



**Campus Curricula Committee Meeting Agenda**

**May 8, 2013**

**12 pm**

**Room 117 Fulton Hall**

**Associating minors with DSCCs**

**Review of submitted DC forms:**

DC #0474, Mining and Nuclear Engineering, Bachelor of Science in Nuclear Engineering, effective Fall 2013.

DC #0475, Mechanical and Aerospace Engineering, Bachelor of Science in Aerospace Engineering, effective Fall 2013.

**Review of submitted CC forms:**

CC #8464, Economics 400, Special Problems, effective Summer 2013.

CC #8465, Art 251, Genre Studies in Film and Literature, effective Fall 2013.

CC #8466, Economics 443, Creativity, Innovation, and Sustainability, effective Summer 2013.

CC #8467, Explosives Engineering 360, Display Fireworks Manufacturing, effective Fall 2013.

**Review of submitted EC forms:**

EC #2463, Civil Engineering 401, Structural Health Monitoring, effective Fall 2013.

EC #2464, Mining Engineering 401, Contract Management, effective Summer 2013.

EC #2465, Mining Engineering 401, Belt Conveying in Mines, effective Summer 2013.

EC #2466, Geophysics 401, Advanced Geophysical Field Methods, effective Summer 2013.

**Tabled Items:**

DC #0450, Bachelor of Science in Mechanical Engineering.



DC #0451, Bachelor of Science in Aerospace Engineering  
DC #0466, Materials Science and Engineering, Minor in Materials Science and Engineering.  
DC #0472, Manufacturing Engineering, Master of Science in Manufacturing Engineering.  
CC #8385, Ceramic Engineering 261, Materials Senior Design I.  
CC #8386, Ceramic Engineering 262, Materials Senior Design II.  
CC #8406, Metallurgical Engineering 216, Mechanical Testing of Materials.  
CC #8407, Metallurgical Engineering 218, Microstructural Development Laboratory.  
CC #8445, Metallurgical Engineering 261, Materials Senior Design I.  
CC #8446, Metallurgical Engineering 262, Materials Senior Design II.  
CC #8447, Ceramic Engineering 262, Materials Senior Design II.

DC # 0474-2013-MUCENG-000-00

Effective Year: **2013** Effective Term: Summer ☐ Fall ☒ Spring ☐  
(Creating or modifying a degree program must be effective for a Fall term.)

## Degree Change Form (DC)

This form is to be used for creating or modifying degree programs, emphasis areas, and minors.

Title of degree program, emphasis area, or minor:

**Nuclear Engineering (NE)**

Department: **Mining and Nuclear Engineering**

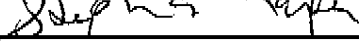
Briefly describe action requested (attach documentation as appropriate):

**NE B.S. Program is being modified to provide more flexibility to the students to take substitute courses for C. Sc. 73, 77, 228, Stat 215 and English 160. Also, NE 25 will be waived for transfer students.**

**Attachments:**

- 1. Current Bachelor of Science, Nuclear Engineering degree requirements, pages 220-222, Undergraduate Catalog 2011-2013.**
- 2. Proposed changes in the degree requirements for B.S. Nuclear Engineering effective Fall 2013.**

Recommended by Department:  Date: 3-21-13  
(Chair signature)

Recommended by DSCC:  Date: 4-21-13  
(Chair signature)

Approved by Curricula Committee: \_\_\_\_\_ Date: \_\_\_\_\_  
(Chair signature)

Approved by Faculty Senate: \_\_\_\_\_ Date: \_\_\_\_\_  
(Chair signature)

# Undergraduate Catalog 2011-2013

## 220 — Nuclear Engineering

### MISSION STATEMENT

The primary mission of the Nuclear Engineering program is to provide well-educated Nuclear Engineering professionals and leaders to Missouri and the nation in the commercial nuclear industry, national laboratories, graduate schools, and the nation's defense and federal agencies.

### Program Educational Objectives

The Educational Objectives of the Nuclear Engineering undergraduate program are:

- Fundamental knowledge of Nuclear Engineering and related technologies. Our graduates will continue to demonstrate a sound fundamental knowledge of nuclear engineering and related technologies as members of their professional community.
- Analytical and problem solving ability. Our graduates will continue to use logical, creative, collaborative, analytical and problem solving abilities to address emerging multidisciplinary endeavors.
- Leadership and professional ethics. Our graduates will continue to demonstrate leadership with an understanding of, and a commitment to, professional ethics.
- Technical communication and interpersonal skills. Our graduates will continue to demonstrate technical communication and interpersonal skills, enabling them to excel in their profession.
- Capability to conduct research. Our graduates will continue to demonstrate the capability to conduct research enabling them to contribute to meeting the needs of their profession.
- Pursuit of life-long learning. Our graduates will continue to demonstrate a recognition of, and a desire for, the pursuit of life long learning that will foster their ability to adapt to change.

### Program Outcomes

The following Program Outcomes (a - k) apply to the Nuclear Engineering program.

- (a) an ability to apply knowledge of mathematics, science, and engineering.
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data.
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- (d) an ability to function on multidisciplinary teams.
- (e) an ability to identify, formulate, and solve engineering problems.
- (f) an understanding of professional and ethical responsibility.
- (g) an ability to communicate effectively.
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

(i) a recognition of the need for, and an ability to engage in life-long learning.

(j) a knowledge of contemporary issues.

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

### Faculty

#### Professor:

Arvind Kumar, Ph.D., California-Berkeley, Program Chair, Nuclear Engineering

#### Associate Professor:

Hyoung Koo Lee, Ph.D., University of California, Berkeley

Gary Mueller<sup>1</sup>, Ph.D., UM-Rolla

Shoaib Usman, Ph.D., University of Cincinnati

#### Assistant Professors:

Ayodeji Alajo, Ph.D., Texas A&M University

Carlos Castano, Ph.D., University of Illinois at Urbana

#### Adjunct Professors:

Mariesa Crow<sup>1</sup>, Ph.D., Illinois; Professor of Electrical & Computer Engineering, UM-Rolla

Delbert Day<sup>1</sup>, Ph.D., Pennsylvania State; Curators' Professor Emeritus, UM-Rolla

Tod Moser<sup>1</sup>, M.S., UM-Columbia; Manager, Plant Engineering, AmerenUE - Callaway Plant

David A. Summers, Ph.D., Leeds, England; Curators' Professor of Mining Engineering, UM-Rolla

#### Emeritus Professors:

D. Ray Edwards<sup>1</sup>, Sc.D., MIT

Nicholas Tsoulfanidis<sup>1</sup>, Ph.D., Illinois

<sup>1</sup> Registered Professional Engineer

### Bachelor of Science Nuclear Engineering

Entering freshmen desiring to study Nuclear Engineering will be admitted to the Freshman Engineering Program. They will, however, be permitted, if they wish, to state a Nuclear Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the Freshman Engineering Program is on enhanced advising and career counseling, with the goal of providing to the student the information necessary to make an informed decision regarding the choice of a major.

For the Bachelor of Science degree in Nuclear Engineering a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. A student must maintain at least two grade points per credit hour for all courses taken in the student's major department, and an average of at least two grade points per credit hour must be maintained in Nuclear Engineering.

The Nuclear Engineering curriculum contains a required number of hours in humanities and social sciences as specified by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Each student's program of study must contain a minimum of 16 credit hours of course work

**Nuclear Engineering — 221**

from the humanities and the social sciences areas and should be chosen according to the following rules:

1) All students are required to take one American history course and one economics course. The history course is to be selected from History 112, 175, History 176, or Political Science 90. The economics course may be either Economics 121 or 122. Some disciplines require one humanities course to be selected from the approved lists for art, English, foreign languages, music, philosophy, speech and media studies, or theater.

2) Of the remaining hours, six credit hours must be taken in humanities or social sciences at the 100 level or above and must be selected from the approved lists. One of these courses must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 70 to 80 can be considered to be one of these courses. (Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 300 level.)

3) Some departments list specific requirements; e.g. a psychology course, a literature course, and /or a second semester of economics. Selections should be made to ensure that these requirements are met.

4) Skill courses are not allowed to meet humanities and social sciences requirements except in foreign languages. Students who select the foreign language option are urged to take more than one course.

5) Special topics, special problems courses and honors seminars are allowed only by petition to and approval by the student's department chair.

The Nuclear Engineering program at Missouri S&T is characterized by its focus on the scientific basics of engineering and its innovative application; indeed, the underlying theme of this educational program is the application of the scientific basics to engineering practice through attention to problems and needs of the public. The necessary interrelations among the various topics, the engineering disciplines, and the other professions as they naturally come together in the solution of real world problems are emphasized as research, analysis, synthesis, and design are presented and discussed through classroom and laboratory instruction.

**FRESHMAN YEAR**

First Semester	Credit
Freshman Chemistry Requirement <sup>(1)</sup> . . . . .	5
Eng 20-Exposition and Argumentation . . . . .	3
FE 10-Study and Careers in Engineering . . . . .	1
Math 14-Calculus for Engineers I . . . . .	4
Nu Eng 25-Nuclear Technology Applications <sup>(2)</sup> . . . . .	1
	14

**Second Semester**

Elective-Hum or Soc Sci <sup>(3)</sup> . . . . .	3
History 112, 175, 176, or Political Science 90 . . . . .	3
Physics 23-Engineering Physics I . . . . .	4
IDE 20-Intro to Engr Design. . . . .	3
Math 15-Calculus for Engineers II . . . . .	4
	17

**SOPHOMORE YEAR**

First Semester	Credit
Cmp Sc 73 or 74-Basic Scientific Programming <sup>6</sup> . . . . .	2
Cmp Sc 77 or 78-Computer Programming Lab <sup>6</sup> . . . . .	1
CE 50-Statics . . . . .	3
Math 22-Calculus w/Analytic Geometry III . . . . .	4
Nu Eng 105-Intro to Nuclear Engineering . . . . .	2
Physics 24-Engineering Physics II . . . . .	4
	16

**Second Semester**

Cmp Sc 228-Intro to Numerical Methods . . . . .	3
Econ 121 or 122-Micro/Macroeconomics . . . . .	3
Nu Eng 206-Reactor Operations I . . . . .	1
CE 110-Mechanics of Materials . . . . .	3
Math 204-Elem Diff Equations . . . . .	3
Nu Eng 203-Interactions of Radiation w/Matter or	
Physics 107-Intro to Modern Physics . . . . .	3
	16

**JUNIOR YEAR**

First Semester	Credit
Elective-Hum or Soc Sci <sup>(3)</sup> . . . . .	3
Stat 215-Engineering Statistics . . . . .	3
Mt Eng 121-Metallurgy for Engineers . . . . .	3
Nu Eng 205-Fundamentals of Nuclear Engineering . . . . .	3
Nu Eng 221-Reactor Fluid Mechanics . . . . .	3
	15

**Second Semester**

English 160-Technical Writing . . . . .	3
Nu Eng 312-Nuc Radiation Measurement & Spectro . . . . .	3
Nu Eng 223-Reactor Heat Transfer . . . . .	3
Nu Eng 303-Reactor Physics I . . . . .	3
Nu Eng 319-Nuclear Power Plant Systems . . . . .	3
Technical Electives-200 or 300 level <sup>(5)</sup> . . . . .	3
	18

**SENIOR YEAR**

First Semester	Credit
Elective-Hum or Soc Sci <sup>(3)</sup> . . . . .	3
Nu Eng 304-Reactor Lab I . . . . .	2
Nu Eng 307-Nuclear Fuel Cycle . . . . .	3
Elective-300 level Math . . . . .	3
Nu Eng 322-Nuclear System Design I . . . . .	1
Nu Eng 341-Nuclear Materials I . . . . .	3
	15

**Second Semester**

Elective-Hum or Soc Sci <sup>(3)</sup> . . . . .	3
Technical Elective-300 level <sup>(5)</sup> . . . . .	3
Free Elective <sup>(4)</sup> . . . . .	6
Nu Eng 308-Reactor Lab II . . . . .	2
Nu Eng 323-Nuclear System Design II . . . . .	3
	17

**NOTE:** Minimum credit hours for graduation is 128.

<sup>1)</sup> Chemistry 1 and 2 or Chemistry 5 and Chemistry 4 or an equivalent training program approved by Missouri S&T.

<sup>2)</sup> Nuclear Engineering students are expected to take Nuclear Technology Applications (Nu Eng 25) during their freshman year.

<sup>3)</sup> Humanities and Social Science to be taken in accordance with the policy described above.

<sup>4)</sup> Courses which do not count towards this requirement are remedial courses such as algebra

## 222 — Nuclear Engineering

and trigonometry, physical education courses, extra credits in required courses, and basic Air Force and Army ROTC courses (courses taught in the first two years of the ROTC program).

<sup>5)</sup> Any Math, Science, or Engineering courses.

<sup>6)</sup> Students may take CS 53 in place of CS 73 or 74 and CS 54 in place of CS 74 or 78.

**Fundamentals of Engineering Exam:** All Nuclear Engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade on this examination is not required to earn a B.S. degree, however, it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process as described in Assessment Requirements found elsewhere in this catalog. Students must sign a release form giving the University access to their Fundamentals of Engineering Examination score.

### Nuclear Engineering Minor Curriculum

Nuclear power plants and other nuclear installations employ not only nuclear but also civil, mechanical, electrical, and chemical engineers. A Nuclear Engineering minor, therefore, enhances the academic credentials of a student and broadens his/her employment choices. A minimum of 15 hours is required for a minor in Nuclear Engineering.

Before the courses listed below can be taken, the student should have completed Elementary Differential Equations (Math 204 or equivalent) and Atomic and Nuclear Physics (Physics 107 or Nu Eng 203 or equivalent). Required courses are:

- Nu Eng 204-Nuc Radiation Measurements (3 hrs)
- Nu Eng 205-Fundamentals of Nu Eng (3 hrs)
- Nu Eng 223-Reactor Heat Transfer (3 hrs)

The other 6 hours should be selected from nuclear engineering 300-level courses.

### Nuclear Engineering Courses

- 25 Nuclear Technology Applications** (LEC 1.0) It is a project oriented course that examines various aspects of nuclear technology, such as radiation detection, radiation protection, food irradiation, medical and industrial applications. The students will work in small groups on stimulating projects.
- 101 Special Topics** (Variable 0.0-6.0) This course is designed to give the department an opportunity to test a new course. Variable title.
- 105 Introduction To Nuclear Engineering** (LEC 2.0) Atoms and nuclei; nuclear reactions; radioactivity, interactions of radiation with matter; fission and fusion reactors; nuclear fuels; radiation effects on materials and man; radioactive waste disposal; reactor safety; radiation protection. Prerequisite: Math 15 or Math 21.
- 200 Special Problems** (IND 0.0-6.0) Problems or readings on specific subjects or projects in the department. Consent of instructor required.

**201 Special Topics** (Variable 0.0-6.0) This course is designed to give the department an opportunity to test a new course. Variable title.

**203 Interactions Of Radiation With Matter** (LEC 3.0) Atoms and nuclei; relativistic kinematics; quantum theory; nuclear decay; cross sections; neutron, gamma, and charged particle interactions; production of radioisotopes; electrical, thermal and magnetic properties of solids. Prerequisites: Math 22, Physics 24.

**205 Fundamentals Of Nuclear Engineering** (LEC 3.0) An introduction to the principles and equations used in nuclear fission reactor technology, including reactor types; neutron physics and reactor theory; reactor kinetics and control; radiation protection; reactor safety and licensing; and environmental aspects of nuclear power. Prerequisite: Physics 107 or Nu Eng 203; Math 204.

**206 Reactor Operations I** (LAB 1.0) A first course in reactor operations training and practical approach to nuclear reactor concepts. Students will receive hands-on training and are encouraged to take the NRC Reactor Operator's Exam. Prerequisites: Math 14 or Math 8; preceded or accompanied by Nu Eng 25.

**221 Reactor Fluid Mechanics** (LEC 3.0) A study of the fundamental principles of incompressible viscous and inviscid flows in ducts, nozzles, tube bundles and applications to nuclear engineering; fluid statics; dimensional analysis and similitude; boundary layer theory. Prerequisites: Math 204, Junior standing.

**223 Reactor Heat Transfer** (LEC 3.0) A study of the fundamental principles of conduction, convection and thermal radiation with volumetric source terms for nuclear engineering applications; empirical correlations; finite difference methods; analysis of nuclear reactor cores. Prerequisite: Nu Eng 221.

**300 Special Problems** (IND 0.0-6.0) Problems or readings on specific subjects or projects in the department. Consent of instructor required.

**301 Special Topics** (Variable 0.0-6.0) This course is designed to give the department an opportunity to test a new course. Variable title.

**303 Reactor Physics I** (LEC 3.0) Study of neutron interactions, fission, chain reactions, neutron diffusion and neutron slowing down; criticality of a bare thermal homogeneous reactor. Prerequisite: Nu Eng 205.

**304 Reactor Laboratory I** (LEC 1.0 and LAB 1.0) Acquaints the student with neutron flux measurement, reactor operation, control rod calibration, reactor power measurement and neutron activation experiments. Experiments with the thermal column and neutron beam port are also demonstrated. Prerequisites: Nu Eng 204, 205.

**306 Reactor Operation II** (LAB 1.0) The operation of the training reactor. The program is similar to that required for the NRC Reactor Operator's

# Undergraduate Catalog 2011-2013

## (Proposed) Nuclear Engineering Curriculum – FS 2013

### Bachelor of Science Nuclear Engineering

#### FRESHMAN YEAR

First Semester Credit	
Freshman Chemistry Requirement <sup>(1)</sup>	5
Eng 20-Exposition and Argumentation	3
FE 10-Study and Careers in Engineering	1
Math 14-Calculus for Engineers I	4
Nu Eng 25-Nuclear Technology Applications <sup>(2)</sup>	1
	<u>14</u>

#### Second Semester

Elective-Hum or Soc Sci <sup>(3)</sup>	3
History 112, 175, 176, or Political Science 90	3
Physics 23-Engineering Physics I	4
IDE 20-Eng Design w/Computer App	3
Math 15-Calculus for Engineers II	4
	<u>17</u>

#### SOPHOMORE YEAR

First Semester Credit	
Cmp Sc 53/73/74-Basic Programming	2
Cmp Sc 54/77/78-Computer Programming Lab	1
IDE 50-Eng Mech-Statics	3
Math 22-Calculus w/Analytic Geometry III	4
Nu Eng 105-Intro to Nuclear Engineering	2
Physics 24-Engineering Physics II	4
	<u>16</u>

#### Second Semester

Cmp Sc 228-Intro to Numerical Methods	
Or any 200 level Math or 300 Level Statistics	3
Econ 121 Or 122-Micro/Macroeconomics	3
Nu Eng 206-Reactor Operations I	1
IDE 110-Mechanics of Materials	3
Math 204-Elem Diff Equations	3
Physics 107-Intro to Modern Physics	3
	<u>16</u>

#### JUNIOR YEAR

First Semester Credit	
Elective-Hum or Soc Sci <sup>(3)</sup>	3
Stat 211/213/215/217-Statistics	3
Mt Eng 121-Metallurgy for Engineers	3
Nu Eng 205-Fundamentals of Nuclear Engineering	3
Nu Eng 221-Reactor Fluid Mechanics	3
	<u>15</u>

#### Second Semester

English 60/160-Technical Writing	3
Nu Eng 312-Nuc Radiation Measurement & Spectro	3
Nu Eng 223-Reactor Heat Transfer	3
Nu Eng 303-Reactor Physics I	3
Nu Eng 319-Nuclear Power Plant Systems	3
Technical Electives – 200 or 300 level <sup>(5)</sup>	3
	<u>18</u>

#### SENIOR YEAR

First Semester Credit	
Elective-Hum or Soc Sci <sup>(3)</sup>	3
Nu Eng 304-Reactor Lab I	2
Nu Eng 307-Nuclear Fuel Cycle	3
Elective-300 level Math	3
Nu Eng 322-Nuclear System Design I	1
Nu Eng 341-Nuclear Materials I	3
	<u>15</u>

#### Second Semester

Elective-Hum or Soc Sci <sup>(3)</sup>	3
Technical Elective-300 level <sup>(5)</sup>	3
Free Elective <sup>(4)</sup>	6
Nu Eng 308-Reactor Lab II	2
Nu Eng 323-Nuclear System Design II	3
	<u>17</u>

#### Minimum credit hours for graduation is 128.

- 1) Chemistry 1 and 2 or Chemistry 5 and Chemistry 4 or an equivalent training program approved by Missouri S&T.
- 2) Nuclear Engineering students are expected to take Nuclear Technology Applications (Nu Eng 25) during their Freshman year. However transfer students are exempt.
- 3) Humanities and Social Science to be taken in accordance with The School of Materials, Energy, and Earth Resources policy.
- 4) Courses which do not count towards this requirement are remedial courses such as algebra and trigonometry, physical education courses, extra credits in required courses, and basic Air Force and Army ROTC courses (courses taught in the first two years of the ROTC program).
- 5) Any Math, Science, or Engineering courses.

**Fundamentals of Engineering Exam:** All Nuclear Engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade on this examination is not required to earn a B.S. degree; however, it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process as described in Assessment Requirements found elsewhere in this catalog. Students must sign a release form giving the University access to their Fundamentals of Engineering Examination score.

DC # 0475-2013- Aero Eng - 000-00

Effective Year: **2013** Effective Term: Summer ☐ Fall ☒ Spring ☐

(Creating or modifying a degree program must be effective for a Fall term.)

## Degree Change Form (DC)

This form is to be used for creating or modifying degree programs, emphasis areas, and minors.

Title of degree program, emphasis area, or minor:

**Aerospace Engineering**Department: **Mechanical & Aerospace Engineering**

Briefly describe action requested (attach documentation as appropriate):

**Revise degree requirements as in the attachment**

Recommended by Department:

(Chair signature)

Date:

4/9/2013

Recommended by DSCC:

(Chair signature)

Date:

4/18/13

Approved by Curricula Committee:

(Chair signature)

Date:

Approved by Faculty Senate:

(Chair signature)

Date:



**AE Catalog Revision: Summary of Changes  
April 2013**

1. Changes footnotes (highlighted in yellow)
2. Combined footnotes 4 and 5 into footnote 4
3. Added AE 330 and Stat 213 and 215 to Advanced Math/Comp Sc list
4. Added footnote for 300-level tech elective exception for Ae Eng 377 and Ae Eng 3xx (Asteroid Mining)
5. Reduced number of free electives to 2
6. Added bio ethics to the type of allowable ethics courses
7. Added requirement for passing assessment exam

**BSAE Catalog Revision (April 2013)****FRESHMAN YEAR**

<u>First Semester</u>	<u>Credit</u>
Freshman Engineering 10 .....	1
Chemistry 1,2,4, <sup>1</sup> .....	6
English 20 .....	3
Math 14 <sup>4</sup> .....	4
H/SS History elective <sup>2</sup> .....	<u>3</u>
	<b>17</b>

**Second Semester**

IDE 20 .....	3
Math 15 <sup>4</sup> .....	4
Physics 23 <sup>4</sup> .....	4
H/SS Economics elective <sup>3</sup> .....	<u>3</u>
	<b>14</b>

**SOPHOMORE YEAR**

<u>First Semester</u>	<u>Credit</u>
Cmp Sc 73 or 74-Basic Sci Prog <sup>10</sup> .....	2
Cmp Sc 77 or 78-Comp Prog Lab <sup>10</sup> .....	1
CE 50 or 51-Statics <sup>4</sup> .....	3
Math 22-Calc/Analy Geom III <sup>4</sup> .....	4
Physics 24-Eng Physics II <sup>4</sup> .....	4
Ae Eng 161-Aero Vehicle Performance <sup>4</sup> .....	<u>3</u>
	<b>17</b>

**Second Semester**

Ae Eng 180-Intro to Aerospace Design	2
Ae Eng 160-Eng Mech-Dyn <sup>4</sup> .....	3
Mc Eng 219-Thermodynamics <sup>4</sup> .....	3
Math 204-Elem Diff Equations <sup>4</sup> .....	3
CE 110-Mech of Materials <sup>4</sup> .....	3
Elective/Literature .....	<u>3</u>
	<b>17</b>

**JUNIOR YEAR**

<u>First Semester</u>	<u>Credit</u>
Ae Eng 213-Aerospace Mech I <sup>4</sup> .....	3
Ae Eng 231-Aerodynamics I <sup>4</sup> .....	3
Ae Eng 377-Princ of Eng Materials .....	3
EI Eng 281-Electrical Circuits .....	3
Electives-Advanced Math/Cmp Sc <sup>5</sup> .....	<u>3</u>
	<b>15</b>

**Second Semester**

Ae Eng 251-Aerospace Structures I <sup>4</sup> .....	3
Ae Eng 261-Flight Dynamics and Control .....	3
Ae Eng 271-Aerodynamics II .....	3
Ae Eng 282-Exp Methods in Ae Eng I .....	2
Elective/Ethics <sup>11</sup> .....	3
Elective/Communications <sup>7</sup> .....	<u>3</u>
	<b>17</b>

**SENIOR YEAR**

<u>First Semester</u>	<u>Credit</u>
Ae Eng 235-Aircraft & Space Vehicle Propulsion .	3
Ae Eng 253-Aerospace Structures II . . . . .	3
Ae Eng 280 or 380-Aero Sys Design I . . . . .	2
Ae Eng 283-Experimental Methods in Ae Eng II .	2
Electives-Technical <sup>7</sup> . . . . .	3
Elective upper level /Hum/Soc Sci <sup>8</sup> . . . . .	3
	<b>16</b>
<u>Second Semester</u>	
Ae Eng 281 or 382-Aero Sys Design II . . . . .	3
Electives-Technical <sup>6</sup> . . . . .	3
Electives-Technical <sup>6</sup> . . . . .	3
Assessment	1
Electives Free <sup>9</sup> . . . . .	2
Electives-Hum/Soc Sci . . . . .	3
	<b>15</b>

**List of Notes:**

- 1) Chem 1, 2 and 4 or an equivalent training program approved by Missouri S&T
- 2) Must be one of the following: Political Science 90, History 112, History 175, or History 176.
- 3) Must be one of the following: Economics 121 or Economics 122.
- 4) A grade of "C" or better in Chem 1, Math 14, 15, 22, 204, Physics 23, 24, Civ Eng 50, 110, Computer programming elective, Ae Eng 161, Mc Eng 219, and Ae Eng 160, both as prerequisite for follow-up courses in the curriculum and for graduation.
- 5) Must be one of the following: AE 330, Comp Sc 228, Math 203, Math 208, Stat 213, Stat 215, or any 300-level math or computer science course approved by the student's advisor.
- 6) Electives must be approved by the student's advisor. Nine hours of technical electives must be in Mechanical and Aerospace Engineering. Three hours of departmental technical electives must be at the 300-level. Ae Eng 377 and the 300-level Asteroid Mining course co-listed with Geological Engineering are not to be used for 300-level tech elective.
- 7) This course can be selected from English 60, 160, SP&MS 85, or the complete four-course sequence in Advanced ROTC (Mil Sc 105, 106, 207, and 208 or Aerospace Studies 350, 351, 380, and 381).
- 8) Choose 100- or higher-level course from the approved list. One of the other courses taken in humanities/social science should be a prerequisite for this course.
- 9) Each student is required to take ~~two hours~~<sup>or more</sup> of free electives in consultation with his/her academic advisor. Credits which do not count towards this requirement are deficiency courses (such as algebra and trigonometry), and extra credits in required courses.
- 10) Computer Science requirement can be satisfied by taking CS 53 and CS 54.
- 11) Must be a course in engineering ethics, business ethics, bio ethics, social ethics, or any ethics course approved by the student's advisor.

**NOTE:** All Aerospace Engineering students **must take and pass** the Aerospace Engineering Assessment Exam prior to graduation.

## Current (April 2013) Online BSAE Catalog Description

### FRESHMAN YEAR

#### First Semester Credit

Freshman Engineering 10	.1
Chemistry 1,2,4 <sub>1,4</sub>	.6
English 20	.3
Math 14 <sub>4</sub>	.4
H/SS History elective <sub>2</sub>	.3
	<b>17</b>

#### Second Semester

IDE 20	.3
Math 15 <sub>4</sub>	.4
Physics 23 <sub>4</sub>	.4
H/SS Economics elective <sub>3</sub>	.3
	<b>14</b>

### SOPHOMORE YEAR

#### First Semester Credit

Cmp Sc 73 or 74-Basic Sci Prog <sub>11</sub>	.2
Cmp Sc 77 or 78-Comp Prog Lab <sub>11</sub>	.1
CE 50 or 51-Statics <sub>4</sub>	.3
Math 22-Calc/Anal Geom III <sub>4</sub>	.4
Physics 24-Eng Physics II <sub>4</sub>	.4
Ae Eng 161-Aero Vehicle Performance	.3
	<b>17</b>

*foot note*

#### Second Semester

Ae Eng 180-Intro to Aerospace Design	.2
Ae Eng 160-Eng Mech-Dyn <sub>3</sub>	.3
Mc Eng 219-Thermodynamics <sub>4,5</sub>	.3
Math 204-Elem Diff Equations <sub>4</sub>	.3
CE 110-Mech of Materials <sub>4</sub>	.3
Elective/Literature	.3
	<b>17</b>

### JUNIOR YEAR

#### First Semester Credit

Ae Eng 213-Aerospace Mech I <sub>4,3</sub>	
Ae Eng 231-Aerodynamics I <sub>4,5</sub>	.3
Ae Eng 377-Princ of Eng Materials	.3
El Eng 281-Electrical Circuits	.3
Electives-Advanced Math/Cmp Sc <sub>5</sub>	.3
	<b>15</b>

*Added AE330 and Stat 213, 215*

#### Second Semester

Ae Eng 251-Aerospace Structures I <sub>4</sub>	.3
Ae Eng 261-Flight Dynamics and Control	.3
Ae Eng 271-Aerodynamics II	.3
Ae Eng 282-Exp Methods in Ae Eng I	.2
Elective/Ethl <sub>CS,2</sub>	.3
Elective/Communications <sub>3</sub>	.3
	<b>17</b>

*Added Bio Ethics*

### SENIOR YEAR

#### First Semester Credit

Ae Eng 235-Aircraft & Space Vehicle Propulsion	.3
Ae Eng 253-Aerospace Structures II	.3
Ae Eng 280 or 380-Aero Sys Design I	.2
Ae Eng 283-Experimental Methods in Ae Eng II	.2
Electives-Technical <sub>7</sub>	.3
Electives/Hum/Soc Sci <sub>9</sub>	.3
	<b>16</b>



## Second Semester

Ae Eng 281 or 382-Aero Sys Design II . . . . .	3
Electives-Technical . . . . .	3
Electives-Technical . . . . .	3
Electives Free . . . . .	3
Electives-Hum/Soc Sci . . . . .	3
	<b>15</b>

### List of Notes:

- 1) Chemistry 1, 2 and 4 or an equivalent training program approved by Missouri S&T
- 2) Must be one of the following: Political Science 90, History 112, History 175, or History 176.
- 3) Must be one of the following: Economics 121 or Economics 122.
- 4) A grade of "C" or better in Chem 1, Math 14, 15, 22, 204, Physics 23, 24 CE 50, 110 and Computer programming is required both for enrollment in ME 219, AE 213, AE 231, or AE 251 and for graduation.
- 5) A grade of "C" or better in AE Eng 160 and ME 219 is required both for enrollment in any courses which require either AE Eng 160 or ME 219 as prerequisites and for graduation.
- 6) Must be one of the following: Comp Sc 228, Math 203, Math 208, or any 300-level math or computer science course approved by the student's advisor.
- 7) Electives must be approved by the student's advisor. Nine hours of technical electives must be in Mechanical and Aerospace Engineering. Three hours of departmental technical electives must be at the 300-level. Honors students have special requirements for technical electives.
- 8) This course can be selected from English 60, 160, SP&MS 85, or the complete four-course sequence in Advanced ROTC (Mil Sc 105, 106, 207, and 208 or Aerospace Studies 350, 351, 380, and 381).
- 9) All electives must be approved by the student's advisor. Students must comply with the requirements specified in the current catalog.
- 10) Each student is required to take six hours of free electives in consultation with his/her academic advisor. Credits which do not count towards this requirement are deficiency courses (such as algebra and trigonometry), and extra credits in required courses. Any courses outside of engineering and science must be at least three credit hours.
- 11) Computer Science requirement can be satisfied by taking CS 53 and CS 54.
- 12) Must be a course on engineering ethics, business ethics, social ethics, or any ethics course approved by the student's advisor.

**NOTE:** All Aerospace Engineering students must take the departmental Exit Exam prior to graduation.

Effective Year: 2013

Term: Summer ☒ Fall ☐ Spring ☐

CC File # 8464-2013-ECON-400-10

**Course Change Form (CC)**

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)New Course ☒Course Deletion ☐Credit Hours ☐Prerequisites ☐Course Title ☐Catalog Description ☐Course Number ☐Co-listing ☐**Course Information** (1-9 Must Be Completed. Leave "Proposed" items blank if no change is being made.)

1. Department: Economics

2. Discipline and Course Number: Present :

ECON  
Proposed: 400

3. Course Title: Present:

Proposed: Special Problems

Abbreviated Course Title:

(24 Spaces or Less. Only needed for New Courses or Title Changes.)

4. Catalog Description (300 Character Spaces or Less.)

Present:

Proposed: Problems or readings on specific subjects or projects in the department. Consent of instructor required.

5. If course requires field trip check box: ☐

6. Credit Hours:

Present:

Lecture:

Lab:

Total:

Proposed:

Lecture: 3

Lab: 0

Total: 3

7. Prerequisites:

Present:

Proposed:

8. Required for Majors: ☐Elective for Majors: ☒

9. Justification: Additional graduate courses have been developed in the department and this would provide an avenue for additional graduate-level inquiry.

10. Semesters previously offered as an experimental course (101, 201, 301, 401):

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1)

2)

3)

4)

5)

6)

Recommended by Department



(Chair signature)

Date: 2/28/13

Recommended by Discipline Specific Curricula Committee



(Chair signature)

Date: 3/2/13

Approved by Curricula Committee:

(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate:

(Chair signature)

Date: \_\_\_\_\_

(Revised 1/29/09)

Effective Year: 2013

Term: Summer ☐ Fall ☒ Spring ☐

CC File # 8465-2013-ART-

251-33

**Course Change Form (CC)**

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)New Course ☐Course Deletion ☐Credit Hours ☐Prerequisites ☐Course Title ☒Catalog Description ☒Course Number ☐Co-listing ☐**Course Information** (1-9 Must Be Completed. Leave "Proposed" items blank if no change is being made.)

1. Department: ALP

2. Discipline and Course Number: Present: Art 251

Proposed: Art 251

3. Course Title: Present: Art 251: Genre Studies in Film and Literature

Proposed: Art 251: A Study of Documentary

Abbreviated Course Title: Study of Documentary

(24 Spaces or Less. Only needed for New Courses or Title Changes.)

4. Catalog Description (300 Character Spaces or Less.)

Present: Topics examine various generic relationships between film and literature (e.g., comedy, Film Noir, western literature/film)

Proposed: An exploration of the art, truth, and controversy of the documentary from 1895 to the present, featuring landmark films seen through contemporary and historical perspectives: actualities, city symphonies, war documentaries, concert films, personal documentaries, and mockumentaries.

5. If course requires field trip check box: ☐6. Credit Hours: Present: Lecture: 3 Lab: 0 Total: 3  
Proposed: Lecture: Lab: Total:

7. Prerequisites:

Present: Art 85

Proposed: Art 85

8. Required for Majors: ☐ Elective for Majors: ☒

9. Justification:

10. Semesters previously offered as an experimental course (101, 201, 301, 401):

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1) 2) 3)

4) 5)

Recommended by Department \_\_\_\_\_

(Chair signature)

Date: 3/6/2013

Recommended by Discipline Specific Curricula Committee \_\_\_\_\_

(Chair signature)

Date: 3/6/2013

Approved by Curricula Committee: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

(Revised 1/29/09)

Effective Year: 2013

Term: Summer ☒ Fall ☐ Spring ☐

CC File # 8466-2013-Econ-443-10

**Course Change Form (CC)**

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)New Course ☒Course Deletion ☐Credit Hours ☐Prerequisites ☐Course Title ☒Catalog Description ☒Course Number ☒Co-listing ☐**Course Information** (1-9 Must Be Completed. Leave "Proposed" items blank if no change is being made.)

1. Department: Economics

2. Discipline and Course Number: Present :

Proposed: Econ 443

3. Course Title: Present:

Proposed: Creativity, Innovation, and Sustainability

Abbreviated Course Title: Creat Innov Sustain

(24 Spaces or Less. Only needed for New Courses or Title Changes.)

4. Catalog Description (300 Character Spaces or Less.)

Present:

**Proposed:** This interdisciplinary course examines the use of innovation as a competitive technological strategy with a sustainability perspective. It explores ways in which individuals, groups, and organizations can become more creative and how leadership and a culture of change can be implemented.

5. If course requires field trip check box: ☐

6. Credit Hours:

Present:

Lecture:

Lab:

Total:

Proposed:

Lecture: 3

Lab: 0

Total: 3

7. Prerequisites:

Present:

Proposed: Graduate standing.

8. Required for Majors: ☐Elective for Majors: ☒

9. Justification: Taught as BUS 401-Business Innovation, Sp 12; BUS 401-Innovation Management, Sp 13.

10. Semesters previously offered as an experimental course (101, 201, 301, 401): Sp 12, Sp 13

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1)

2)

3)

4)

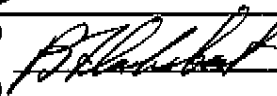
5)

Recommended by Department



(Chair signature)

Recommended by Discipline Specific Curricula Committee



(Chair signature)

Approved by Curricula Committee:

(Chair signature)

Approved by Faculty Senate:

(Chair signature)

Date: 3/13/13

Date: 4/3/13

Date: \_\_\_\_\_

Date: \_\_\_\_\_



Effective Year: 2013

CC File # 8467-2013-EXP ENG-360-10

Effective Term: Summer ☐ Fall ☒ Spring ☐

# Course Change Form (CC)

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)

New Course ☒ Course Deletion ☐ Credit Hours ☐ Prerequisites ☐  
 Course Title ☐ Catalog Description ☐ Course Number ☐ Co-listing ☐

**Course Information** (1-9 Must Be Completed. Leave "Proposed" items blank if no change is being made.)

1. Department: Mining &amp; Nuclear Engineering

2. Discipline and Course Number: Present :

Proposed: ExpEng 360

3. Course Title: Present:

Proposed: Display Fireworks Manufacturing

Abbreviated Course Title: Fireworks Manufacturing

(24 Spaces or Less. Only needed for New Courses or Title Changes.)

4. Catalog Description (40 Words or Less)

Present:

Proposed: Theory and practice of manufacturing display fireworks. Focusing on safety, chemical interaction, color development, basic theory, state and federal law. The lab will include hands on building of ball and canister shells and other pyrotechnic effects.

5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture: Lab: Total:  
 Proposed: Lecture: 1 Lab: 2 Total: 3

7. Prerequisites:  
Present:

Proposed: Chem 1, Chem2, Chem 4; one of Econ 121 , Econ 122, Emgt 137; Successful background check.

8. Required for Majors: ☐ Elective for Majors: ☒

9. Justification: Application after 2 succesful offerings to obtain permanent number. This class is an important offering for the minor and an additional class for the masters in explosives engineering. The Federal ATF also have considerable interest in a blended learning offering for their agents taking the explosives technology grad certificate.

10. Semesters previously offered as an experimental course (101, 201, 301, 401): Exp 301 FS2012, SP2013

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1) 2) 3)  
 4) 5) 6)  
 Recommended by Department DR. WILSON FOR DR. FRIMAN  
 (Chair signature)

Date: 20 March 2013

Recommended by Discipline Specific Curricula Committee Alpha Raper  
 (Chair signature)

Date: 4/2/13

Approved by Curricula Committee: \_\_\_\_\_  
 (Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate: \_\_\_\_\_  
 (Chair signature)

Date: \_\_\_\_\_

Effective Year: 2013

Effective Term: Summer ☐ Fall ☒ Spring ☐

EC File # 2463-Fall 2013-CIV ENG-401

## Experimental Course Form (EC)

This form must be filed with the Secretary to the Campus Curricula Committee, after the department chair's notation, by the appropriate deadline. Filing deadlines for inclusion in the initial release of the Schedule of Classes are as follows:

Summer and Fall Semester Offerings – January 1  
Spring Semester Offerings – August 1

An EC form must be submitted each semester it is to be offered, not to exceed two offerings. An experimental course that is required should be submitted on a CC form. *Co-listed offerings should be submitted on one form, originating from the primary discipline.*

**Department:** Civil, Architectural, and Environmental Engineering

**Discipline and Course Number:** CE/ArchE401

**Course Title:** Structural Health Monitoring

**Abbreviated Title (24 spaces or less):** Struct Health Monitoring

**Instructor(s):** Genda Chen

**Credit Hours:**      **Lecture:** 3.0      **Lab:**      **Total:**

**Prerequisites:** CE/ArchE384 or equivalent

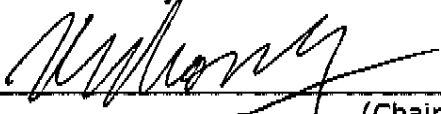
**Semester(s) previously taught:**

**Brief Course Description: (40 words or less)**

This course discusses the state-of-the-art development and implementation of structural health monitoring technologies, sensor designs, data analyses, and comprehensive applications in structural engineering. Emphasis is placed on the integration of various disciplines-specific technologies into a general framework of structural monitoring. Both experimental and numerical simulations are expected throughout the course work.

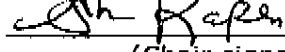
**List all co-listed courses: Include initials of Dept. Chair, if signature is not already included below.**

- 1) ArchE401      2) CE401      3)  
4)      5)      6)

Department Chair: 

(Chair Signature)

Date: 3/28/13

Discipline Specific Curricula Committee: 

(Chair signature)

Date: 4-8-13

Curricula Committee: \_\_\_\_\_

(Chair Signature)

Date: \_\_\_\_\_

## *ArchE*/CE401 STRUCTURAL HEALTH MONITORING Fall Semester 2013

**Instructor:** Genda Chen, Room 328 in Butler-Carlton Hall

**Catalog Description:** Structural health monitoring overview and process; damage mechanisms of structural materials and systems; sensors, conditioning and metrology; adaptive data analysis; data transmission; feature extraction and discrimination; system identification and damage detection; case studies.

**Prerequisites:** CE/ArchE 384 (Structural Dynamics) or equivalent.

**Class Schedule:** Tuesday and Thursday 3:00 – 4:15 p.m. in CE316

**Office Hours:** 1:00 – 3:00 p.m. and 4:30 – 6:00 p.m. Tuesday and Thursday

**Textbook:** Structural Health Monitoring.

<b>Grading:</b>	Quizzes (2)	50%	(see Quizzes below)
	Homework	25%	(see Team Homework below)
	Final Take-home Project	25%	

**Quizzes:** Two quizzes will be given on March 14 and April 27, respectively. No make-up quizzes will be given. Approval from instructor must be obtained in advance if a quiz has to be missed for a valid reason.

**Team Homework:** Assigned problems will be worked in pencil on 8 ½ x 11 in. engineering paper on one side of the sheet, with each problem starting on a new page or one inch spacing between problems. The presentation will include a statement of the problem, a neat sketch (optional), and an orderly presentation of the solution. Assigned problems will be collected.

**Attendance Policy:** Any students with three or more absences without a valid reason may be asked to drop out of the class.

**Objectives:** This course is intended to provide graduate students with an opportunity to have a general understanding of the state-of-the-art development and implementation of structural health monitoring technologies, and an in-depth study on several specific technologies in terms of sensor design, data analysis, data transmission, and comprehensive application in transportation infrastructure. Emphasis will be placed on the integration of various discipline-specific technologies into a general framework of structural health monitoring. Both experimental and numerical simulations are expected throughout the course work.

On completion of this course, students should be able to:

1. Describe and apply the concept and process of structural health monitoring.

2. Describe various damage mechanisms of structural materials and systems.
3. Describe and apply the design methodology and operation principle of at least two types of sensors.
4. Describe and apply at least two types of data analysis methods such as non-adaptive vs. adaptive time-frequency analysis.
5. Describe and apply at least one feature extraction and discrimination technique.
6. Design and deploy a structural health monitoring system in transportation structures.

**Final Take-home Project:** Design a structural health monitoring system for a structural member, component, or system.

**Remarks:** Student and guest presentations are expected on selected topics.

**Tentative Lecture Topics:**

Lecture 1: Introduction to Structural Health Monitoring (concept, process, classification – construction/operation/diagnostic monitoring, and damage mechanisms of materials and structural systems)

***Part I: Operation and Environment***

Lecture 2: Noise Characteristics – Stochastic Representation

Lecture 3: Operational Loading – Traffic Modeling

***Part II: Sensing, Conditioning, Acquisition, and Communication***

Lecture 4: Point Sensors (LVDT, Tiltmeter, Accelerometer, Strain Gauge, Thermometer, Pressure Transducer, Electromagnetic Sensor)

Lecture 5: Distributed Sensors (Coax Cable and Optical Fiber Sensors)

Lecture 6: Metrology in Various Applications

Lecture 7: Wired and Wireless Data Transmission

***Part III: Feature Extraction and Discrimination***

Lecture 8: Stationary and Non-stationary Signals

Lecture 9: Fourier and Hilbert Transforms and Their Applications

Lecture 10: Wavelet Analysis and Applications

Lecture 11: Adaptive Empirical Mode Decomposition and Hilbert-Huang Transform

Lecture 12: Adaptive Analytical Mode Decomposition or Adaptive Filter

Lecture 13: Adaptive Wavelet Analysis

Lecture 14: Supervised and Unsupervised Extraction

Lecture 15: Support Vector Machine

Lecture 16: Dynamic Characteristics or Neural Network Approach or Image Processing

Lecture 17: System Identification and Damage Detection (Least-square Method, Subspace Iterative Method, Random Decrement, Eigen Realization Algorithm, ARMA model)

***Part IV: Classification of Structural Condition***

Lecture 18: Statistical Model for Classification

Lecture 19: Case Study – Real-time Bill Emerson Cable-stayed Bridge Monitoring System and/or Monitoring of a Geomechanic System

EC # 2464-SS13-MIN ENG-401Effective Year: **2013** Effective Term: Summer ☒ Fall ☐ Spring ☐

## Experimental Course Form (EC)

An EC form must be submitted before an experimental course is to be offered. EC forms approved Spring 2009 or later allow the course to be offered twice at any time during the following three year period. After an experimental course has been offered twice, a CC form may be submitted to request a permanent course number.

A new course that is required as part of a degree program, minor, or graduate certificate may be submitted on a CC form to receive a permanent course number.

Co-listed offerings should be submitted on one form, originating from the primary discipline.

Department: **Mining and Nuclear Engineering**

Discipline and Course Number: **MI Eng 401**

Course Title: **Contract Management**

Abbreviated Title (24 spaces or less): **Contract Mgt**

Instructor(s): **Dr. Tad S. Golosinski**

Credit Hours: Lecture **3** Lab **0** Total **3**

Prerequisites: **Consent of Instructor**

Semester(s) previously taught:

Brief Course Description (360 character spaces or less): **Contracting in mining/ policies/ types of contracts/ bid preparation and evaluation/negotiations. Contract risks, contract administration. Earthmoving and excavation contracts. Mining / maintenance contracts and partnerships / alliancing.**

List all co-listed courses: Include initials of Department Chair, if signature is not already included below.

- |    |    |    |
|----|----|----|
| 1) | 3) | 5) |
| 2) | 4) | 6) |

Recommended by Department: \_\_\_\_\_

(Chair signature)

*DR. WORSEY FOR MR. FRIMPONG*

Date: 19 March 2013

Recommended by DSCC: \_\_\_\_\_

(Chair signature)

Date: 21 March 2013

Approved by Curricula Committee: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

EC # 2465-SS2013-MINENG-401

Effective Year: 2013 Effective Term: Summer ☒ Fall ☐ Spring ☐

## Experimental Course Form (EC)

An EC form must be submitted before an experimental course is to be offered. EC forms approved Spring 2009 or later allow the course to be offered twice at any time during the following three year period. After an experimental course has been offered twice, a CC form may be submitted to request a permanent course number.

A new course that is required as part of a degree program, minor, or graduate certificate may be submitted on a CC form to receive a permanent course number.

Co-listed offerings should be submitted on one form, originating from the primary discipline.

Department: **Mining and Nuclear Engineering**

Discipline and Course Number: **MI Eng 401**

Course Title: **Belt Conveying in Mines**

Abbreviated Title (24 spaces or less): **Belt Conveying**

Instructor(s): **Dr. Tad S. Golosinski**

Credit Hours: **Lecture 3 Lab 0 Total 3**

Prerequisites: **Consent of Instructor**

Semester(s) previously taught: **SS2006**

Brief Course Description (360 character spaces or less): **Intro: belt conveyor components, <sup>est</sup> of required conveyor drive power/conveying rate. Friction drives/belt tensions, <sup>C</sup> conveyor take-ups, <sup>conveyor</sup> conveyor drives, Other conveyor <sup>components?</sup> components idlers transfer point, other <sup>S</sup> selection of a belt <sup>conveyor</sup> conveyor for specific mining application. Conveyor operations/maintenance/troubleshooting, <sup>and applications,</sup> Steep angle conveyor, types, properties, <sup>and applications,</sup> and tube pipe.**

List all co-listed courses: Include initials of Department Chair, if signature is not already included below.

- |    |    |    |
|----|----|----|
| 1) | 3) | 5) |
| 2) | 4) | 6) |

Recommended by Department: \_\_\_\_\_

(Chair signature)

DR. WARENY FOR DR. FRANK PACHA

Date: 19 March 2013

Recommended by DSCC: \_\_\_\_\_

(Chair signature)

Date: 21 Mar 2013

Approved by Curricula Committee: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

EC # *2466-SS2013-Geophys-401*Effective Year: **2013** Effective Term: Summer ☒ Fall ☐ Spring ☐

## Experimental Course Form (EC)

An EC form must be submitted before an experimental course is to be offered. EC forms approved Spring 2009 or later allow the course to be offered twice at any time during the following three year period. After an experimental course has been offered twice, a CC form may be submitted to request a permanent course number.

A new course that is required as part of a degree program, minor, or graduate certificate may be submitted on a CC form to receive a permanent course number.

Co-listed offerings should be submitted on one form, originating from the primary discipline.

Department: **GSE**

Discipline and Course Number: **Geophys 401**

Course Title: **Advanced Geophysical Field Methods**

Abbreviated Title (24 spaces or less): **Advanced Field Methods**

Instructor(s): **Anderson**

Credit Hours: **Lecture 1      Lab 2      Total 3**

Prerequisites: **Instructor Approval**

Semester(s) previously taught: **None**

Brief Course Description (360 character spaces or less): **Geophysical field data will be acquired by registrants at selected study sites with the objective of imaging the shallow subsurface and built structures.**

**Registrants will process and interpret the acquired geophysical data using commercial state-of-the art geophysical processing and interpretational software.**

List all co-listed courses: Include initials of Department Chair, if signature is not already included below.

1) **GE 401**      3)      5)  
2)      4)      6)

Recommended by Department: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

*Ralph J. Shaw*  
4-5-13

Recommended by DSCC: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

*Alpha Reyes*  
4-8-13

Approved by Curricula Committee: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

DC # *0450-2013-Mech Eng-000-00*

Effective Year: **2013** Effective Term: Summer ☐ Fall ☒ Spring ☐  
(Creating or modifying a degree program must be effective for a Fall term.)

## Degree Change Form (DC)

This form is to be used for creating or modifying degree programs, emphasis areas, and minors.

Title of degree program, emphasis area, or minor:

**B.S. in Mechanical Engineering**

Department: **Mechanical & Aerospace Engineering**

Briefly describe action requested (attach documentation as appropriate):

**Add the following footnote j to the ME curriculum, as shown on the attached page. The footnote should be indicated with the following courses in the curriculum (as shown on the attached page):**

**Mc Eng 213, 221, 211, 208, 225, 231, 240, 242, 279, 261, 280**

The text of the footnote j is as follows:

**j) Students must be currently admitted to an engineering or science degree program, or receive permission of the MAE department chair, to enroll in this course.**

**The purpose of this modification is to prevent enrollment in these upper level courses by students that have not met the conditions for admission into one of the engineering or science degree programs.**

Recommended by Department: \_\_\_\_\_

*(Chair signature)*

Date: *1/12/2013*

Recommended by DSCC: \_\_\_\_\_

*(Chair signature)*

Date: *1/22/13*

Approved by Curricula Committee: \_\_\_\_\_

*(Chair signature)*

Date: \_\_\_\_\_

Approved by Faculty Senate: \_\_\_\_\_

*(Chair signature)*

Date: \_\_\_\_\_



**Mechanical Engineering — 192**

either Economics 121 or 122. The humanities course must be selected from the approved lists for art, English, foreign languages, music, philosophy, speech and media studies, or theater.

2) Depth requirement. Three credit hours must be taken in humanities or social sciences at the 100 level or above and must be selected from the approved list. This course must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 70 or 80 will be considered to satisfy this requirement. Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 300 level. All courses taken to satisfy the depth requirement must be taken after graduating from high school.

3) The remaining two courses are to be chosen from the list of approved humanities/social sciences courses and may include one communications course in addition to English 20.

4) Any specific departmental requirements in the general studies area must be satisfied.

5) Special topics and special problems and honors seminars are allowed only by petition to and approval by the student's department chairman.

The Mechanical Engineering program at Missouri S&T is characterized by its focus on the scientific basics of engineering and its innovative application; indeed, the underlying theme of this educational program is the application of the scientific basics to engineering practice through attention to problems and needs of the public. The necessary interrelations among the various topics, the engineering disciplines, and the other professions as they naturally come together in the solution of real world problems are emphasized as research, analysis, synthesis, and design are presented and discussed through classroom and laboratory instruction.

**FREE ELECTIVES FOOTNOTE:**

Free electives. Each student is required to take six hours of free electives in consultation with his/her academic advisor. Credits which do not count towards this requirement are deficiency courses (such as algebra and trigonometry), and extra credits in required courses. Any courses outside of Engineering and Science must be at least three credit hours.

**FRESHMAN YEAR**

First Semester	Credit
FE 10-Study and Careers in Engineering	1
Chem 1-General Chemistry <sup>a</sup>	4
Chem 2-General Chemistry Lab	1
Math 14-Calculus I for Engineers <sup>a,b</sup>	4
Engl 20-Exposition and Argumentation	3
Hist-112, 175, 176, or Pol Sc 90	3
	16
Second Semester	
IDE 20-Intro to Engineering Design	3
Math 15-Calculus II for Engineers <sup>a,b</sup>	4
Physics 23-Engineering Physics I <sup>a</sup>	4
Econ-121 or 122	3
Elective-Hum or Soc Sci <sup>f</sup>	3
	17

**SOPHOMORE YEAR**

First Semester	Credit
Programming Elective <sup>a,c</sup>	3
CE 50-Statics <sup>a</sup>	3
Math 22-Calculus w/Analytic Geometry III <sup>a</sup>	4
Physics 24-Eng Physics II <sup>a</sup>	4
Mc Eng 153-Intro to Manufacturing Processes	3
	17
Second Semester	
Mc Eng 161-Intro to Design	3
Mc Eng 219-Thermodynamics <sup>a</sup>	3
Mc Eng 160-Dynamics <sup>a</sup>	3
Math 204-Elementary Differential Equations <sup>a</sup>	3
Mt Eng 121-Metallurgy for Engineers <sup>a</sup>	3
	15

**JUNIOR YEAR**

First Semester	Credit
Mc Eng 213-Machine Dynamics	3
Mc Eng 221-Applied Thermodynamics	3
EI Eng 281-Electrical Circuits	3
CE 110-Mechanics of Materials <sup>a</sup>	3
CE 120-Material Lab	1
Elective-Advanced Math/Stat or Cmp Sc <sup>e</sup>	3
	16
Second Semester	
Mc Eng 211-Modeling and Analysis of Dyn Sys <sup>a,f</sup>	3
Mc Eng 208-Machine Design I <sup>a</sup>	3
Mc Eng 225-Heat Transfer <sup>a</sup>	3
Mc Eng 231-Thermofluid Mechanics I <sup>a</sup>	3
Mc Eng 240-Mechanical Instrumentation <sup>a</sup>	2
Elective-Communications <sup>d</sup>	3
	17

**SENIOR YEAR**

First Semester	Credit
Mc Eng 242-Mech Engineering Systems <sup>a</sup>	2
Mc Eng 279-Automatic Control of Dynamic Systems <sup>a</sup>	3
Mc Eng technical elective <sup>a</sup>	3
Free Elective <sup>e</sup>	3
Literature elective <sup>f</sup>	3
Elective-Advanced Hum or Soc Sci <sup>f</sup>	3
	17
Second Semester	
Eng Mg 124-Practical Concepts for Tech Managers	1
Eng Mg 137-Economic Analysis of Engr Projects	2
Mc Eng 261-Eng Design <sup>a</sup>	3
Mc Eng 280-Control Systems Lab <sup>a</sup>	1
Mc Eng 3xx technical elective <sup>a</sup>	3
Free Elective <sup>e</sup>	3
	13

**NOTE:** Students must satisfy the common engineering freshman year course requirements, and be admitted into the department, in addition to the sophomore, junior and senior year requirements listed above with a minimum of 128 hours

<sup>a</sup> A grade of "C" or better is required in Chem 1, Math 14, 15, 22, 204, Phys 23, 24, programming elective, Met Eng 121, CE 50, 110, Mc Eng 219, 160, and 211, both as prerequisite for follow-up courses in the curriculum and for graduation.

<sup>b</sup> Math 8 and 21 may be substituted for Math 14 and 15, respectively.

## 193 — Mechanical Engineering

- <sup>d</sup>) The programming elective consists of a lecture and lab combination, and may be selected from Cmp Sc 73/77, 74/78, or 53/54. Note that Cmp Sc 53/54 requires one more credit hour than the other options.
- <sup>d</sup>) This course must be selected from the following: English 60, 160 or SP&M S 85, or the complete four course sequence in Advanced ROTC (Mil Sc 105, 106, 207 and 208 or Aerosp S 350,351,380 and 381.)
- <sup>e</sup>) This course must be selected from the following: Cmp Sc 228, Math 203, 208, Stat 213, 215 or any 300-level math or computer science course approved by the student's advisor.
- <sup>f</sup>) All electives must be approved by the student's advisor. Students must comply with the general education requirements with respect to selection and depth of study. These requirements are specified in the current catalog.
- <sup>g</sup>) Electives must be approved by the student's advisor. Six hours of technical electives, which may not include Ae Eng/EMech/Mc Eng 202, 300 or 390, must be in the Department of Mechanical and Aerospace Engineering. At least three of these technical elective hours in the Department must be at the 300 level. Honors students have special requirements for technical electives.
- <sup>h</sup>) All Mechanical Engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade on this examination is not required to earn a B.S. degree, however, it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process as described in Assessment Requirements found elsewhere in this catalog. Students must sign a release form giving the University access to their Fundamentals of Engineering Examination score.
- <sup>i</sup>) Each student is required to take six hours of free electives in consultation with his/her academic advisor. Credits which do not count towards this requirement are deficiency courses (such as algebra and trigonometry), and extra credits in required courses. Any courses outside of Engineering and Science must be at least three credit hours.

### Energy Conversion Emphasis Area for Mechanical Engineering

Students desiring to obtain a Bachelor of Science degree in Mechanical Engineering with an Emphasis Area in Energy Conversion must satisfy all the requirements of the Bachelor of Science degree in Mechanical Engineering, with the additional stipulation that four courses must be taken as follows:

- a. Two courses from the following list: Mc Eng/Ae Eng 327, Mc Eng 333, Mc Eng 366, Mc Eng 371, Mc Eng 375, Ae Eng 369, Ae Eng 335.
- b. One course from the following list: Mc Eng/Ae Eng 319, Mc Eng/Ae Eng 325, Mc Eng/Ae Eng 331, Mc Eng/Ae Eng 339

- c. One additional course from either list "a" or list "b", or from the following list: Econ 345, El Eng 352, Env Eng 367, Nu Eng 317

**Note:** By using the free electives and technical electives to satisfy the above requirements, this emphasis area requires the same total number of credit hours as the BSME degree. A change of major form should be submitted to designate the Energy Conversion Emphasis Area

### Manufacturing Processes Emphasis Area for Mechanical Engineering

Students desiring to obtain a Bachelor of Science in Mechanical Engineering with an Emphasis Area in Manufacturing Processes must satisfy all requirements of the Bachelor of Science in Mechanical Engineering with the following modifications:

- a. Mc Eng 253 is required.
- b. One of the Mc Eng technical electives must be from the following Manufacturing/Automation courses: Mc Eng 353, 355, 349, and 306.
- c. One of the Mc Eng technical electives must be from the following Design courses: Mc Eng 363, 308, 356, and 302.
- d. Two courses 1) Mc Eng 357 or Mc Eng 308, and 2) Mc Eng 358 are required in lieu of Mc Eng 261.
- e. The Math/Stat elective must be either Stat 213 or 215.

A suggested sequence for the Junior and Senior years is given below. Note that by using the free electives and technical electives to satisfy the above requirements, this emphasis area requires the same total number of credit hours as the BSME degree. A change of major form should be submitted to designate the Manufacturing Processes Emphasis Area

#### JUNIOR YEAR

First Semester	Credit
Mc Eng 213-Machine Dynamics	3
El Eng 281-Electrical Circuits	3
Mc Eng 221-Applied Thermodynamics	3
CE 110-Mechanics of Materials*	3
CE 120-Materials Lab	1
Stat 213-Stat Meth in Eng or Stat 215-Eng Stat	3
	16

#### Second Semester

Mc Eng 211-Modeling and Analysis of Dyn Sys*	3
Mc Eng 231-Thermofluid Mechanics	3
Mc Eng 225-Heat Transfer	3
Mc Eng 240-Mechanical Instrumentation	2
Mc Eng 253-Manufacturing	3
Elective-Communications <sup>d</sup>	3
	17

#### SENIOR YEAR

First Semester	Credit
Mc Eng 242-Mech Eng Systems	2
Mc Eng 279-Auto Control of Dynamic Systems	3
Mc Eng 208-Machine Design I	3
Mc Eng 357-Integrated Prod & Proc Design	3
or Mc Eng 308-Rapid Product Design	

Insert footnote j) here.

DC # 0451-2013-Aero Eng -000-00

Effective Year: **2013** Effective Term: Summer ☐ Fall ☒ Spring ☐  
(Creating or modifying a degree program must be effective for a Fall term.)

## Degree Change Form (DC)

This form is to be used for creating or modifying degree programs, emphasis areas, and minors.

Title of degree program, emphasis area, or minor:

**B.S. in Aerospace Engineering**

Department: **Mechanical & Aerospace Engineering**

Briefly describe action requested (attach documentation as appropriate):

**Add the following footnote 13 to the AE curriculum, as shown on the attached page. The footnote should be indicated with the following courses in the curriculum (as shown on the attached page): Ae Eng 213, 231, 377, 251, 261, 271, 282, 235, 253, 280 or 380, 283, 281 or 382**

The text of the footnote 13 is as follows:

**13) Students must be currently admitted to an engineering or science degree program, or receive permission of the MAE department chair, to enroll in this course.**

The purpose of this modification is to prevent enrollment in these upper level courses by students that have not met the conditions for admission into one of the engineering or science degree programs.

Recommended by Department: \_\_\_\_\_

(Chair signature)

Date: 1/12/2013

Recommended by DSCC: \_\_\_\_\_

(Chair signature)

Date: 1/22/2013

Approved by Curricula Committee: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

**Aerospace Engineering — 55**

English 20 .....	3
Math 14 <sup>a</sup> .....	4
H/SS History elective <sup>2</sup> .....	3
	17

**Second Semester**

IDE 20 .....	3
Math 15 <sup>a</sup> .....	4
Physics 23 <sup>a</sup> .....	4
H/SS Economics elective <sup>3</sup> .....	3
	14

**SOPHOMORE YEAR**

First Semester	Credit
Cmp Sc 73 or 74-Basic Sci Prog <sup>11</sup> .....	2
Cmp Sc 77 or 78-Comp Prog Lab <sup>11</sup> .....	1
CE 50 or 51-Statics <sup>4</sup> .....	3
Math 22-Calc/Anal Geom III <sup>a</sup> .....	4
Physics 24-Eng Physics II <sup>a</sup> .....	4
Ae Eng 161-Aero Vehicle Performance .....	3
	17

**Second Semester**

Ae Eng 180-Intro to Aerospace Design .....	2
Ae Eng 160-Eng Mech-Dyn <sup>5</sup> .....	3
Mc Eng 219-Thermodynamics <sup>4,5</sup> .....	3
Math 204-Elem Diff Equations <sup>4</sup> .....	3
CE 110-Mech of Materials <sup>4</sup> .....	3
Elective/Literature .....	3
	17

**JUNIOR YEAR**

First Semester	Credit
Ae Eng 213-Aerospace Mech I <sup>1,13</sup> .....	3
Ae Eng 231-Aerodynamics I <sup>5,13</sup> .....	3
Ae Eng 377-Princ of Eng Materials <sup>13</sup> .....	3
El Eng 281-Electrical Circuits .....	3
Electives-Advanced Math/Cmp Sc <sup>6</sup> .....	3
	15

**Second Semester**

Ae Eng 251-Aerospace Structures I <sup>1,13</sup> .....	3
Ae Eng 261-Flight Dynamics and Control <sup>13</sup> .....	3
Ae Eng 271-Aerodynamics II <sup>13</sup> .....	3
Ae Eng 282-Exp Methods in Ae Eng I <sup>13</sup> .....	2
Elective/Ethics <sup>12</sup> .....	3
Elective/Communications <sup>8</sup> .....	3
	17

**SENIOR YEAR**

First Semester	Credit
Ae Eng 235-Aircraft & Space Vehicle Propulsion <sup>13</sup> .....	3
Ae Eng 253-Aerospace Structures II <sup>13</sup> .....	3
Ae Eng 280 or 380-Aero Sys Design I <sup>13</sup> .....	2
Ae Eng 283-Experimental Methods in Ae Eng II <sup>13</sup> .....	2
Electives-Technical <sup>7</sup> .....	3
Electives/Hum/Soc Sci <sup>9</sup> .....	3
	16

**Second Semester**

Ae Eng 281 or 382-Aero Sys Design II <sup>13</sup> .....	3
Electives-Technical <sup>7</sup> .....	3
Electives-Technical <sup>7</sup> .....	3
Electives Free <sup>10</sup> .....	3
Electives-Hum/Soc Sci <sup>9</sup> .....	3
	15

**List of Notes:**

- <sup>1)</sup> Chemistry 1, 2 and 4 or an equivalent training program approved by Missouri S&T
- <sup>2)</sup> Must be one of the following: Political Science 90, History 112, History 175, or History 176.
- <sup>3)</sup> Must be one of the following: Economics 121 or Economics 122.
- <sup>4)</sup> A grade of "C" or better in Chem 1, Math 14, 15, 22, 204, Physics 23, 24 CE 50, 110 and Computer programming is required both for enrollment in ME 219, AE 213, AE 231, or AE 251 and for graduation.
- <sup>5)</sup> A grade of "C" or better in AE Eng 160 and ME 219 is required both for enrollment in any courses which require either AE Eng 160 or ME 219 as prerequisites and for graduation.
- <sup>6)</sup> Must be one of the following: Comp Sc 228, Math 203, Math 208, or any 300-level math or computer science course approved by the student's advisor.
- <sup>7)</sup> Electives must be approved by the student's advisor. Nine hours of technical electives must be in Mechanical and Aerospace Engineering. Three hours of departmental technical electives must be at the 300-level. Honors students have special requirements for technical electives.
- <sup>8)</sup> This course can be selected from English 60, 160, SP&MS 85, or the complete four-course sequence in Advanced ROTC (Mil Sc 105, 106, 207, and 208 or Aerospace Studies 350, 351, 380, and 381).
- <sup>9)</sup> All electives must be approved by the student's advisor. Students must comply with the requirements specified in the current catalog.
- <sup>10)</sup> Each student is required to take six hours of free electives in consultation with his/her academic advisor. Credits which do not count towards this requirement are deficiency courses (such as algebra and trigonometry), and extra credits in required courses. Any courses outside of engineering and science must be at least three credit hours.
- <sup>11)</sup> Computer Science requirement can be satisfied by taking CS 53 and CS 54.
- <sup>12)</sup> Must be a course on engineering ethics, business ethics, social ethics, or any ethics course approved by the student's advisor.

**NOTE:** All Aerospace Engineering students must take the departmental Exit Exam prior to graduation.

Insert footnote 13 here.

**Requirements for a Minor in Aerospace Engineering**

A student who receives a bachelor of science degree in an accredited engineering program from Missouri S&T may receive a minor in aerospace engineering by completing the 15 hours of courses listed below.

DC # 0466 - 2013 - MS&E - 000-00

Effective Year: **2013** Effective Term: Summer ☐ Fall ☒ Spring ☐  
(Creating or modifying a degree program must be effective for a Fall term.)

## Degree Change Form (DC)

This form is to be used for creating or modifying degree programs, emphasis areas, and minors.

Title of degree program, emphasis area, or minor:

**B.S. minor in Materials Science & Engineering**

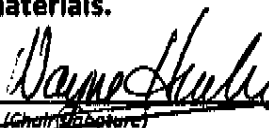
Department: **Materials Science & Engineering**

Briefly describe action requested (attach documentation as appropriate):

**Discontinue offering the Minor in Materials**

**In the January 2013 curriculum review meeting by the Materials Science and Engineering Department faculty, it was decided to discontinue offering the Materials Minor (Vote of 15 to discontinue minor, 2 to continue offering the minor and 1 abstaining). The faculty felt that the the current Materials Minor requirements of 15 hours does not provide students with sufficient materials background to be designated a Materials Minor. Most Materials Minors come from the Mechanical Engineering Department where students can take 12 hours as a part of their required ME curriculum (ME153, Met 121 and two ME tech electives: ME 336 and ME 338) allowing students to get a minor in materials with only one more 3 hour course. The faculty found this to be an insufficient materials background to continue providing a minor in materials.**

Recommended by Department:

  
(Chair signature)

Date:

2/6/13

Recommended by DSCC:

  
(Chair signature)

Date:

02/15/13

Approved by Curricula Committee:

(Chair signature)

Date:

Approved by Faculty Senate:

(Chair signature)

Date:

**Effective Year: 2013**

**DC # 0472-2013-MfgEng-000-00**

**Effective Term: Summer** ☐ **Fall** ☒ **Spring** ☐

(Creating or modifying a degree program must be effective for a Fall term)

## Degree Change Form (DC)

This form is to be used for creating or modifying degree programs, emphasis areas, and minors.

**Title of degree program, emphasis area, or minor:**

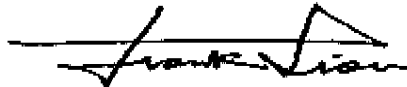
Master of SCIENCE in Manufacturing Engineering

*Mechanical & Aerospace*  
**Department:** ~~Manufacturing Engineering Program~~

**Briefly describe action requested (Attach documentation as appropriate):**

For Manufacturing Engineering Master of SCIENCE: (to Change thesis credits from "6 credit hours" to "6 to 9 credit hours")

Recommended by Department: \_\_\_\_\_



(Chair signature)

Date: Feb 20, 2013

Recommended by: \_\_\_\_\_



Discipline Specific Curricula Committee

(Chair signature)

Date: 3-11-13

Approved by Curricula Committee: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate: \_\_\_\_\_

(Chair signature)

Date: \_\_\_\_\_

Modify the requirements for the MS in Manufacturing Engineering by replacing the “current” text on p. 84 of the 2012-2014 Graduate Catalog with the “proposed” text shown below.

**Current:**

The MS program requires 30 credit hours and a thesis:

- 12 credit hours from the Manufacturing Core Areas
- 6 credit hours of 400 level courses in Manufacturing
- 3 credit hours of approved Mathematics/ Computer Science or any suggested Manufacturing courses
- 6 credit hours for thesis research
- 3 credit hours of graduate courses in Manufacturing

**Proposed:**

The MS program requires 30 credit hours and a thesis:

- 12 credit hours from the Manufacturing Core Areas
- 6 credit hours of 400 level courses in Manufacturing
- 6 to 9 credit hours for thesis research
- 3 to 6 credit hours of graduate courses in Manufacturing as approved by the academic advisor

CC File # 8385-2013-CER ENG-261-31

Effective Year: <sup>2014</sup> ~~2013~~ Effective Term: Summer ☐ Fall ☒ Spring ☒**Course Change Form (CC)**

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)

New Course ☐ Course Deletion ☐ Credit Hours ☒ Prerequisites ☒  
 Course Title ☐ Catalog Description ☐ Course Number ☐ Co-listing ☐

**Course Information** (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)1. Department: **Materials Science & Engineering**2. Discipline and Course Number: Present: **Cer 261** Proposed:3. Course Title: Present: **Materials Senior Design I**

Proposed:

Abbreviated Course Title (24 Spaces or Less. Only needed for New Courses or Title Changes.):

4. Catalog Description (360 character spaces or less.)

Present: **Students working in groups will be assigned a capstone design project related to a specific materials technology. This course will focus on project plan and all aspects of product and process design. Prerequisite: Senior standing. (Co-listed with Met Eng 261)**

Proposed:

5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture 0 Lab 1 Total 1

Proposed: Lecture 0 Lab 3 Total 3

7. Prerequisites:

Present:

Proposed:

8. Required for Majors: ☒ Elective for Majors: ☐9. Justification: *Increased hours needed to expand course content & expectations.*

10. Semesters previously offered as an experimental course (101, 201, 301, 401):

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1) **Met 261** 3) 5)  
 2) *Eng* 4) 6)

Recommended by Department *Wayne Smith* Date: 2/22/13  
 (Chair signature)

Recommended by DSCC *Sharon Raper* Date: 3-11-13  
 (Chair signature)

Approved by Curricula Committee: \_\_\_\_\_ Date: \_\_\_\_\_  
 (Chair signature)

Approved by Faculty Senate: \_\_\_\_\_ Date: \_\_\_\_\_  
 (Chair signature)



CC File # 8386-2013-CER ENG-262-31

Effective Year: 2013 Effective Term: Summer ☐ Fall ☒ Spring ☐**Course Change Form (CC)**

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)

New Course ☐ Course Deletion ☐ Credit Hours ☒ Prerequisites ☒  
 Course Title ☐ Catalog Description ☐ Course Number ☐ Co-listing ☐

**Course Information** (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)1. Department: **Materials Science & Engineering**2. Discipline and Course Number: Present: **Cer 262** <sup>ENG</sup> Proposed:3. Course Title: Present: **Materials Senior Design II**

Proposed:

Abbreviated Course Title (24 Spaces or Less. Only needed for New Courses or Title Changes.):

4. Catalog Description (360 character spaces or less.)

Present: **A continuation of the Materials Senior Design I. Students working in groups will complete a capstone design project including process and product simulation and/or fabrication, safety aspects, environmental impact and capital and operating economics. Prerequisite: Cer Eng 261 or Met Eng 261. (Co-listed with Met Eng 262)**

Proposed:

5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture 0 Lab 2 Total 2

Proposed: Lecture 0 Lab 3 Total 3

7. Prerequisites: **ENG ENG**  
Present: **Cer 261 or Met 261**Proposed: **Pass prerequisite course with "C" or better in either CER ENG 261 or MET ENG 261**8. Required for Majors: ☒ Elective for Majors: ☐9. Justification: **Encourage student success through a better understanding of core material** ; *increased hours needed, expand course content & expectations.*

10. Semesters previously offered as an experimental course (101, 201, 301, 401):

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1) **Met 262** 3) 5)  
2) **ENG** 4) 6)

Recommended by Department Wayne Hudson

(Chair signature)

Date: 2/22/13Recommended by DSCC Stephen Rapp

(Chair signature)

Date: 3-11-13Approved by Curricula Committee: \_\_\_\_\_  
(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate: \_\_\_\_\_  
(Chair signature)

Date: \_\_\_\_\_

CC File # 8406-2013-MET ENG-216-31

Effective Year: 2013 Effective Term: Summer ☐ Fall ☒ Spring ☐**Course Change Form (CC)**

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)New Course ☐Course Deletion ☐Credit Hours ☒Prerequisites ☒Course Title ☐Catalog Description ☐Course Number ☐Co-listing ☐**Course Information** (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)1. Department: **Materials Science & Engineering**2. Discipline and Course Number: Present: **Met 216** Proposed:3. Course Title: Present: **Mechanical Testing of Materials**

Proposed:

Abbreviated Course Title (24 Spaces or Less. Only needed for New Courses or Title Changes.):

4. Catalog Description (360 character spaces or less.)

Present: **Deformation of materials and mechanical testing of materials; tensile testing, creep; impact testing; fracture mechanics and fatigue. Prerequisites: Met Eng 121, accompanied by Met Eng 215.**Proposed: **Deformation of materials and mechanical testing of materials; tensile testing, creep; impact testing; fracture mechanics and fatigue. Prerequisites: Met Eng 121 with a "C" or better, preceded or accompanied by Met Eng 215.**5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture 0 Lab 1 Total 1

Proposed: Lecture 1 Lab 1 Total 2

7. Prerequisites:

Present: **Met 121, and preceded or accompanied by Met 215**Proposed: **Met 121 with "C" or better, and preceded or accompanied by Met 215**8. Required for Majors: ☒ Elective for Majors: ☐9. Justification: **Prerequisite grade "C" - new department standard to improve student success; increased credit hours**10. Semesters previously offered as an experimental course (101, 201, 301, 401): **due to adding lecture section**

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1) 3) 5)  
2) 4) 6)

Recommended by Department

(Chair signature)

Date: 2/22/13

Recommended by DSCC

(Chair signature)

Date: 3-11-13

Approved by Curricula Committee:

(Chair signature)

Date:

Approved by Faculty Senate:

(Chair signature)

Date:

CC File # 8407-2013-MET ENG-218-31

Effective Year: **2013** Effective Term: Summer ☐ Fall ☒ Spring ☐

## Course Change Form (CC)

This form is for creating or modifying permanent courses.

### Course Changes (Check all changes.)

New Course ☐ Course Deletion ☐ Credit Hours ☒ Prerequisites ☒  
Course Title ☐ Catalog Description ☐ Course Number ☐ Co-listing ☐

### Course Information (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)

1. Department: **Materials Science & Engineering** *ENG*
2. Discipline and Course Number: Present: **Met 218** Proposed:
3. Course Title: Present: **Microstructural Development Laboratory**  
Proposed:

Abbreviated Course Title (24 Spaces or Less. Only needed for New Courses or Title Changes.):

4. Catalog Description (360 character spaces or less.)  
Present: **Investigation of the relationships between microstructures, and processing for various materials.**  
**Prerequisites: Met Eng 121, accompanied by Met Eng 217.**  
Proposed: **Investigation of the relationships between microstructures, and processing for various materials.**  
**Prerequisites: Accompanied or preceded by Met Eng 217.**

5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture **0** Lab **1** Total **1**  
Proposed: Lecture **1** Lab **1** Total **2**

7. Prerequisites: *ENG*  
Present: **Met 121; accompanied or preceded by Met 217** *ENG*  
Proposed: **Accompanied or preceded by Met 217** *ENG*

8. Required for Majors: ☒ Elective for Majors: ☐

9. Justification: **Increase credit hours due adding lecture section**

10. Semesters previously offered as an experimental course (101, 201, 301, 401):

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1) 3) 5)  
2) 4) 6)

Recommended by Department

(Chair signature)

Date: 2/22/13

Recommended by DSCC

(Chair signature)

Date: 3-11-13

Approved by Curricula Committee:

(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate:

(Chair signature)

Date: \_\_\_\_\_

CC File # 8445-2013-MET ENG-261-31

Effective Year: **2013** Effective Term: Summer ☐ Fall ☒ Spring ☒

## Course Change Form (CC)

This form is for creating or modifying permanent courses.

### Course Changes (Check all changes.)

New Course ☐ Course Deletion ☐ Credit Hours ☒ Prerequisites ☒  
 Course Title ☐ Catalog Description ☒ Course Number ☐ Co-listing ☐

### Course Information (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)

1. Department: **Materials Science & Engineering**  
 2. Discipline and Course Number: Present: **Met 261** Proposed:  
 3. Course Title: Present: **Materials Senior Design I**  
 Proposed:

Abbreviated Course Title (24 Spaces or Less. Only needed for New Courses or Title Changes.):

### 4. Catalog Description (360 character spaces or less.)

Present: **Students working in groups will be assigned a capstone design project related to a specific materials technology. This course will focus on project plan and all aspects of product and process design. Prerequisite: Senior standing. (Co-listed with Cer Eng 261)**

Proposed: **Overview of the methods, approaches, and techniques required to execute materials related capstone senior design projects. Formation of teams, assignment of projects, review of department curriculum concepts and topics, and comprehensive project management skills needed to complete projects will be used as means to learn the design process. Prerequisite:**

### 5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture ☐ Lab **1** Total **1**  
 Proposed: Lecture **3** Lab ☐ Total **3**

### 7. Prerequisites:

Present: **Senior Standing**

Proposed: **Met 216 and Met 218, or Cer 231 with a "C" or better**

8. Required for Majors: ☒ Elective for Majors: ☐

9. Justification: **Increased hours needed to expand course content & expectations; prerequisite grade of "C" new dept. standard**

10. Semesters previously offered as an experimental course (101, 201, 301, 401): to improve student success

11. List all co-listed courses, initialed by Dept. Chair, If signature does not appear below.

1) **Cer 261** 3) 5)  
 2) **ENG** 4) 6)

Recommended by Department

(Chair signature)

Date: **2/22/13**

Recommended by DSCC

(Chair signature)

Date: **3-13-13**

Approved by Curricula Committee:

(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate:

(Chair signature)

Date: \_\_\_\_\_

(Revised December 2012)

CC File # 8446-2013-MET ENG-262-31

Effective Year: <sup>2014</sup> ~~2013~~Effective Term: Summer ☐ Fall ☒ Spring ☐**Course Change Form (CC)**

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)New Course ☐Course Deletion ☐Credit Hours ☒Prerequisites ☒Course Title ☐Catalog Description ☐Course Number ☐Co-listing ☐**Course Information** (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)1. Department: **Materials Science & Engineering**2. Discipline and Course Number: Present: **Met <sup>ENG</sup> 262** Proposed:3. Course Title: Present: **Materials Senior Design II**

Proposed:

Abbreviated Course Title (24 Spaces or Less. Only needed for New Courses or Title Changes.):

4. Catalog Description (360 character spaces or less.)

Present: **A continuation of the Materials Senior Design I. Students working in groups will complete a capstone design project including process and product simulation and/or fabrication, safety aspects, environmental impact and capital and operating economics. Prerequisite: Cer Eng 261 or Met Eng 261. (Co-listed with Cer Eng 262)**Proposed: **A continuation of the Materials Senior Design I. Students working in groups will complete a capstone design project including process and product simulation and/or fabrication, safety aspects, environmental impact and capital and operating economics. Prerequisite: Cer Eng 261 or Met Eng 261 with "C" or better. (Co-listed with Cer Eng 262)**5. If course requires field trip check box: ☐6. Credit Hours: Present: Lecture ☐ Lab **2** Total **2**Proposed: Lecture ☐ Lab **3** Total **3**

7. Prerequisites:

Present: **Cer <sup>ENG</sup> 261 or Met <sup>ENG</sup> 261**Proposed: **Cer <sup>ENG</sup> 261 or Met <sup>ENG</sup> 261 with "C" or better in either CER ENG 261 or MET ENG 261**8. Required for Majors: ☒ Elective for Majors: ☐9. Justification: **Increased hours needed to expand course content & expectations; Prerequisite grade requirement - new dept. standard to improve student success**

10. Semesters previously offered as an experimental course (101, 201, 301, 401):

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1) **Cer <sup>ENG</sup> 262**

3)

5)

2)

4)

6)

Recommended by Department

(Chair signature)

Date: **2/20/13**

Recommended by DSCC

(Chair signature)

Date: **3-11-13**

Approved by Curricula Committee:

(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate:

(Chair signature)

Date: \_\_\_\_\_

CC File # 8447-2013-CER ENG-262-31

Effective Year: 2013 Effective Term: Summer ☐ Fall ☒ Spring ☐**Course Change Form (CC)**

This form is for creating or modifying permanent courses.

**Course Changes** (Check all changes.)New Course ☐Course Deletion ☐Credit Hours ☒Prerequisites ☒Course Title ☐Catalog Description ☒Course Number ☐Co-listing ☐**Course Information** (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)1. Department: **Materials Science & Engineering**2. Discipline and Course Number: Present: **Cer <sup>ENG</sup>262** Proposed:3. Course Title: Present: **Materials Senior Design II**

Proposed:

Abbreviated Course Title (24 Spaces or Less. Only needed for New Courses or Title Changes.):

4. Catalog Description (360 character spaces or less.)

Present: **A continuation of the Materials Senior Design I. Students working in groups will complete a capstone design project including process and product simulation and/or fabrication, safety aspects, environmental impact and capital and operating economics. Prerequisite: Cer Eng 261 or Met Eng 261. (Co-listed with Met Eng 262)**Proposed: **Overview of the methods, approaches, and techniques required to execute materials related capstone senior design projects. Formation of teams, assignment of projects, review of department curriculum concepts and topics, and comprehensive project management skills needed to complete projects will be used as means to learn the design process. Prerequisites: Cer 261 or Met 261 with "C" or better.**5. If course requires field trip check box: ☐6. Credit Hours: Present: Lecture ☐ Lab 2 Total 2Proposed: Lecture ☐ Lab 3 Total 37. Prerequisites: **ENG** **ENG**Present: **Cer 261 or Met 261**Proposed: **Cer 261 or Met 261 with "C" or better in either CER ENG 261 or MET ENG 261**8. Required for Majors: ☒ Elective for Majors: ☐9. Justification: **Increased prerequisite grade - new department standard to improve student success; increased credit hours**10. Semesters previously offered as an experimental course (101, 201, 301, 401): **needed to expand course content & expectations.**

11. List all co-listed courses, initialed by Dept. Chair, if signature does not appear below.

1) **Met 262**

3)

5)

2)

4)

6)

Recommended by Department

(Chair signature)

Date: **2/22/13**

Recommended by DSCC

(Chair signature)

Date: **3-11-13**

Approved by Curricula Committee:

(Chair signature)

Date: \_\_\_\_\_

Approved by Faculty Senate:

(Chair signature)

Date: \_\_\_\_\_

(Revised December 2012)