COLLEGE OF ENGINEERING
COURSE AND CURRICULUM CHANGES

Approved at the College of Engineering
Course and Curriculum Meeting

March 26, 2015

Edwards Conference Room

9:00

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

Architectural Engineering and Construction Science and Management

From:

CNS 210 - Graphic Communication I
Credits: (1)

Introduction to graphic communication and methods using orthographic projections, isometrics, and perspective drawings and sketches and their application to the engineering, design, and construction industry.

Note
One hour recitation and two hours lab per week.

Requisites
Prerequisite or concurrent enrollment: CNS 220

When Offered
Fall, Spring

UGE course
No

K-State 8
None

To:

CNS 210 - Graphic Communication I
Credits: (1)

Introduction to graphic communication and methods using orthographic projections, isometrics, and perspective drawings and sketches and their application to the engineering, design, and construction industry.

Note
Two hours lab per week.

Requisites
Prerequisite or concurrent enrollment: CNS 220

When Offered
Fall, Spring

UGE course
No

K-State 8
None

Impact: None

Rationale: The course was taught under a topics class number for the first term of offering. It was determined that the 2 hours of lab per week was the best format to accomplish the goals of the course.

Effective Date: Fall 2015

FROM: CNS 331 Strength of Materials and Analysis (3) I, II Study of behavior of materials subjected to tension, compression, shear, and bending; analysis of beams and columns. Three hours recitation a week. Prerequisite: CNS 231 and Professional Program Standing in CNSM.

TO: CE 331 Strength of Materials and Analysis (3) I, II Study of behavior of materials subjected to tension, compression, shear, and bending; analysis of beams and columns. Three hours recitation a week. Prerequisite: CNS 231.

Rationale: This course has been traditionally taught for the Construction Science and Management majors by Civil Engineering traditionally. The course proposal approved by the College of Engineering November 7, 2013 (approved by Faculty Senate February 2014) was to move it to the Department of Architectural Engineering and Construction Science with the other structural courses taught within the department, however, the course material currently needs to remain in the Civil Engineering Department to match the lab component.

Impact: None. This course has been taught by an Instructor whose time is split between Civil Engineering and the Department of Architectural Engineering and Construction Science. It is anticipated that this arrangement will continue for the foreseeable future.

Effective Date: Spring 2016

FROM: CNS 332 Strength of Materials A Laboratory (1) I, II Tests to determine the physical properties of various structural materials. Analysis and interpretation of test data. Three hours lab a week. Prerequisite or concurrent enrollment: CNS 331.

TO: CE 332 Strength of Materials A Laboratory (1) I, II Tests to determine the physical properties of various structural materials. Analysis and interpretation of test data. Three hours lab a week. Prerequisite or concurrent enrollment: CE 331.

Rationale: Same as CE 331 rationale.
Impact: This has been discussed with Civil Engineering. Both departments agree for scheduling and teaching of this class to continue to be taught by the Civil Engineering Department.

Effective Date: Spring 2016

Biological and Agricultural Engineering

From: BAE 560. Natural Resource Engineering I (3). II. Principles and measures for controlling storm water runoff and soil erosion including hydrology and surface water flow; design of water handling structures for land drainage, flood protection, and irrigation. Three hours recitation a week. Not available to students with credit for CE 550.

Credit: 3

Pre-requisite: STAT 490. Prerequisite or concurrent enrollment: ME 571.

To: BAE 560. Hydrology for Biological Systems (3). II. Components of water cycle including precipitation, infiltration, evapotranspiration. Principles and measures for controlling storm water runoff and soil erosion including hydrology and surface water flow; design of water handling structures for land drainage, flood protection, and irrigation. Three hours recitation a week. Not available to students with credit for CE 550.

Credit: 3

Pre-requisite: Prerequisite or concurrent enrollment: ME 571 and either STAT 490 or STAT 510.

Rationale: Adding more information on the hydrologic cycle based on advisory board and industry input. Renaming course to better reflect current material. STAT 490 has been replaced by STAT 510 in the new BSE program.

Impact: Potential impacts with Civil Engineering have been discussed and resolved.

Effective Date: Fall 2015

Chemical Engineering

FROM:

CHE 499 - Honors Research in Chemical Engineering

Credits: (1-18)

Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.
Note
Repeatable.

When Offered
Fall, Spring

UGE course
No

K-State 8
None

TO:

CHE 499 - Honors Research in Chemical Engineering

Credits: **(1-6)**

Individual research problem selected with approval of faculty advisor. Open to students in the College of Engineering honors program. A report is presented orally and in writing during the last semester.

Note
Repeatable.

When Offered
Fall, Spring

UGE course
No

K-State 8
None

Rationale: In the past the number of credit hours for which a student could enroll in CHE 499 in any one semester was left to the decision of the student and their honors research advisor. It was felt advisable to limit the number of credit hours in which students could enroll in this course to six (6) credit hours in any one semester. In addition, this change would be consistent with proposed curriculum changes that limit the total number of research credits that can be applied to the degree.

Impact: No impact on other units

Effective Date: Fall 2015
A study of the first and second laws of thermodynamics, real gases, heat of solution and reaction.

Note
Two hours recitation a week.

Requisites
Prerequisite: CHE 320. Prerequisite or concurrent enrollment: MATH 240.

When Offered
Fall

UGE course
No

K-State 8
None

Che 520 - Chemical Engineering Thermodynamics I

Credits: (2)

A study of the first and second laws of thermodynamics, real gases, heat of solution and reaction.

Note
Two hours recitation a week.

Requisites
Prerequisite: A grade of C or better in CHE 320. Prerequisite or concurrent enrollment: MATH 240.

When Offered
Fall

UGE course
No
Rationale: Students who struggle with junior-level and senior-level courses often were observed to have not performed well in CHE 320. By requiring a grade of C or better in CHE 320, we hope students will have a better foundation for subsequent chemical engineering courses.

Impact: No impact to other departments.

Effective Date: Fall 2015

FROM:

CHE 530 - Transport Phenomena I

Credits: (3)

A unified treatment of the basic principles of momentum, energy, and mass transport.

Note
Three hours recitation a week.

Requisites
Prerequisite: CHE 320 and MATH 240.

When Offered
Fall

UGE course
No

K-State 8
None

TO:

CHE 530 - Transport Phenomena I

Credits: (3)
A unified treatment of the basic principles of momentum, energy, and mass transport.

**Note**
Three hours recitation a week.

**Requisites**
Prerequisite: A grade of C or better in CHE 320 and MATH 240.

**When Offered**
Fall

**UGE course**
No

**K-State 8**
None

**Rationale:** Students who struggle with junior-level and senior-level courses often were observed to have not performed well in CHE 320. By requiring a grade of C or better in CHE 320, we hope students will have a better foundation for subsequent chemical engineering courses.

**Impact:** No impact to other departments.

**Effective Date:** Fall 2015

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**Expedited COURSE PROPOSALS**

**Courses Numbered 000-599**

**Biological and Agricultural Engineering**

From: BAE 665. Ecological Engineering Design. (3). I. Definition, classification, and practice of ecological engineering. Course describes ecological systems, ecosystem restoration, and the utilization of natural processes to provide societal services and benefits to nature. Three hours recitation a week.

Credit: 3

Pre-requisite: Prerequisite: MATH 221 and one of the following courses: BAE 560, CE 563, BIOL 529, BIOL 612, ATM 661.

restoration, and the utilization of natural processes to provide societal services and benefits to nature. Three hours recitation a week.

Credit: 3
Pre-requisite: Prerequisite: MATH 221 and one of the following courses: BAE 560, CE 563, BIOL 529, BIOL 612, ATM 661.
Rationale: Taught on demand fall semester of odd years.
Impact: No impact to other departments.
Effective Date: Fall 2015

Credit: 3
Pre-requisite: NA
Credit: 3
Pre-requisite: NA
Rationale: Taught on demand fall semester of odd years.
Impact: No impact to other departments.
Effective Date: Fall 2015

**Electrical and Computer Engineering**

**FROM**

**ECE 660 - Communication Systems I**

**Credits:** (3)

Introduction to the analysis and design of analog and digital communication systems. Topics include analog and digital modulation schemes, digital encoding of messages, mathematical modeling of communications systems, noise in communication links and calculation of performance measures for practical links.

**Note**

Three hours recitation a week.

**Requisites**

Prerequisite or concurrent enrollment: ECE 512.
TO:
ECE 660 - Communication Systems I
Credits: (3)

Introduction to the analysis and design of analog and digital communication systems. Topics include analog and digital modulation schemes, digital encoding of messages, mathematical modeling of communications systems, noise in communication links and calculation of performance measures for practical links.

Note
Three hours recitation a week.

Requisites
Prerequisite or concurrent enrollment: ECE 512.

When Offered
Spring

UGE course
No

K-State 8
None

Effective: Fall 2015

Rationale: This is a change to the term offered only. The offering term is being changed from Fall to Spring in order to better coordinate with department scheduling priorities. Changes are highlighted in RED below. Other information in black or left open is not being changed.

Impact: No

Expedited
Curriculum Changes

Chemical Engineering

<table>
<thead>
<tr>
<th>From:</th>
<th>To:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bachelor degree requirements</strong></td>
<td><strong>Bachelor degree requirements</strong></td>
</tr>
<tr>
<td><strong>Freshman year</strong></td>
<td><strong>Freshman year</strong></td>
</tr>
<tr>
<td><strong>Fall semester (15 credit hours)</strong></td>
<td><strong>Fall semester (15 credit hours)</strong></td>
</tr>
<tr>
<td>• Humanities/social science elective Credits: (3)</td>
<td>• Humanities/social science elective Credits: (3)</td>
</tr>
<tr>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
</tr>
<tr>
<td>• CHE 110 - Current Topics in Chemical Engineering Credits: (1)</td>
<td>• CHE 110 - Current Topics in Chemical Engineering Credits: (1)</td>
</tr>
<tr>
<td>• CHM 210 - Chemistry I Credits: (4)**</td>
<td>• CHM 210 - Chemistry I Credits: (4)**</td>
</tr>
<tr>
<td>• ENGL 100 - Expository Writing I Credits: (3)</td>
<td>• ENGL 100 - Expository Writing I Credits: (3)</td>
</tr>
<tr>
<td>• MATH 220 - Analytic Geometry and Calculus I Credits: (4)</td>
<td>• MATH 220 - Analytic Geometry and Calculus I Credits: (4)</td>
</tr>
<tr>
<td><strong>Spring semester (16 credit hours)</strong></td>
<td><strong>Spring semester (16 credit hours)</strong></td>
</tr>
<tr>
<td>• Humanities/social science elective Credits: (3)</td>
<td>• Humanities/social science elective Credits: (3)</td>
</tr>
<tr>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
</tr>
<tr>
<td>• CHM 230 - Chemistry II Credits: (4)**</td>
<td>• CHM 230 - Chemistry II Credits: (4)**</td>
</tr>
<tr>
<td>• COMM 105 - Public Speaking IA Credits: (2)</td>
<td>• COMM 105 - Public Speaking IA Credits: (2)</td>
</tr>
<tr>
<td>• ECON 110 - Principles of Macroeconomics Credits: (3)</td>
<td>• ECON 110 - Principles of Macroeconomics Credits: (3)</td>
</tr>
<tr>
<td>• MATH 221 - Analytic Geometry and Calculus II Credits: (4)</td>
<td>• MATH 221 - Analytic Geometry and Calculus II Credits: (4)</td>
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<tr>
<td><strong>Sophomore year</strong></td>
<td><strong>Sophomore year</strong></td>
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<tr>
<td><strong>Fall semester (16 credit hours)</strong></td>
<td><strong>Fall semester (16 credit hours)</strong></td>
</tr>
<tr>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
</tr>
<tr>
<td>• CHE 320 - Chemical Process Analysis Credits: (3)</td>
<td>• CHE 320 - Chemical Process Analysis Credits: (3)</td>
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<tr>
<td>• CHM 371 - Chemical Analysis Credits: (4)†</td>
<td>• CHM 371 - Chemical Analysis Credits: (4)†</td>
</tr>
<tr>
<td>• MATH 222 - Analytic Geometry and Calculus III Credits: (4)</td>
<td>• MATH 222 - Analytic Geometry and Calculus III Credits: (4)</td>
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<tr>
<td>• PHYS 213 - Engineering Physics I Credits: (5)</td>
<td>• PHYS 213 - Engineering Physics I Credits: (5)</td>
</tr>
<tr>
<td><strong>Spring semester (17 credit hours)</strong></td>
<td><strong>Spring semester (17 credit hours)</strong></td>
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<tr>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
</tr>
<tr>
<td>• CHE 416 - Computational Techniques in Chemical Engineering Credits: (3)</td>
<td>• CHE 416 - Computational Techniques in Chemical Engineering Credits: (3)</td>
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<tr>
<td>• CHE 520 - Chemical Engineering Thermodynamics I Credits: (2)</td>
<td>• CHE 520 - Chemical Engineering Thermodynamics I Credits: (2)</td>
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<tr>
<td>• CHM 531 - Organic Chemistry I Credits: (3)</td>
<td>• CHM 531 - Organic Chemistry I Credits: (3)</td>
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<tr>
<td>Senior year</td>
<td>Junior year</td>
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<tr>
<td>Fall semester (18 credit hours)</td>
<td>Fall semester (17 credit hours)</td>
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<tr>
<td>• Technical elective Credits: (3)</td>
<td>• Chemistry/biochemistry/biology elective\‡ Credits: (3)</td>
</tr>
<tr>
<td>• UGE ≥ 300 level humanities and social science elective Credits: (6)</td>
<td>• Technical elective Credits: (3)</td>
</tr>
<tr>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
<td>• CHE 015 - Engineering Assembly Credits: (0)</td>
</tr>
<tr>
<td>• 'CHE 550 - Chemical Reaction Engineering Credits: (3)</td>
<td>• 'CHE 550 - Chemical Reaction Engineering Credits: (3)</td>
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<tr>
<td>• 'CHE 560 - Separational Process Design Credits: (3)</td>
<td>• 'CHE 560 - Separational Process Design Credits: (3)</td>
</tr>
<tr>
<td>• 'CHE 570 - Chemical Engineering Systems Design I Credits: (3)</td>
<td>• 'CHE 570 - Chemical Engineering Systems Design I Credits: (3)</td>
</tr>
<tr>
<td>Spring semester (16 credit hours)</td>
<td>Spring semester (14 credit hours)</td>
</tr>
<tr>
<td>• Chemical engineering elective Credits: (3)</td>
<td>• Chemistry/biochemistry/biology elective\‡ Credits: (3)</td>
</tr>
<tr>
<td>• Unrestricted elective Credits: (3)</td>
<td>• Technical elective Credits: (3)</td>
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</tbody>
</table>

‡ Selected from CHE 350 - Design I Credits: (3)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE 015</td>
<td>Engineering Assembly</td>
<td>(0)</td>
</tr>
<tr>
<td>*CHE 542</td>
<td>Unit Operations Laboratory</td>
<td>(3)</td>
</tr>
<tr>
<td>CHE 561</td>
<td>Chemical Process Dynamics and Control</td>
<td>(3)</td>
</tr>
<tr>
<td>*CHE 571</td>
<td>Chemical Engineering Systems Design II</td>
<td>(3)</td>
</tr>
<tr>
<td>CHE 565</td>
<td>Health and Safety in Chemical Engineering Systems</td>
<td>(1)</td>
</tr>
</tbody>
</table>

**Notes**

* These courses form the chemical engineering core program.

** Chemical Principles I (CHM 220) and Chemical Principles II (CHM 250) may be taken instead of CHM 210, CHM 230, and CHM 371. If this option is elected, two additional credit hours of technical electives are to be selected.

‡ Chemistry/biochemistry/biology electives must include either Physical Chemistry I (CHM 585) or Physical Chemistry II (CHM 595). In addition, possible selections in each department for electives include the following:

- Chemistry: Organic Chemistry II (CHM 550), Instrumental Analysis (CHM 566), Physical Chemistry I (CHM 585) and Physical Chemistry II (CHM 595).
- Biochemistry: General Biochemistry (BIOCH 521), Physical Studies of Biomacromolecules (BIOCH 590), Biochemistry I (BIOCH 755), and Biochemistry II (BIOCH 765); Biology: BIOL 450 or above; some possible courses include Modern Genetics (BIOL 450), General Microbiology (BIOL 455), Plant Physiology (BIOL 500), Fundamentals of Ecology (BIOL 529) or Cell Biology (BIOL 541).

§ The advanced laboratory experience is to be a 2-credit-hour laboratory course selected from the following courses: Organic Chemistry Laboratory (CHM 532), Physical Methods Laboratory (CHM 596), General Biochemistry Laboratory (BIOCH 522), or Biochemistry I Laboratory (BIOCH 756).

The departmental requirements below must be satisfied.

32 credit hours of electives are required, and they are to be selected in consultation with the student’s advisor. All electives must be on the lists approved by the department or have the approval of the department head and must support the program educational objectives and student outcomes of the chemical engineering program. A student’s overall program of study must meet university requirements.

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** Chemical Principles I (CHM 220) and Chemical Principles II (CHM 250) may be taken instead of CHM 210, CHM 230, and CHM 371. If this option is elected, two additional credit hours of technical electives are to be selected.

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The remaining 6 credit hours of technical electives are to be chosen from courses identified as engineering topics, with at least one course selected from either analytical mechanics (both statics and dynamics must be represented) or circuits, fields, and electronics.

- 15 credit hours of social sciences and humanities electives are required. These courses are to be selected from the list approved by the College of Engineering. At least 6 credit hours of 300-level or higher courses must be included within these 15 credit hours. All courses must be taken for a letter grade.

- Three (3) credit hours of unrestricted elective are to be selected from courses numbered 100 or higher, excluding courses listed as a prerequisite to a required course.

A grade of C or higher in each course within the chemical engineering core program is required for graduation.

Total hours required for graduation (129)

Effective term: Fall 2015

Rationale: In recent years students have transferred into our program who have completed significant amounts of chemical engineering coursework from another institution. It would be possible for such students to graduate with a degree in chemical engineering from Kansas State University while only completing a minimal number of courses within our department. We desire to have our graduates have their chemical engineering education be truly representative of that provided by our faculty. Thus we want to establish the amount of discipline specific coursework that must be completed at Kansas State in order to obtain a chemical engineering degree.

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