regarding fiscal or programmatic impact on your department, program or students
**Expedited COURSE PROPOSALS**
**Courses Numbered 000-599**

**Computing and Information Sciences**

**Change:** CIS 300 – Data and Program Structures (3). A study of common data and program structures together with associated algorithms. Topics include interfaces, design patterns, arrays, stacks, queues, lists, trees, hash tables, recursion, binary search, and tree traversals. Experience with both use and implementation of these structures and algorithms using a modern programming language. Discussion of tradeoffs involving performance and software maintainability.

**Requisites**
Prerequisite: CIS 200. Students may enroll in CIS courses only if they have earned a grade of C or better for each prerequisite to those courses.

**When Offered**
Fall, Spring

**To:** CIS 300 – Data and Program Structures (3). A study of common data and program structures together with associated algorithms. Topics include interfaces, design patterns, arrays, stacks, queues, lists, trees, hash tables, recursion, binary search, and tree traversals. Experience with both use and implementation of these structures and algorithms using a modern programming language. Discussion of tradeoffs involving performance and software maintainability.

**Note**
Six hours lab a week.

**Requisites**
Prerequisite: CIS 200. Students may enroll in CIS courses only if they have earned a grade of C or better for each prerequisite to those courses.

**When Offered**
Fall, Spring

**Rationale:** This change reflects our current practice. Six hours of lab a week gives students an opportunity to apply new concepts immediately and to receive appropriate help with any difficulties they have. Roughly the first 20 minutes of each 2-hour lab are spent introducing new material. A lab exercise applying this material is then given, and students have the remainder of that lab to complete this exercise. Lab exercises comprise a significant percentage of the final grade (20% in Fall 2013). In addition, several programming assignments are given as homework throughout the semester. These homework assignments also comprise a significant percentage of the final grade (also 20% in Fall 2013). The remainder of the grade is based on exams.

**Effective:** Fall 2014
Impact: This course is required for Computer Engineering students. We talked with the Department of Electrical and Computer Engineering prior to changing to this format.

From: CIS 415 - Computers and Society (1). A study of the impact of computers and associated technologies on society, including such topics as ethics of computer use, computer fraud, protection of privacy; legal, moral, and public policy-making responsibility of computer professionals.

Requisites
Prerequisite: CIS 300. Students may enroll in CIS courses only if they have earned a grade of C or better for each prerequisite to those courses.

When Offered
Fall

To: CIS 415 - Ethics and Computing Technology (1). A study of the ethical issues raised by computing technologies and the impact on society. Topics include an examination of Profession Codes of Conduct for computer scientists and informatics professionals, ethics of software development, and ethical issues relating to privacy and intellectual property in cyberspace.

Requisites
Prerequisite: CIS 300 and junior standing. Students may enroll in CIS courses only if they have earned a grade of C or better for each prerequisite to those courses.

When Offered
Fall

Rationale: Current course title and course description is not reflective of the true content of the course as it has been taught the last few years. Course involves a heavy emphasis on the ethical and moral analysis of issues relating to computing technologies and their impact on society. It was also felt that the word “ethics” should appear on the course title listed on the student’s official university transcript as part of their CS/IS degree program.

Effective: Fall 2014

Impact: None.
From: CIS 551 - Introduction to Computer and Information Security (3). An introduction to computer and information security, including common attack techniques, application of cryptography in security, authentication and authorization, network security, enterprise network defense, web security, and analysis of design flaws that render a system vulnerable. Course projects provide hands-on experience on both the defense and offense aspects in cyberspace.

Note
Three hours recitation a week.
Not available for credit to students with credit in CIS 751.

Requisites
Pre-Requisite: CIS 450 or 520. Students may enroll in CIS courses only if they have earned a grade of C or better for each prerequisite to those courses.

When Offered
Fall

To: CIS 551 - Introduction to Computer and Information Security (3). An introduction to computer and information security, including common attack techniques, application of cryptography in security, authentication and authorization, network security, enterprise network defense, web security, and analysis of design flaws that render a system vulnerable. Course projects provide hands-on experience on both the defense and offense aspects in cyberspace.

Note
Three hours recitation a week.
Not available for credit to students with credit in CIS 751.

Requisites
Pre-Requisite: CIS 450, 520, or 527. Students may enroll in CIS courses only if they have earned a grade of C or better for each prerequisite to those courses.

When Offered
Fall

Rationale: We recently changed our IS curriculum to include CIS 551 as a requirement, but at the same time, changed its current prerequisite, CIS 450, to be one of three courses from which a student must take two. Furthermore, the current alternative prerequisite, CIS 520, is not in the IS curriculum. As a result, some of our IS students may not take either of the current alternative prerequisites. The architectural topics covered in CIS 527 will provide adequate background for students to understand the security issues discussed in CIS 551. Because IS students must take two of either CIS 450, CIS 526, or CIS 527, they must take one of the proposed alternative prerequisites.

Effective: Fall 2014
Impact: None
From: CIS 562 - Enterprise Information Systems. (3) Conceptual models for E-Commerce and for business applications, database management systems, relational data model, normal forms, query language, security features, web access and scripting languages, development process and management, issues in management of enterprise information systems.

Requisites
CIS 501. Students may enroll in CIS courses only if they have earned a grade of C or better for each prerequisite to those courses.

When Offered
Spring

To: CIS 562 - Enterprise Information Systems. (3) Models for E-Commerce and for business applications, database management systems, relational data model, normal forms, query language, security features, web access and scripting languages, development process and management, issues in management of enterprise information systems.

Requisites
CIS 501. Students may enroll in CIS courses only if they have earned a grade of C or better for each prerequisite to those courses.

When Offered
Fall

Rationale: Offering this course in the fall better suits the needs of the department. A minor change to the course description is being made for clarity.

Effective: Fall 2014

Impact: None.

Mechanical Engineering

ME 101. Introduction to Mechanical Engineering. Introduction to the mechanical engineering curriculum and profession. Orientation for successful transition of new students to college life. Engineering approach to problem solving and computer use in all areas of mechanical engineering. Exchange of information regarding academic, technical, social, ethical, and professional matters between students, faculty, and practicing professionals.

Note

ME 101. Introduction to Mechanical Engineering. Introduction to the mechanical engineering curriculum and profession. Orientation for successful transition of new students to college life. Engineering approach to problem solving and computer use in all areas of mechanical engineering. Exchange of information regarding academic, technical, social, ethical, and professional matters between students, faculty, and practicing professionals.

Note
Must be taken during the student’s first fall semester in mechanical engineering.

Two hours recitation a week.

When Offered
Fall

UGE course
No

K-State 8
None

Rationale: The MNE Department requests that ME101 Introduction to Mechanical Engineering has a Math 220 Calculus I co-requisite to ensure the students are ready for the content covered in the course. The material now being covered within the framework of the catalog description statement “Engineering approach to problem solving and computer use in all areas of mechanical engineering” requires this slight change.

The MNE Department requests that ME101 Introduction to Mechanical Engineering be offered in both the Fall and Spring semesters (rather than just the Fall semester) to allow management of the large enrollment of incoming freshmen and transfer students in this course.

Impact: None
Expedited COURSE PROPOSALS
Courses Numbered 599-999

Architectural Engineering and Construction Science Management

From: CNS 642 Construction Management (3) I,II. An introduction to the business of construction; study of legal considerations, contract documents, bonds and insurance. Evaluation of the characteristics of the construction firm, organization structure, and financial performance. Three hours recitation a week. Prerequisite: CNS 540.

To: CNS 642 Construction Management (3) I,II. An introduction to the business of construction; study of legal considerations, contract documents, bonds and insurance. Evaluation of the characteristics of the construction firm, organization structure, and financial performance. Three hours recitation a week. Prerequisite: CNS 540, Prerequisite or Concurrent: CNS 542.

Rationale: This revision is the result of assessment of the necessities of the prerequisite with determination that CNS 542 Ethics and Professional Practice should be required or concurrent.

Impact: NONE

Effective Date: Fall 2014

Industrial Engineering

From: IMSE 810 - Industrial Logistics Engineering

The course provides comprehensive coverage of supply chain logistics components and system issues, including control of the movement of goods and information, coordination of supply and demand in creation and maximization of time and place utility. Emphasis is given to integrating workflow modeling, control, and design concepts and performance evaluation of logistic activities such as transportation,

To: IMSE 810 - Industrial Logistics Engineering

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inventory, warehousing, and information technology. The systems viewpoint is explored at the individual firm level and from the perspective of inter-firm relationships among participants in logistics supply chains. Recognition is also given to important interrelationships between logistics and production, marketing, and financial management.

**Credits:** (3)

**Note:**
Three hours rec. per week.

**Requisites:**
Pr.: MATH 222.

**When Offered:**
On sufficient demand

Rationale: The proposed change to the course prerequisites more accurately reflects the material upon which the course concepts build. The course will be taught in the fall of even years.

Impact: None

Effective Date: Fall 2014

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**CURRICULUM CHANGES**

**Civil Engineering**

**Rationale:** DEN 325 is no longer offered by the college of engineering. Students will take an equivalent number of credit hours of their track technical electives to keep the total number of their credit hours at 128. Hence, the course should officially be dropped from the civil engineering curriculum, and the pertinent documents such as undergraduate handbook and related flowcharts be updated.

Drop – DEN 325 (1)
Add: Track elective credit (1)
No change in total number of credits.

**Impact (i.e. if this impacts another unit):** None outside the department

**Effective:** Fall 2014
<table>
<thead>
<tr>
<th>Curriculum in civil engineering (CE)</th>
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<tbody>
<tr>
<td><strong>Freshman year</strong></td>
<td><strong>Freshman year</strong></td>
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<tr>
<td><strong>Fall semester (17 credit hours)</strong></td>
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<tr>
<td>- CE 015 - Engineering Assembly</td>
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<td>Credits: (0)</td>
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<td>- CE 101 - Introduction to Civil</td>
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<td>- CE 202 - Civil Engineering Graphics</td>
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<td>- ECON 110 - Principles of</td>
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<td>- CHM 230 - Chemistry II Credits: (4)</td>
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<td>Engineers Credits: (3)</td>
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<td>CE 015 - Engineering Assembly</td>
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<td>CE 212 - Elementary Surveying Engineering</td>
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<td>COMM 105 - Public Speaking IA</td>
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<td>MATH 222 - Analytic Geometry and Calculus III</td>
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<td>PHYS 213 - Engineering Physics I</td>
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Spring semester (16 credit hours)

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<th>Course</th>
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<tr>
<td>CE 015 - Engineering Assembly</td>
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<tr>
<td>CE 333 - Statics</td>
<td>(3)</td>
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<tr>
<td>DEN 325 - Introduction to Personal and Professional Development</td>
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<td>MATH 240 - Elementary Differential Equations</td>
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<tr>
<td>PHYS 214 - Engineering Physics II</td>
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<tr>
<td>STAT 490 - Statistics for Engineers</td>
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Junior year

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<tr>
<td>CE 015 - Engineering Assembly</td>
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<tr>
<td>CE 533 - Mechanics of Materials</td>
<td>(0)</td>
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<tr>
<td>CE 534 - Mechanics of Materials Laboratory</td>
<td>(1)</td>
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<tr>
<td>ME 512 - Dynamics</td>
<td>(3)</td>
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Fall semester (16 credit hours)

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<tr>
<td>CE 015 - Engineering Assembly</td>
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Junior year

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<tr>
<td>CE 534 - Mechanics of Materials Laboratory</td>
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<td>ME 512 - Dynamics</td>
<td>(3)</td>
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<td>ME 513 - Thermodynamics I</td>
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Spring semester (15 credit hours)

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<tr>
<td>CE 015 - Engineering Assembly</td>
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<td>CE 522 - Soil Mechanics I</td>
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<td>CE 537 - Introduction to Structural Analysis</td>
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<td>CE 563 - Environmental Engineering Fundamentals</td>
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<td>* ENGL 415 - Written Communication for Engineers</td>
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<td>ME 571 - Fluid Mechanics</td>
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Senior year

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<tr>
<td>****Civil engineering design electives</td>
<td>(6)</td>
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<tr>
<td>***Track elective</td>
<td>(3)</td>
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<tr>
<td>**General education humanities or social science elective</td>
<td>(3)</td>
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<tr>
<td>CE 015 - Engineering Assembly</td>
<td>(0)</td>
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<tr>
<td>CE 550 - Water Resources</td>
<td>(3)</td>
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Fall semester (15 credit hours)

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<td>CE 015 - Engineering Assembly</td>
<td>(0)</td>
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<tr>
<td>CE 550 - Water Resources</td>
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Spring semester (15 credit hours)

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<tr>
<td>CE 585 - Civil Engineering Project</td>
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**Notes**

To graduate with a BS in Civil Engineering at Kansas State University students must obtain a minimum of a C letter grade in all CE courses that are at the 300 level or above and that are counted toward the degree requirements.

*Students must complete the appropriate prerequisite credits for ENGL 415, but may apply only 3 credit hours of ENGL 415 prerequisite credits towards degree requirements.

**General education humanities and general education social sciences electives are to be selected from general education courses (K-State 8) that are also on the engineering humanities and social sciences elective list and need not be taken in the order listed in the curriculum.

***Track electives are to be selected in consultation with the student’s faculty advisor to satisfy the requirements of the track the student has chosen. One course from either the engineering materials or circuits, fields, and electronics engineering science group is required in the general track.

****CE design electives are to be selected from the list approved by the department to satisfy track requirements.

IMPORTANT NOTES: Students who first enroll in Summer 2011 or later must meet the requirements of the K-State 8 General Education Program.
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Students who began their programs of study in earlier terms under the University General Education (UGE) program may complete their degrees with UGE requirements or may choose to move to the K-State 8. Students should check with their academic advisors to determine which choice would be better. To switch, students must consult with their academic advisors.

Students who are readmitted in Summer 2011 and later will be designated as meeting the K-State 8 by the Office of Admissions. Deans’ offices can make an exception for the readmitted student who has completed UGE or who would prefer to complete UGE requirements.

For additional information about the University General Education program, check the requirements specified by the College of Engineering.

Total hours required for graduation (128)

Mechanical Engineering

Rationale: The MNE Department proposes this transfer policy as a quality control measure in our undergraduate curriculum. We strongly believe that our currently admitted students should take our courses from our instructors for quality control and consistency of content. Of course, with programs such as Study Abroad, etc, exceptions will be made on a case by case basis. We have identified 4 courses that will not be considered for transfer by currently admitted students since they carry ABET-specific measures for our department. Please note that this policy does not apply to incoming transfer students, only to currently admitted students.

We currently require three MNE technical electives, with one them required to be \( \geq 600 \) level. We strongly believe that our currently admitted students should take the majority of these technical electives from our instructors for
quality control and consistency of content. Of course, with programs such as Study Abroad, etc, exceptions will be made on a case by case basis. Please note that this policy does not apply to incoming transfer students, only to currently admitted students.

**Effective:** Fall 2014

**Impact:** Does not impact units outside of the college

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**Mechanical Engineering (ME) (B.S.)**

- Return to: Mechanical and Nuclear Engineering

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

**Bachelor's degree requirements**

**Freshman year**

**Fall semester (16 credit hours)**

- *a – Humanities/social science elective Credits: (3)
- CHM 210 - Chemistry I Credits: (4)
- ENGL 100 - Expository Writing I Credits: (3)
- MATH 220 - Analytic Geometry and Calculus I Credits: (4)
- ME 101 - Introduction to Mechanical Engineering Credits: (2)

**Spring semester (16 credit hours)**

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<td>ME 513</td>
<td>Thermodynamics I Credits: (3)</td>
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<td>NE 495</td>
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<td>Statics Credits: (3)</td>
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<td>CHE 354</td>
<td>Basic Concepts in Materials Science and Engineering Credits: (1)</td>
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<td>CHE 355</td>
<td>Fundamentals of Mechanical Properties Credits: (1)</td>
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<td></td>
<td>IMSE 250</td>
<td>Introduction to Manufacturing Processes and Systems Credits: (2)</td>
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<tr>
<td></td>
<td>MATH 222</td>
<td>Analytic Geometry and Calculus III Credits: (4)</td>
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<tr>
<td></td>
<td>PHYS 214</td>
<td>Engineering Physics II Credits: (5)</td>
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<tr>
<td>Spring</td>
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<tr>
<td></td>
<td>*a – Humanities/social science elective Credits: (2)</td>
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<tr>
<td></td>
<td>MATH 240</td>
<td>Elementary Differential Equations Credits: (4)</td>
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</tbody>
</table>

**Notes:**
- *a – Humanities/social science elective
- MATH 222 - Analytic Geometry and Calculus II Credits: (4)
- PHYS 213 - Engineering Physics I Credits: (5)
- MATH 221 - Analytic Geometry and Calculus II Credits: (4)
- PHYS 214 - Engineering Physics II Credits: (5)
### Junior year

#### Fall semester (16 credit hours)

- *b - Technical elective Credits: (3)
- CE 533 - Mechanics of Materials Credits: (3)
- ECE 519 - Electric Circuits and Control Credits: (4)
- MATH 551 - Applied Matrix Theory Credits: (3)
- ME 400 - Computer Applications in Mechanical Engineering Credits: (3)

#### Spring semester (16 credit hours)

- *b - Technical elective Credits: (3)
- ME 533 - Machine Design I Credits: (3)
- ME 535 - Measurement and Instrumentation Laboratory Credits: (3)
  
  or

- NE 612 - Principles of Radiation Detection Credits: (3)
- ME 570 - Control of Mechanical Systems I Credits: (4)
- ME 571 - Fluid Mechanics Credits: (3)

### Senior year

#### Fall semester (17 credit hours)

- *a - Humanities/social science elective (300-level or above) Credits: (3)

#### Spring semester (16 credit hours)

- *b - Technical elective Credits: (3)
- CE 533 - Mechanics of Materials Credits: (3)
- ECE 519 - Electric Circuits and Control Credits: (4)
- MATH 551 - Applied Matrix Theory Credits: (3)
- ME 400 - Computer Applications in Mechanical Engineering Credits: (3)
  
  or

- NE 612 - Principles of Radiation Detection Credits: (3)
- ME 570 - Control of Mechanical Systems I Credits: (4)
- ME 571 - Fluid Mechanics Credits: (3)
Fall semester (17 credit hours)

- *a – Humanities/social science elective (300-level or above) Credits: (3)
- Technical elective Credits: (3)
- Technical elective Credits: (3)
- ENGL 415 - Written Communication for Engineers Credits: (3)
- IMSE 530 - Engineering Economic Analysis Credits: (2)
- ME 574 - Interdisciplinary Industrial Design Projects I Credits: (3)

Spring semester (15 credit hours)

- Humanities/social science elective (300-level or above) Credits: (3)
- *b – Technical elective Credits: (3)
- *b – Technical elective Credits: (3)
- ME 573 - Heat Transfer Credits: (3)
- ME 575 - Interdisciplinary Industrial Design Projects II Credits: (3)

Notes

*a – A total of 11 credits of humanities and social science electives are required, six of which must be 300-level or higher. These are to be selected from the College of Engineering Humanities and Social Science Electives Course List. Students should select these courses such that the requirements of the K-State 8 general education program also are met.

*b – Three technical electives are to be chosen from MNE courses with at least one course 600-level or above. Another technical elective is to be chosen from 200-level or above College of Engineering (including MNE) classes. The remaining technical electives credits are to be chosen from 200-level or above College of Engineering, Math, Chemistry, Physics, Biology, or Business Administration classes or 400-level or above Statistics classes. Other classes that strengthen a student’s program of study

Notes

*a – A total of 11 credits of humanities and social science electives are required, six of which must be 300-level or higher. These are to be selected from the College of Engineering Humanities and Social Science Electives Course List. Students should select these courses such that the requirements of the K-State 8 general education program also are met.

*b – Technical Electives: Three technical electives are to be chosen from MNE courses with at least one course 600-level or above. Currently
will be considered and require advisor and
department head approval.

*c – Nuclear Engineering Option: The four Nuclear
Engineering options courses fulfill the requirement
of the three MNE and one College of Engineering
technical elective courses.

IMPORTANT NOTES: Students who first enroll in Summer 2011 or later must meet the requirements of the K-State 8 General Education Program.

Students who began their programs of study in earlier terms under the University General Education (UGE) program may complete their degrees with UGE requirements or may choose to move to the K-State 8. Students should check with their academic advisors to determine which choice would be better. To switch, students must consult with their academic advisors.

Students who are readmitted in Summer 2011 and later will be designated as meeting the K-State 8 by the Office of Admissions. Deans’ offices can make an exception for the readmitted student who has completed UGE or who would prefer to complete UGE requirements.

For additional information about the University General Education program, check the requirements specified by the College of Engineering.

Total credit hours required for graduation (127)

admitted students will only be allowed to transfer
in one of their three required MNE technical
electives; however, the >= 600 level MNE
technical elective must be taken within the MNE Department. Another technical elective is to be chosen from 200–level or above College of Engineering (including MNE) classes. The remaining technical electives credits are to be chosen from 200–level or above College of Engineering, Math, Chemistry, Physics, Biology, or Business Administration classes or 400–level or above Statistics classes. Other classes that strengthen a student’s program of study will be considered and require advisor and department head approval.

*d – ME535 and NE612 may both be taken and one of them applied as a Tech Elective. NE612 must be taken for the NE Option.

*e - Currently admitted students will only be allowed to transfer in one ME/NE numbered course as required by the curriculum; however, ME533, ME574, ME575 and ME573 must be taken within the MNE department.

IMPORTANT NOTES: Students who first enroll in Summer 2011 or later must meet the requirements of the K-State 8 General Education Program.

Students who began their programs of study in earlier terms under the University General Education (UGE) program may complete their degrees with UGE requirements or may choose to move to the K-State 8. Students should check with their academic advisors to determine which choice would be better. To switch, students must consult with their academic advisors.

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For additional information about the University General Education program, check the requirements specified by the College of Engineering.

Total credit hours required for graduation (127)

Expedited Graduate Curriculum Proposals

**Industrial Engineering**

**Operations Research (M.S.)**

**Master’s Degree Options and Requirements**

**Effective:** Fall 2014

**Rationale:** We propose to add courses to the list of options that students have for the (a) stochastic processes core component and (b) the additional operations research courses component. The added courses are already being taught in the department and, by including them, we provide greater flexibility for students to choose among operations research methods and applications of interest.

**Impact (i.e. if this impacts another unit):** None

| One core course must be taken in each of the following three areas: | One core course must be taken in each of the following three areas: |
| Continuous Optimization: | Continuous Optimization: |
• IMSE 881 – Linear Programming Credits: (3)
• IMSE 982 – Nonlinear Programming Credits: (3)

Discrete Optimization:

• IMSE 882 – Network Flows and Graph Theory Credits: (3)
• IMSE 884 – Integer Programming and Combinatorial Optimization Credits: (3)

Stochastic Processes:

• IMSE 842 – Reliability Theory Credits: (3)
• IMSE 866 – Applied Stochastic Processes and Theoretical Simulation Credits: (3)
• IMSE 971 – Industrial Queuing Processes Credits: (3)

Additional Operations Research courses include the following courses and any core courses:

• IMSE 643 – Industrial Simulation Credits: (3)
• IMSE 751 – Normative Theory of Decisions and Games Credits: (3)
• IMSE 780 – Methods of Operations Research Credits: (3)
• IMSE 830 – Applied Fuzzy Set Theory Credits: (3)

• IMSE 881 – Linear Programming Credits: (3)
• IMSE 982 – Nonlinear Programming Credits: (3)

Discrete Optimization:

• IMSE 882 – Network Flows and Graph Theory Credits: (3)
• IMSE 884 – Integer Programming and Combinatorial Optimization Credits: (3)

Stochastic Processes:

• IMSE 842 – Reliability Theory Credits: (3)
• IMSE 866 – Applied Stochastic Processes and Theoretical Simulation Credits: (3)
• IMSE 971 – Industrial Queuing Processes Credits: (3)

Additional Operations Research courses include the following courses and any core courses:

• IMSE 643 – Industrial Simulation Credits: (3)
• IMSE 751 – Normative Theory of Decisions and Games Credits: (3)
• IMSE 760 – Stochastic Calculus Financial Engineering Credits: (3)
• IMSE 780 – Methods of Operations Research Credits: (3)
• IMSE 810 – Industrial Logistics Engineering Credits: (3)
Industrial Engineering, Concurrent BSIE/MSIE

Rationale: We propose to remove IMSE 666 and IMSE 888 from this curriculum. IMSE 666 is no longer taught on a regular basis. We propose to replace the operations research component of the core with one or more other classes, as summarized below. The objectives of IMSE 888, namely technical communication, are accomplished through elements of other core courses.

Impact (i.e. if this impacts another unit): None

Effective: Fall 2014
Concurrent B.S.I.E./M.S.I.E. (Industrial Engineering)
The formats for this program are as follows*

*Actual degree requirements will be summarized on an approved plan of study. Some general guidelines include:

- The student must complete all of the B.S.I.E. undergraduate requirements with the exception that up to 9 credit hours of IMSE 600 level classes taken for graduate credit can also count toward his/her undergraduate degree requirements.
- The student must complete at least 30 graduate hours.
- At least 60 percent of graduate courses must be above the 700 level.
- No more than 6 graduate hours can be taken from an outside department without prior permission.
- Graduate courses in the IMSE department must be above the 600 level.
- Graduate courses outside the department must be above the 500 level.
- Continuous enrollment required.
- Each semester a student must enroll in either:
  IMSE 015 – Engineering Assembly Credits: (0)
  or
  IMSE 892 – Graduate Seminar Credits: (0)
  and
  complete at least 2 semesters of IMSE 892 Credits: (0)

Concurrent B.S.I.E./M.S.I.E. (Industrial Engineering)
The formats for this program are as follows*

*Actual degree requirements will be summarized on an approved plan of study. Some general guidelines include:

- The student must complete all of the B.S.I.E. undergraduate requirements with the exception that up to 9 credit hours of IMSE 600 level classes taken for graduate credit can also count toward his/her undergraduate degree requirements.
- The student must complete at least 30 graduate hours.
- At least 60 percent of graduate courses must be above the 700 level.
- No more than 6 graduate hours can be taken from an outside department without prior permission.
- Graduate courses in the IMSE department must be above the 600 level.
- Graduate courses outside the department must be above the 500 level.
- Continuous enrollment required.
- Each semester a student must enroll in either:
  IMSE 015 – Engineering Assembly Credits: (0)
  or
  IMSE 892 – Graduate Seminar Credits: (0)
  and
  complete at least 2 semesters of IMSE 892 Credits: (0)
**Industrial Engineering (M.S.)**

**Rationale:** We propose to remove IMSE 888 from this curriculum and to add more courses from which students may choose for the operations research core requirement. The objectives of IMSE 888, namely technical communication, are accomplished through elements of other core courses.

**Impact:** None

**Effective:** Fall 2014
## Industrial Engineering (M.S.)

### Master's program requirements

To pursue the Industrial Engineering M.S. through the Industrial and Manufacturing Systems Engineering graduate program, students must hold a B.S. degree in engineering, mathematics, or physical science and be versed in several of the basic areas of industrial engineering. Non-industrial engineering undergraduates may require 6 semester credit hours of prerequisite courses. GRE scores are required for all students who apply.

An entering M.S.I.E. student is expected to have proficiency in computer programming, linear programming and statistics. Students failing to meet these expectations may be required to take some prerequisite courses.

### Required Core Courses

To graduate, a student may receive at most one C in all of the core courses (no D’s or F’s are allowed). This may require some students to retake core courses.

- **IMSE 641 - Quality Engineering** Credits: (3)
- **IMSE 780 - Methods of Operations Research** Credits: (3)
- **IMSE 811 - Advanced Production and Inventory Control** Credits: (3)
- **IMSE 888 - Research Methods in Industrial Engineering** Credits: (3)

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## Industrial Engineering (M.S.)

### Master's program requirements

To pursue the Industrial Engineering M.S. through the Industrial and Manufacturing Systems Engineering graduate program, students must hold a B.S. degree in engineering, mathematics, or physical science and be versed in several of the basic areas of industrial engineering. Non-industrial engineering undergraduates may require 6 semester credit hours of prerequisite courses. GRE scores are required for all students who apply.

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### Required Core Courses

To graduate, a student may receive at most one C in all of the core courses (no D’s or F’s are allowed). This may require some students to retake core courses.

- **IMSE 641 - Quality Engineering** Credits: (3)
- **IMSE 811 - Advanced Production and Inventory Control** Credits: (3)
- **IMSE 780 - Methods of Operations Research** Credits: (3) or two of the following classes:
  - **IMSE 751 – Normative Theory of Decisions and Games**
  - **IMSE 760 – Stochastic Calculus Financial Engineering**
  - **IMSE 810 – Industrial Logistics Engineering**
  - **IMSE 830 – Applied Fuzzy Set Theory**
  - **IMSE 842 – Reliability Theory**
  - **IMSE 881 – Linear Programming**
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<tr>
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<td>IMSE 882</td>
<td>Network Flows and Graph Theory</td>
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<td>IMSE 865</td>
<td>Simulation of Industrial Management Systems</td>
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<tr>
<td>IMSE 866</td>
<td>Applied Stochastic Processes and Theoretical Simulation</td>
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<td>Industrial Queuing Processes</td>
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