COLLEGE OF ENGINEERING
COURSE AND CURRICULUM CHANGES

Approved at the College of Engineering Course and Curriculum Meeting

May 5, 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:

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

Electrical and Computer Engineering

From: ECE 511 - Circuit Theory II
Credits: (3)

Analysis of electric circuits using differential equations, transform techniques, and linear algebra. Transmission lines and applications.

Note
Three hours lecture a week.

Requisites
Prerequisite: MATH 240, STAT 510, and ECE 410.

When Offered
Fall, Spring

UGE course
No

K-State 8
None

To: ECE 511 - Circuit Theory II
Credits: (3)

Analysis of electric circuits using differential equations, transform techniques, and linear algebra. Transmission lines and applications.

Note
Three hours lecture a week.

Requisites
Prerequisite: MATH 240, and ECE 410.

When Offered
Fall, Spring

UGE course
No
K-State 8
None

Effective: Fall 2014

Rationale: Remove the prerequisite of Stat 510. The addition of a new required course, ECE 540, that includes the statistics material, has made the Stat 510 prerequisite unnecessary for Circuit Theory II.

Impact (i.e. if this impacts another unit): no impact outside ECE

From: ECE 557 - Electromagnetic Theory I
Credits: (4)

Vector analysis, electrostatics, magnetostatics, Faraday’s Law, Maxwell’s Equations, transmission line analysis, plane waves, Poynting’s theorem, and applications.

Note
Four hours lecture a week.

Requisites
Prerequisite: PHYS 214 and ECE 410.

When Offered
Fall, Spring

UGE course
No

K-State 8
None

To: ECE 557 - Electromagnetic Theory I
Credits: (4)

Vector analysis, electrostatics, magnetostatics, Faraday’s Law, Maxwell’s Equations, transmission line analysis, plane waves, Poynting’s theorem, and applications.

Note
Four hours lecture a week.

Requisites
Prerequisite: PHYS 214, ECE 410 and Math 222.
**When Offered**
Fall, Spring

**UGE course**
No

**K-State 8**
None

**Effective:** Fall 2014

**Rationale:** Calculus III has always been a prerequisite for this course, but when we changed the flowchart to allow students to take Math 240 before Math 222 we missed that this prerequisite has to be made explicit.

**Impact (i.e. if this impacts another unit):** no impacts expected.

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**Mechanical Engineering**

**From:** ME 535 - Measurement and Instrumentation Laboratory  
**Credits:** (3)

Theory and application of mechanical engineering measurements, instrumentation, and computer-based data acquisition.

**Note**
One hour recitation and six hours lab a week.

**Requisites**
Prerequisite: ME 400, ME 513, and ECE 519.

**When Offered**
Fall, Spring

**UGE course**
No

**K-State 8**
Empirical and Quantitative Reasoning
To: ME 535 - Measurement and Instrumentation Laboratory  
Credits: (3)

Theory and application of mechanical engineering measurements, instrumentation, and computer-based data acquisition.

Note
One hour recitation and six hours lab a week.

Requisites
Prerequisite: ME 513, and ECE 519.

When Offered
Fall, Spring

UGE course
No

K-State 8
Empirical and Quantitative Reasoning

Effective: Fall 2014

Rationale: ME 535 now uses LabVIEW exclusively as the programming language and it is not dependent on the content covered in ME 400.

Impact: N/A

Expedited COURSE PROPOSALS  
Courses Numbered 599-999

From: ME 610 - Finite Element Applications in Mechanical Engineering  
Credits: (3)

The application of the finite element method to the solution of engineering problems. Topics include introductions to the methods, linear elastic stress analysis, thermal analysis, and modeling limitations and errors. Commercial computer codes are used in the applications.

Requisites
Prerequisite: CE 533. Prerequisite or concurrent: ME 573.

When Offered
Fall
To: ME 610 - Finite Element Applications in Mechanical Engineering
Credits: (3)

The application of the finite element method to the solution of engineering problems. Topics include introductions to the methods, linear elastic stress analysis, thermal analysis, and modeling limitations and errors. Commercial computer codes are used in the applications.

Requisites
Prerequisite: CE 533.

When Offered
Fall

UGE course
No

K-State 8
None

Effective: Fall 2014

Rationale: When ME 610 was first taught, included a section on computational fluid dynamics. This is no longer part of the course. Although we still do some heat transfer calculations, the material is used at a level that does not require heat transfer as a pre-req.

Impact: N/A

From: ME 620 - Internal Combustion Engines
Credits: (3)

Analysis of cycles, design and performance characteristics.

Note
Three hours recitation a week.

Requisites
Prerequisite: ME 523.
Fall, even years

UGE course
No

K-State 8
None

To: ME 620 - Internal Combustion Engines
Credits: (3)

Analysis of cycles, design and performance characteristics.

Note
Three hours recitation a week.

Requisites
Prerequisite: ME 523.

When Offered
Fall

UGE course
No

K-State 8
None

Effective: Fall 2014

Rationale: To address the needs of higher enrollment and to offer more opportunities for students to take classes offered as undergrads.

Impact: N/A

From: ME 622 - Indoor Environmental Engineering
Credits: (3)

Ventilation, heating and cooling system design for buildings. Application of thermodynamic, heat transfer, and fluid mechanics principles for determination of building heating and cooling loads. Determination of ventilation requirements. Sizing, design and integration of environmental control systems.

Note
Three hours recitation a week.

Requisites
Prerequisite or concurrent: ME 573.

When Offered
Spring, even years

UGE course
No

K-State 8
None

To: ME 622 - Indoor Environmental Engineering
Credits: (3)

Ventilation, heating and cooling system design for buildings. Application of thermodynamic, heat transfer, and fluid mechanics principles for determination of building heating and cooling loads. Determination of ventilation requirements. Sizing, design and integration of environmental control systems.

Note
Three hours recitation a week.

Requisites
Prerequisite: ME 571

When Offered
Spring

UGE course
No

K-State 8
None

Effective: Fall 2014

Rationale: Heat Transfer knowledge needed is minimal and this prereq prevents eligible students from taking the course; knowledge of Fluid Mechanics is more pertinent to this course’s material. Addresses the needs of higher enrollment and offers more opportunities for students to take classes offered when they are undergraduates.

Impact: N/A
From: ME 631 - Aircraft and Missile Propulsion  
Credits: (3)

Mechanics and thermodynamics of aircraft and missile propulsion systems; combustion; air breathing jet engines; rockets; applied compressible flow; propellants; performance and design of propulsion systems.

Note
Three hours recitation a week.

Requisites
Prerequisite: ME 523, 571, MATH 240.

When Offered
Spring, odd years

UGE course
No

K-State 8
None

To: ME 631 - Aircraft and Missile Propulsion  
Credits: (3)

Mechanics and thermodynamics of aircraft and missile propulsion systems; combustion; air breathing jet engines; rockets; applied compressible flow; propellants; performance and design of propulsion systems.

Note
Three hours recitation a week.

Requisites
Prerequisite: ME 523, 571, MATH 240.

When Offered
Spring

UGE course
No

K-State 8
None
Effective: Fall 2014

Rationale: To address the needs of higher enrollment and to offer more opportunities for students to take classes offered as undergrads.

Impact: N/A

From: ME 633 - Thermodynamics of Modern Power Cycles
Credits: (3)

The first and second law analysis of modern steam cycles for both fossil-fuel and nuclear-fuel installations, Cycle efficiency and factors affecting performance, such as cycle design, load factor, and auxiliaries. Thermal pollution resulting from steam cycles.

Note
Three hours recitation a week.

Requisites
Prerequisite: ME 513.

When Offered
Fall, odd years

UGE course
No

K-State 8
None

To: ME 633 - Thermodynamics of Modern Power Cycles
Credits: (3)

The first and second law analysis of modern steam cycles for both fossil-fuel and nuclear-fuel installations, Cycle efficiency and factors affecting performance, such as cycle design, load factor, and auxiliaries. Thermal pollution resulting from steam cycles.

Note
Three hours recitation a week.

Requisites
Prerequisite: ME 523.
When Offered
Fall

UGE course
No

K-State 8
None

Effective: Fall 2014

Rationale: Currently there is an overlap between ME 633 and ME 523 (Thermo 2). By making Thermo 2 a prereq, this will eliminate the overlap in content and allow the introduction of new material rather than act as a review course for Thermo 2. This also addresses the needs of higher enrollment numbers and offers more opportunities for students to take classes offered as undergrads.

Impact: N/A

CURRICULUM CHANGES

Electrical and Computer Engineering

Computer Engineering

Effective: Spring 2015

Rationale:

Two changes are being done:
1. Add language to Notes section to make a department policy on transfer credits more visible
2. Remove language in Notes section that discusses the transition from UGE to K-State 8

Details:

1) Departments within the College of Engineering are working to address growing concerns over the quality of courses transferred in from other institutions – especially in the case of students who are already in a K-State COE department program and take on-line courses during the summer to avoid taking a potentially harder version at K-State. On the basis of section 3.b.ii in the COE policy statement on transfer credits available at https://www.engg.ksu.edu/files/ss/TransferCreditGuide.pdf, departments are allowed to make their own decisions on which department-level courses can be transferred to satisfy a degree program. The department of Electrical and Computer Engineering (ECE) has an existing policy that addresses this issue, but the policy is not currently visible.
In this curriculum change action, that policy is being updated and made more visible by adding it to the curriculum notes in the course catalog description. The language to be added to the catalog description is:

“All not more than twelve (12) credit hours of courses in electrical and computer engineering may be transferred to Kansas State University for credit toward a bachelor degree in either electrical engineering or computer engineering. Further, those courses selected for transfer credit must be equivalent to courses in the list below and must be such that the prerequisites for the listed course are also satisfied. Any courses transferred must be taken from ABET accredited programs:

ECE 210 ECE 241
ECE 525 ECE 557
ECE 410 ECE 581

Students participating in exchange programs or transferring in from outside the United States may request waivers of this policy. Waivers must be obtained in advance of the exchange semester.”

This language is essentially the same as the department’s existing policy except for changing ECE 510 to ECE 410 (due to a curriculum modification in recent years). During department discussions, each of the courses called out was considered and it was noted that both 210 and 241 have essential laboratory content that is vital to courses that use these as pre-requisites. Hence, it is important that the “equivalent” qualifier take this into account. Discussions also considered the importance of vetting on-line courses, but no specific solutions outside of adding an ABET qualifier were identified. The courses listed are reasonably safe in addressing college-level concerns about transfer credit quality in the sense that they are either terminal in a sequence, or feed into courses with sufficient review that even some imperfect transfers can be tolerated.

2) In Notes section, language about the transition from General Education to K-State 8 is being removed, as it is no longer relevant to students admitted after Summer 2011.

Impact (i.e. if this impacts another unit): No impacts outside the department are anticipated for these changes.
Computer Engineering (CMPEN) (B.S.)


Bachelor's degree requirements

Freshman year

Fall semester (16 credit hours)

- CHM 210 - Chemistry I Credits: (4)
- COMM 105 - Public Speaking IA Credits: (2)
- ECE 015 - New Student Assembly Credits: (0)
- ECE 241 - Introduction to Computer Engineering Credits: (3)
- * ENGL 100 - Expository Writing I Credits: (3)
- MATH 220 - Analytic Geometry and Calculus I Credits: (4)

Spring semester (17 credit hours)

- CIS 200 - Programming Fundamentals Credits: (4)
- ECE 115 New Student Design Project Credits: (1)
- ECE 210 - Introduction to Electrical Engineering Credits: (3)
- MATH 221 - Analytic Geometry and Calculus II Credits: (4)
- PHYS 213 - Engineering Physics I Credits: (5)
### Sophomore year

#### Fall semester (15 credit hours)

- **CIS 300 - Data and Program Structures**  
  Credits: (3)
- **ECE 441 - Design of Digital Systems**  
  Credits: (3)
- **MATH 240 - Elementary Differential Equations**  
  Credits: (4)
- **PHYS 214 - Engineering Physics II**  
  Credits: (5)

#### Spring semester (17 credit hours)

- **CIS 308 - C/C++ Language Laboratory**  
  Credits: (1)
- **ECON 110 - Principles of Macroeconomics**  
  Credits: (3)
- **ECE 410 - Circuit Theory I**  
  Credits: (3)
- **ECE 431 - Microcontrollers**  
  Credits: (3)
- **MATH 222 - Analytic Geometry and Calculus III**  
  Credits: (4)
- **STAT 510 - Introductory Probability and Statistics I**  
  Credits: (3)

### Senior year

#### Fall semester (18 credit hours)

- **Humanities/Social Science Elective**  
  Credits: (3)

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### Sophomore year

#### Fall semester (15 credit hours)

- **CIS 300 - Data and Program Structures**  
  Credits: (3)
- **ECE 441 - Design of Digital Systems**  
  Credits: (3)
- **MATH 240 - Elementary Differential Equations**  
  Credits: (4)
- **PHYS 214 - Engineering Physics II**  
  Credits: (5)

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- **CIS 308 - C/C++ Language Laboratory**  
  Credits: (1)
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  Credits: (3)
- **ECE 431 - Microcontrollers**  
  Credits: (3)
- **MATH 222 - Analytic Geometry and Calculus III**  
  Credits: (4)
- **STAT 510 - Introductory Probability and Statistics I**  
  Credits: (3)

### Senior year

#### Fall semester (18 credit hours)

- **Humanities/Social Science Elective**  
  Credits: (3)
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 501 - Software Architecture and Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 511 - Circuit Theory II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 525 - Electronics I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 540 - Applied Scientific Computing for</td>
<td></td>
</tr>
<tr>
<td>Engineers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 510 - Discrete Mathematics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Spring semester (16 credit hours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Humanities/Social Science Elective</strong></td>
<td>3</td>
</tr>
<tr>
<td>ECE 512 - Linear Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 557 - Electromagnetic Theory I</td>
<td>4</td>
</tr>
<tr>
<td>ECE 649 - Computer Design I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 415 - Written Communication for</td>
<td></td>
</tr>
<tr>
<td>Engineers</td>
<td>3</td>
</tr>
</tbody>
</table>

**Senior year**

**Fall semester (15 credit hours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>***Technical Electives</td>
<td>6</td>
</tr>
<tr>
<td>ECE 590 – Senior Design Experience</td>
<td>3</td>
</tr>
<tr>
<td>**** CIS 520 - Operating Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 643 - Computer Engineering Design Lab</td>
<td>3</td>
</tr>
</tbody>
</table>

**Spring semester (15 credit hours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Humanities/Social Science Elective</strong></td>
<td>3</td>
</tr>
<tr>
<td>ECE 512 - Linear Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 557 - Electromagnetic Theory I</td>
<td>4</td>
</tr>
<tr>
<td>ECE 649 - Computer Design</td>
<td>3</td>
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<tr>
<td>ENGL 415 - Written Communication for</td>
<td></td>
</tr>
<tr>
<td>Engineers</td>
<td>3</td>
</tr>
</tbody>
</table>

**Senior year**

**Fall semester (15 credit hours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>***Technical Electives</td>
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<tr>
<td>ECE 590 – Senior Design Experience</td>
<td>3</td>
</tr>
<tr>
<td>**** CIS 520 - Operating Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 643 - Computer Engineering Design Lab</td>
<td>3</td>
</tr>
</tbody>
</table>
• ***Technical electives Credits: (9)
• **Humanities/Social Science Elective Credits: (3)
• ECE 645 - Digital Electronics Credits: (3)

Notes

*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.

For the good and benefit of the student and their future employer, the ECE department enforces a C- prerequisite policy for all courses listed by number in the curriculum and for any in-major technical elective course applied toward the degree. A grade of C or better must be earned in all prerequisites to such a course before enrolling in that course.

**Humanities and Social Science electives are to be selected from the list of courses approved by the College of Engineering. Students should select these courses as needed to complete the requirements of the K-State 8 General Education program.

***Technical electives must be selected to complete one of the specialization areas.

****Offered only semester shown in curriculum.

**Humanities and Social Science electives are to be selected from the list of courses approved by the College of Engineering. Students should select these courses as needed to complete the requirements of the K-State 8 General Education program.

***Technical electives must be selected to complete one of the specialization areas.

****Offered only semester shown in curriculum.

***** Not more than twelve (12) credit hours of courses in electrical and computer engineering may be transferred to Kansas State University for credit toward a bachelor degree in either electrical engineering or computer engineering. Further, those courses selected for transfer credit must be equivalent to courses in the list below and must be such that the prerequisites for the listed course are also satisfied.

Any courses transferred must be taken from ABET accredited programs:

ECE 210  ECE 241
ECE 525  ECE 557

NOTE: K-State 8 General Education Requirements

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 hours required for graduation (129)

<table>
<thead>
<tr>
<th>ECE 410</th>
<th>ECE 581</th>
</tr>
</thead>
</table>

Students participating in exchange programs or transferring in from outside the United States may request waivers of this policy. Waivers must be obtained in advance of the exchange semester.

NOTE: K-State 8 General Education Requirements

Students must meet the requirements of the K-State 8 General Education Program.

Total hours required for graduation (129)

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**Electrical Engineering**

**Effective:** Spring 2015

**Rationale:**

Three changes are being done:
1. Add language to Notes section to make a department policy on transfer credits more visible
2. Remove language in Notes section that discusses the transition from UGE to K-State 8
3. Swap the Fall vs Spring ordering of one Technical Elective (3 hour) with ECE 557 (4 hour)

**Details:**

1) Departments within the College of Engineering are working to address growing concerns over the quality of courses transferred in from other institutions – especially in the case of students who are already in a K-State COE department program and take on-line courses during the summer to avoid taking a potentially harder version at K-State. On the basis of section 3.b.ii in the COE policy statement on transfer credits available at
departments are allowed to make their own decisions on which department-level courses can be transferred to satisfy a degree program. The department of Electrical and Computer Engineering (ECE) has an existing policy that addresses this issue, but the policy is not currently visible.

In this curriculum change action, that policy is being updated and made more visible by adding it to the curriculum notes in the course catalog description. The language to be added to the catalog description is:

“No more than twelve (12) credit hours of courses in electrical and computer engineering may be transferred to Kansas State University for credit toward a bachelor degree in either electrical engineering or computer engineering. Further, those courses selected for transfer credit must be equivalent to courses in the list below and must be such that the prerequisites for the listed course are also satisfied. Any courses transferred must be taken from ABET accredited programs:

ECE 210 ECE 241
ECE 525 ECE 557
ECE 410 ECE 581

Students participating in exchange programs or transferring in from outside the United States may request waivers of this policy. Waivers must be obtained in advance of the exchange semester.”

This language is essentially the same as the department’s existing policy except for changing ECE510 to ECE410 (due to a curriculum modification in recent years). During department discussions, each of the courses called out was considered and it was noted that both 210 and 241 have essential laboratory content that is vital to courses that use these as pre-requisites. Hence, it is important that the “equivalent” qualifier take this into account. Discussions also considered the importance of vetting on-line courses, but no specific solutions outside of adding an ABET qualifier were identified. The courses listed are reasonably safe in addressing college-level concerns about transfer credit quality in the sense that they are either terminal in a sequence, or feed into courses with sufficient review that even some imperfect transfers can be tolerated.

2) Language in the Notes about the transition from General Education to K-State 8 is being removed, as it is no longer relevant to students admitted after Summer 2011.

3) Finally, ECE 557 (Electromagnetics) is being swapped with a 3 hour technical elective in the Junior year Fall/Spring sequence. This change will better equalize the number of hours and workload in these semesters, and has the added benefit of possibly better preparing students for ECE 681 if they choose to follow this new sequence.

Impact (i.e. if this impacts another unit): No impacts outside the department are anticipated for these changes.
Bachelor’s degree requirements

Freshman year

<table>
<thead>
<tr>
<th>Fall semester (16 credit hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• CHM 210 - Chemistry I Credits: (4)</td>
</tr>
<tr>
<td>• COMM 105 - Public Speaking IA Credits: (2)</td>
</tr>
<tr>
<td>• ECE 015 - New Student Assembly Credits: (0)</td>
</tr>
<tr>
<td>• ECE 210 - Introduction to Electrical Engineering Credits: (3)</td>
</tr>
<tr>
<td>• ENGL 100 - Expository Writing I Credits: (3)</td>
</tr>
<tr>
<td>• MATH 220 - Analytic Geometry and Calculus I Credits: (4)</td>
</tr>
</tbody>
</table>

Spring semester (17 credit hours)

<table>
<thead>
<tr>
<th>Spring semester (17 credit hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• BIOL 198 - Principles of Biology Credits: (4)</td>
</tr>
<tr>
<td>or</td>
</tr>
<tr>
<td>• CHM 230 - Chemistry II Credits: (4)</td>
</tr>
<tr>
<td>• ECON 110 - Principles of Macroeconomics Credits: (3)</td>
</tr>
<tr>
<td>• ECE 115 - New Student Design Project Credits: (1)</td>
</tr>
<tr>
<td>• MATH 221 - Analytic Geometry and Calculus II Credits: (4)</td>
</tr>
<tr>
<td>• PHYS 213 - Engineering Physics I Credits: (5)</td>
</tr>
</tbody>
</table>
### Sophomore year

**Fall semester (17 credit hours)**

- CHE 354 - Basic Concepts in Materials Science and Engineering **Credits:** (1)
- CHE 356 - Fundamentals of Electrical Properties **Credits:** (1)
- ECE 241 - Introduction to Computer Engineering **Credits:** (3)
- ECE 410 - Circuit Theory I **Credits:** (3)
- MATH 240 - Elementary Differential Equations **Credits:** (4)
- PHYS 214 - Engineering Physics II **Credits:** (5)

**Spring semester (16 credit hours)**

- CIS 209 - C Programming for Engineers **Credits:** (3)
- ECE 511 - Circuit Theory II **Credits:** (3)
- ECE 525 - Electronics I **Credits:** (3)
- MATH 222 - Analytic Geometry and Calculus III **Credits:** (4)
- STAT 510 - Introductory Probability and Statistics I **Credits:** (3)

### Junior year

**Fall semester (16 credit hours)**

- CIS 209 - C Programming for Engineers **Credits:** (3)
- ECE 511 - Circuit Theory II **Credits:** (3)
- ECE 525 - Electronics I **Credits:** (3)
- MATH 222 - Analytic Geometry and Calculus III **Credits:** (4)
- STAT 510 - Introductory Probability and Statistics I **Credits:** (3)
<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring semester (18 credit hours)</td>
<td><strong>Humanities/Social Science Elective Credits: (3)</strong>&lt;br&gt;ECE Technical Electives Credits: (3)&lt;br&gt;ECE 431 - Microcontrollers Credits: (3)&lt;br&gt;ECE 526 - Electronics II Credits: (3)&lt;br&gt;ECE 540 - Applied Scientific Computing for Engineers Credits: (3)</td>
</tr>
<tr>
<td>Senior year</td>
<td><strong>Humanities/Social Science Elective Credits: (3)</strong>&lt;br&gt;ECE 502 - Electronics Laboratory Credits: (2)&lt;br&gt;ECE 512 - Linear Systems Credits: (3)&lt;br&gt;ECE 557 - Electromagnetic Theory I Credits: (4)&lt;br&gt;ECE 581 - Energy Conversion I Credits: (3)&lt;br&gt;ENGL 415 - Written Communication for Engineers Credits: (3)</td>
</tr>
<tr>
<td>Fall semester (15 credit hours)</td>
<td>*<strong>Technical electives Credits: (6)</strong>&lt;br&gt;ECE 590 – Senior Design Experience Credits: (3)&lt;br&gt;CE 530 - Statics and Dynamics Credits: (3)&lt;br&gt;ECE 530 - Control Systems Design Credits: (3)</td>
</tr>
<tr>
<td>Spring semester (15 credit hours)</td>
<td><strong>Humanities/Social Science Elective Credits: (3)</strong>&lt;br&gt;ECE 557 - Electromagnetic Theory I Credits: (4)&lt;br&gt;ECE 431 - Microcontrollers Credits: (3)&lt;br&gt;ECE 526 - Electronics II Credits: (3)&lt;br&gt;ECE 540 - Applied Scientific Computing for Engineers Credits: (3)</td>
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<tr>
<td>Senior year</td>
<td><strong>Humanities/Social Science Elective Credits: (3)</strong>&lt;br&gt;ECE 502 - Electronics Laboratory Credits: (2)&lt;br&gt;ECE 512 - Linear Systems Credits: (3)&lt;br&gt;ECE Technical Electives Credits: (3)&lt;br&gt;ECE 581 - Energy Conversion I Credits: (3)&lt;br&gt;ENGL 415 - Written Communication for Engineers Credits: (3)</td>
</tr>
<tr>
<td>Fall semester (15 credit hours)</td>
<td>*<strong>Technical electives Credits: (6)</strong>&lt;br&gt;ECE 590 – Senior Design Experience Credits: (3)&lt;br&gt;CE 530 - Statics and Dynamics Credits: (3)&lt;br&gt;ECE 530 - Control Systems Design Credits: (3)</td>
</tr>
<tr>
<td>Spring semester (17 credit hours)</td>
<td><strong>Humanities/Social Science Elective Credits: (3)</strong>&lt;br&gt;ECE 502 - Electronics Laboratory Credits: (2)&lt;br&gt;ECE 512 - Linear Systems Credits: (3)&lt;br&gt;ECE Technical Electives Credits: (3)&lt;br&gt;ECE 581 - Energy Conversion I Credits: (3)&lt;br&gt;ENGL 415 - Written Communication for Engineers Credits: (3)</td>
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</tr>
</tbody>
</table>
Electrical engineering options

**Technical electives Credit**: (9)

**Humanities/Social Science Elective Credit**: (3)

ME 513 - Thermodynamics I Credit: (3)

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General option

In the general option a set of specializations is possible. Students are expected to select a set of interrelated courses that fulfills an engineering design experience and allows for concentration in one area. Examples of such areas are communication systems and signal processing, digital electronics, integrated circuits and devices, and power systems.

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Bioengineering option

Bioengineering is the application of engineering principles to measurement, analysis, and design issues faced by the medical and life science communities. The health care industry is one of the fastest-growing business sectors in the United States. Through the bioengineering option, undergraduate students can obtain a BS degree in electrical engineering while acquiring a highly marketable biotechnology skill set. Areas of emphasis within this option are medical instrumentation (biosensors and data acquisition tools), biosignal analysis, and biomedical product design.

Candidates for this option include undergraduate electrical engineering and pre-medicine students who seek a multidisciplinary environment focused upon using technology to increase quality of life. Instructors from various colleges at K-State contribute to this curriculum.

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Electrical engineering options

**Technical electives Credit**: (9)

**Humanities/Social Science Elective Credit**: (3)

ME 513 - Thermodynamics I Credit: (3)
The curriculum accommodates pre-medicine students through the acceptance of core premedicine courses as complementary electives. Students pursuing a pre-medicine program should contact the dean's office in the College of Arts and Sciences for additional information.

Notes

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

For the good and benefit of the student and their future employer, the ECE department enforces a C- prerequisite policy for all courses listed by number in the curriculum and for any in-major technical elective course applied toward the degree. A grade of C or better must be earned in all prerequisites to such a course before enrolling in that course.

**Humanities and Social Science electives are to be selected from the list of courses approved by the College of Engineering. Students should select these courses as needed to complete the requirements of the K-State 8 General Education program.

***Technical electives must be selected to complete one of the areas of specialization.

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

Notes

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

For the good and benefit of the student and their future employer, the ECE department enforces a C- prerequisite policy for all courses listed by number in the curriculum and for any in-major technical elective course applied toward the degree. A grade of C or better must be earned in all prerequisites to such a course before enrolling in that course.

**Humanities and Social Science electives are to be selected from the list of courses approved by the College of Engineering. Students should select these courses as needed to complete the requirements of the K-State 8 General Education program.

***Technical electives must be selected to complete one of the areas of specialization.

**** Not more than twelve (12) credit hours of courses in electrical and computer engineering may be transferred to Kansas State University for credit toward a bachelor degree in either electrical engineering or computer engineering. Further, those courses selected for transfer credit must be equivalent to courses in the list below and must be such that the prerequisites for the listed course are also satisfied.

Any courses transferred must be taken from ABET accredited programs:

- ECE 210
- ECE 241
- ECE 525
- ECE 557
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 (129)

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ECE 410  ECE 581

Students participating in exchange programs or transferring in from outside the United States may request waivers of this policy. Waivers must be obtained in advance of the exchange semester.

IMPORTANT NOTE: Students must meet the requirements of the K-State 8 General Education Program.

Total hours required for graduation (129)

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