



**Campus Curricula Committee Meeting Agenda**

**August 13, 2013**

**1:00 pm**

**Room 106B Parker Hall**

**Review of submitted DC forms:**

DC #0477, Geological Science and Engineering, Doctor of Philosophy in Geological Engineering, effective Fall 2013.

DC #0478, Geological Science and Engineering, Master of Science in Geological Engineering, effective Fall 2013.

DC #0479, Civil, Architectural and Environmental Engineering, Bachelor of Science in Architectural Engineering, effective Fall 2014.

DC #0480, Civil, Architectural and Environmental Engineering, Bachelor of Science in Civil Engineering, effective Fall 2014.

DC #0481, Civil, Architectural and Environmental Engineering, Bachelor of Science in Environmental Engineering, effective Fall 2014.

DC #0482, Arts, Languages and Philosophy, Bachelor of Science in Philosophy, effective Fall 2014.

DC #0483, Materials Science and Engineering, Bachelor of Science in Ceramic Engineering, effective Fall 2014.

DC #0484, Materials Science and Engineering, Bachelor of Science in Metallurgical Engineering, effective Fall 2014.

**Review of submitted CC forms:**

CC #8475, Mining Engineering 407, Theory of High Explosives, effective Fall 2014.

CC #8476, Economics 350, Ethical Problems in a Global Environment, effective Fall 2013.

CC #8477, Explosives Engineering 305, Explosives Handling and Safety, effective Fall 2014.



CC #8478, Materials Science and Engineering 325, Materials Selection in Mechanical Design, effective Spring 2014.

CC #8479, Environmental Engineering 265, Water and Wastewater Engineering, effective Fall 2014.

CC #8480, Philosophy 201, Symbolic Logic in Argumentation, effective Spring 2014.

CC #8481, Ceramic Engineering 284, Electrical Properties of Ceramics, effective Spring 2014.

**Review of submitted EC forms:**

EC #2471, Metallurgical Engineering 301, Hydrometallurgy, effective Fall 2013.

EC #2472, Materials Science and Engineering 401, Advanced Integrated Computational Materials Engineering, effective Spring 2014.

EC #2473, Environmental Engineering 301, Sustainable Stormwater Management, effective Fall 2013.

EC #2474, History 301, History of Las Vegas, Nevada, effective Spring 2014.

EC #2475, Electrical Engineering 401, Energy Storage Devices, effective Fall 2013.

EC #2476, Art 201, Topics in Visual Culture and Aesthetics, effective Spring 2014.

**Review of Tabled Items:**

CC #8385, Ceramic Engineering 261, Materials Senior Design I.

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.

**Course Renumbering Initiative**

Effective Year: 2013

DC # 0477-2013-Geo Eng-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:**

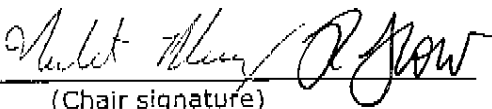
Ph. D., Geological Engineering

**Department:** Geological Sciences and Engineering

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

The Ph. D. Degree will require all on-campus students to take three 1-hour sections of GE 410 (Seminar) as part of their degree program.

This will raise the minimum number of hours for the degree program from 72 to 75.

Recommended by Department:  Date: May 10/13  
(Chair signature)

Recommended by Discipline Specific Curricula Committee:  Date: 05/23/13  
(Chair signature)

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

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

Effective Year: 2013

DC # 0478-2013-Geo Eng-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, Geological Engineering

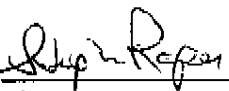
**Department:** Geological Sciences and Engineering

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

The Master of Sciences Degree will require all on-campus students to take two 1-hour sections of GE 410 (Seminar) as part of their degree program.

This will raise the minimum number of hours for the degree program from 30 to 32.

Recommended by Department:  Date: May 10/13  
(Chair signature)

Recommended by Discipline Specific Curricula Committee:  Date: 05/20/13  
(Chair signature)

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

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

**Effective Year:** 2014

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

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

DC # 0477-2013-10200 -  
000000

## 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:**

Architectural Engineering

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

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

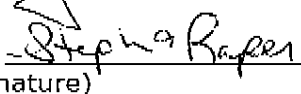
A maximum of 3 credits of independent study (ArchE 300 or ArchE 390) may be used as a technical elective. Additional independent study courses may be taken but will not count towards the B.S. architectural engineering degree.

Recommended by Department:

  
(Chair signature)

Date: 5/20/13

Recommended by Discipline Specific Curricula Committee:

  
(Chair signature)

Date: 5/25/13

Approved by Curricula Committee:

\_\_\_\_\_  
(Chair signature)

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

Approved by Faculty Senate:

\_\_\_\_\_  
(Chair signature)

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

## 64 — Architectural Engineering

- 4) Choose technical electives from approved lists under **Emphasis Areas for Architectural Engineering Students**. **HERE**
- 5) Each student is required to take three 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.

**Note:** All Architectural 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.

### Emphasis Areas and Course Listings by Area for Architectural Engineering Students

#### Area I, Structural Engineering

ArchE 301	Structural Dynamics
ArchE 319	Applied Mechanics in Structural Engr
ArchE 320	Structural Analysis II
ArchE 322	Analysis and Design of Wood Structures
ArchE 323	Classical and Matrix Meth Struct Anal
ArchE 326	Advanced Steel Structures Design
ArchE 327	Advanced Concrete Structures Design
ArchE 328	Prestressed Concrete Design
ArchE 329	Foundation Engineering II
ArchE 3XX	Masonry Engineering
ArchE 374	Infrast. Strengthening with Composites

#### Area II, Construction Engineering and Project Management

ArchE 345	Construction Methods
ArchE 346	Management of Construction Costs
ArchE 349	Eng and Construc Contract Specs
Eng Mg 211	Managing Engineering and Technology
Eng Mg 252	Financial Management
Eng Mg 313	Human Relations in Technical Management
Eng Mg 364	Value Analysis
Eng Mg 375	Total Quality Management

#### Area III, Environmental Systems for Buildings Mechanical Emphasis Courses

ArchE 3XX	Building Performance and Systems Optimization
-----------	---

Mc Eng 309	Engineering Acoustics I
Mc Eng 375	Mech Systems for Environ Control

#### Electrical Emphasis Courses

El Eng 235	Controllers for Factory Automation
El Eng 282	Electronic Circuits and Machines
El Eng 283	Electronics for Instrumentation
Cp Eng 111/112	Intro to Computer Eng

#### Area IV, Construction Materials

ArchE 319	Applied Mechanics in Structural Eng
Cv Eng 313	Composition & Properties of Concrete
Cv Eng 317	Pavement Design

Arch E 3XX	Special Concretes
Ch Eng 381	Corrosion and Its Prevention

#### Architectural Engineering Courses

ArchE 103	Materials and Methods of Construction
ArchE 203	Architectural Design I
ArchE 204	Intro to Architectural Design II
ArchE 205	Illumination of Buildings

#### (to be developed in AY2006/2007)

ArchE 3xx	Masonry Engineering
ArchE 3xx	Special Concretes

#### Architectural Engineering Courses (cross-list with existing civil engineering courses)

ArchE 001	Fundamentals of Surveying
ArchE 003	Engineering Communication
ArchE 101	Special Topics
ArchE 200	Special Problems
ArchE 201	Special Topics
ArchE 202	Co-operative Eng Training
ArchE 210	Senior Seminar
ArchE 217	Structural Analysis I
ArchE 221	Structural Design in Metals
ArchE 223	Reinforced Concrete Design
ArchE 241	Economy of Engineering Design
ArchE 242	Building Systems
ArchE 247	Ethical, Legal, and Prof Eng Prac
ArchE 248	Fund of Contracts & Construction Eng
ArchE 298	Senior Design
ArchE 300	Special Problems
ArchE 301	Special Topics
ArchE 310	Seminar
ArchE 320	Intermediate Structural Analysis
ArchE 322	Analysis & Design of Wood Struct
ArchE 323	Classical and Matrix Meth Struct Anal
ArchE 324	Numerical Methods of Structural Analysis
ArchE 326	Advanced Steel Structures Design
ArchE 327	Advanced Concrete Structures Design
ArchE 328	Prestressed Concrete Design
ArchE 345	Construction Methods
ArchE 346	Management of Construction Costs
ArchE 349	Eng & Construction Contract Spec
ArchE 374	Infrast. Strengthening with Composites
ArchE 390	Undergraduate Research

#### Civil Engineering Courses (required courses, emphasis area, and/or technical electives)

Cv Eng 215	Elementary Soil Mechanics
Cv Eng 216	Const Materials, Prop, & Test
Cv Eng 229	Foundation/Pavement Eng
Cv Eng 230	Elementary Fluid Mechanics
Cv Eng 313	Composition and Properties of Concrete
Cv Eng 317	Pavement Design
Cv Eng 329	Foundation Engineering II
Cv Eng 341	Professional Aspects of Eng Practice
Cv Eng 345	Construction Methods
Cv Eng 346	Management of Construction Costs
Cv Eng 349	Eng & Construction Contract Spec

### Architectural Engineering Courses

- 3 Engineering Communications** (LEC 1.0 and LAB 1.0) Introduction to programming concepts and software tools (computer aided design drafting, computer mathematics, word processing, spreadsheets, and presentation software) with

DC # 0480-2013-0001-000000

Effective Year: 2014 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:

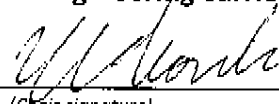
Civil Engineering

Department: Civil, Architectural, and Environmental Engineering

Briefly describe action requested (attach documentation as appropriate):

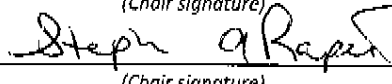
A maximum total of 6 credit hours of independent study (CivE 300 or CivE 390) can be used as depth or technical electives in the B.S. Civil Engineering curriculum.

Recommended by Department:

  
(Chair signature)

Date: 5/14/13

Recommended by DSCC:

  
(Chair signature)

Date: 5-23-13

Approved by Curricula Committee:

\_\_\_\_\_  
(Chair signature)

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

Approved by Faculty Senate:

\_\_\_\_\_  
(Chair signature)

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

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
FE 10-Study & Careers in Eng <sup>2</sup> .....	1
Chem 1 & 2-Gen Chem .....	5
Math 14-Calc for Engineers I .....	4
English 20-Expos & Argumentation .....	3
General Ed Elective <sup>1</sup> .....	3
	16

Second Semester	
IDE 20-Intro to Engr Design .....	3
Math 15-Calc for Engineers II .....	4
Physics 23-Eng Physics I .....	4
General Ed Elective <sup>1</sup> .....	3
General Ed Elective <sup>1</sup> .....	3
	17

### SOPHOMORE YEAR

First Semester	Credit
CE 1-Fund of Surveying <sup>2</sup> .....	3
CE 3-Eng Communications .....	2
IDE 50-Eng Mech-Statics <sup>2</sup> .....	3
Math 22-Calc w/Analytic Geometry III .....	4
Physics 24-Eng Physics II .....	4
	16

Second Semester	
IDE 150-Eng Mech/Dynamics .....	2
Stat 213-Applied Eng Statistics .....	3
GE 50-Geology for Engineers .....	3
IDE 110-Mechanics of Materials <sup>2</sup> .....	3
IDE 120-Materials Test Lab .....	1
Math 204-Differential Equations .....	3
	15

### JUNIOR YEAR

First Semester	Credit
EMgt 137-Econ Analysis of Engr. Projects <sup>2</sup> .....	2
CE 217-Structural Analysis I <sup>2</sup> .....	3
CE 215-Fundamentals of Geotechnical Engr .....	3
CE 230-Engr Fluid Mech <sup>2</sup> .....	3
CE 261-Fund of Environmental .....	3
General Ed Elective <sup>1</sup> .....	3
	17

Second Semester	
CE 216-Construction Materials .....	3
CE 242-Building Systems .....	3
CE 211-Transportation Engineering .....	3
CE 234-Water Resources Eng .....	4
CE 223-Reinf Concrete Design .....	3
	16

### SENIOR YEAR

First Semester	Credit
CE 210-Senior Seminar .....	1
(2) CE Depth Electives <sup>3,4</sup> .....	6
CE 248-Contracts & Const Eng .....	3
CE 221-Structural Design Metals .....	3
General Ed Elective <sup>1</sup> .....	3
	16

Second Semester	
CE 298-Civil Eng Design Project .....	3
CE Tech Elective <sup>3,5</sup> .....	3
CE Depth Elective <sup>3,4</sup> .....	3
General Ed Elective <sup>1</sup> .....	3
CE Tech Elective <sup>3,5</sup> .....	3
	15

<sup>1)</sup> All general education 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. One general education elective must be from Engl 60, Engl 160, or SP&MS 85.

<sup>2)</sup> A grade of 'C' or better required to satisfy graduation requirements.

<sup>3)</sup> A grade of 'C' or better may be required in CE technical and depth elective prerequisite courses. Refer to the Missouri S&T undergraduate catalog for this prerequisite information.

<sup>4)</sup> Choose depth electives using Guidelines for Depth and Technical Electives.

<sup>5)</sup> Choose technical electives using Guidelines for Depth and Technical Electives.

**NOTE:** All Civil 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.

### Guidelines for Depth and Technical Electives

Please consult the Department's Advising Center or your academic advisor for guidelines regarding the selection of depth and technical electives. **HERE**

### Course Listings by Area

#### Construction Engineering

342 Construction Planning and Scheduling Strategies  
345 Construction Methods  
346 Management of Construction Costs  
348 Green Engineering  
349 Engineering and Construction Contract Specifications

#### Materials Engineering

312 Bituminous Materials  
313 Composition and Properties of Concrete  
317 Pavement Design

#### Environmental Engineering

265 Water/Wastewater  
360 Environmental Law and Regulations



DC # 0587 - 10/13 - 10/13 - 10/13 DC

Effective Year: **2014** 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:

**Environmental Engineering**

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

Briefly describe action requested (attach documentation as appropriate):

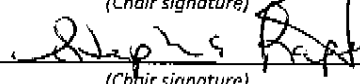
**A maximum total of 6 credit hours of independent study (EnvE 300 or EnvE 390) can be used as depth or technical electives in the B.S. Environmental Engineering curriculum.**

Recommended by Department:

  
(Chair signature)

Date: 5/14/13

Recommended by DSCC:

  
(Chair signature)

Date: 5/25/13

Approved by Curricula Committee:

\_\_\_\_\_  
(Chair signature)

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

Approved by Faculty Senate:

\_\_\_\_\_  
(Chair signature)

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

Bio Sc 110-General Biology .....	3
	16
Second Semester	
IDE 110-Mechanics of Materials .....	3
IDE 120-Materials Testing .....	1
IDE 150-Dynamics .....	2
ChE 120-Chem Eng Mat Bal .....	3
EnvE 262-Env Eng Bio Fund .....	3
Phys 24-Engineering Physics II .....	4
	16

**JUNIOR YEAR**

First Semester	
EnvE 265-Water & Wastewater Eng <sup>3</sup> .....	3
EnvE 263-Env Eng Chem Fund .....	3
CE 230-Elem Fluid Mech <sup>2</sup> .....	3
Math 204-Elem Diff Equations .....	3
GE 50-Geology for Engineers .....	3
	15

~~Second Semester~~

EnvE 369-Sanitary Design .....	3
Stat 213-Applied Eng Stat .....	3
ChE 141-Thermodynamics .....	3
EnvE Technical Elective <sup>5,6</sup> .....	3
Communications Elective <sup>7</sup> .....	3
	15

**SENIOR YEAR**

First Semester	
CE 248-Contracts & Construc Eng .....	3
EnvE 210-Senior Seminar <sup>1</sup> .....	1
CE 234-Hydraulic Eng .....	4
EnvE Air Pollution Elective <sup>4,5</sup> .....	3
Hist 270-History of Technology .....	3
EnvE Depth Elective <sup>4,5</sup> .....	3
	17
Second Semester	
EnvE 298-CE Design Project <sup>1</sup> .....	3
EnvE Depth Elective <sup>4,5</sup> .....	3
EnvE Depth Elective <sup>4,5</sup> .....	3
EnvE Technical Elective <sup>5,6</sup> .....	3
EnvE 269-Research in Env Eng .....	1
General Education Elective <sup>1</sup> .....	3
	16

- (1) All general education 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.
- (2) A grade of 'C' or better required to satisfy graduation requirements
- (3) Existing CE Course that is cross-listed as Env E course.
- (4) Choose 3 of the following: Env Eng 360, 361, 362, 363, 364, 367, 368 or GE 331. One class may not be used to fulfill both the air pollution requirement and a depth elective.
- (5) A grade of 'C' or better may be required in Env Eng technical and depth elective prerequisite courses. Refer to the Missouri S&T undergraduate catalog for this prerequisite information.
- (6) Select technical electives from approved list.
- (7) Choose 1 of the following: CE 3, Enl 60, Enl 160, or SP&MS 85

**Note:** All Environmental 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.

**Environmental Engineering Courses**

- 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.
- 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.
- 210 Senior Seminar: Engineering In A Global Society** (RSD 1.0) Discussion of contemporary issues: public safety, health, and welfare; the principles of sustainable development; lifelong learning; impact of engineering solutions in a global and societal and political context; relationships with owners, contractors, and the public; public service; the Code of Ethics; and the Missouri Licensing Statutes and Board Rules. Prerequisite: Senior standing. (Co-listed with Civ Eng and ArchE 210)
- 261 Fundamentals of Environmental Engineering and Science** (LEC 2.0 and LAB 1.0) Course discusses fundamental chemical, physical, and biological principles in environmental engineering and science. Topics include environmental phenomena, aquatic pollution and control, solid waste management, air pollution and control, radiological health, and water and waste water treatment systems. (Co-listed with Civ Eng 261)
- 262 Biological Fundamentals Of Environmental Engineering** (LEC 3.0) Introduction to the function of organisms related to environmental engineering. The course focuses on both the application of organisms to removing contaminants and the effects of contaminants on organisms. Prerequisites: Bio Sci 110 and preceded or accompanied by Civ/Env Eng 261. (Co-listed with Civ Eng 262)
- 263 Chemical Fundamentals Of Environmental Engineering** (LEC 2.0 and LAB 1.0) Introduction to the key chemical and physical concepts integral to environmental systems and processes. This course provides a fundamental background in those chemical and environmental engineering principles that are common to all environmental engineering disciplines. Prerequisites: Chem 3 or Geo 275; Physics 23, Math 22.
- 265 Water And Wastewater Engineering** (LEC 3.0) A study of the engineering design principles dealing with the quantity, quality and treatment of water, and the quantity, characteristics, treatment

Effective Year: 2013

Effective Term: Summer

Fall

Spring

DC # 0982-2013 ALP-000000

## Degree Change Form (DC)

Title of degree program, emphasis area, or minor:

Undergraduate Business Administration

Department: Business Administration

Briefly describe action requested (Attach documentation as appropriate).

Change Bachelor's degree from BSBA to BSBA in Management Information Systems based on faculty recommendation and approval through the Undergraduate Program Committee. The change is being made to the BSBA degree program to allow students to be able to attach a minor in Management Information Systems and to allow students to be able to attach a minor in Management Information Systems. The change is being made to the BSBA degree program to allow students to be able to attach a minor in Management Information Systems and to allow students to be able to attach a minor in Management Information Systems. The change is being made to the BSBA degree program to allow students to be able to attach a minor in Management Information Systems and to allow students to be able to attach a minor in Management Information Systems.

Recommended by: [Signature]

[Signature]

Date: 7/19/2013

Recommended by: [Signature]

[Signature]

Date: May 3, 2013

Approved by: [Signature]

[Signature]

Date:

Approved by: [Signature]

[Signature]

Date:



Missouri Department of Higher Education

Building Missouri's future...by degrees

## PROGRAM CHANGE FORM

1. Submitted by: Missouri S&T  
 Name of Institution (Campus or off-campus residential center in the case of multi-campus institutions)

2. Type of Program Change (Check those that apply):

- ☒ Title change only  
☐ Combination program created out of closely allied existing programs  
☐ Option(s) added to existing program(s)  
☐ Addition of certificate program developed from approved existing parent degree  
☐ Addition of free-standing single-semester certificate program  
☐ Delete program(s)  
☐ Delete option(s)  
☐ Program placed on "Inactive Status" list

3. Indicate Program Change or Addition of Options:

Before the Proposed Change			After the Proposed Change		
Title of Old Program or Certificate Option	Degree	CIP Code	Title of New Program or Certificate Option	Degree	CIP Code
Philosophy	BA	38.0101	Philosophy	BS	38.0101

4. Attach a copy of the "before and after" curriculum, as applicable, and a rationale for the proposed change.

5. Intended date of program change, additional options, or "Inactive Status":

Fall 2013

Month/Year

#### AUTHORIZATION

Chris Weisbrook, Director of Academic Programs

Name/Title of Institutional Officer

Signature

Date

Chris Weisbrook

573-882-0001

Person to Contact for More Information

Telephone Number

[www.dhe.mo.gov](http://www.dhe.mo.gov) • [info@dhe.mo.gov](mailto:info@dhe.mo.gov)

205 Jefferson Street, P. O. Box 1469, Jefferson City, MO 65102 • (573) 751-2361 • (800) 473-6757 • Fax (573) 751-6635

#### **4. "Before and After" Curriculum and Rationale for Proposed Change**

##### **Current Requirements for B.A. in Philosophy**

1. A. English 20 and one further composition course. (6 hours)  
B. Western Civilization: History 111 and 112. (6 hours)  
C. Foreign/Modern Languages: 12 hours of a single foreign language or 16 hours of two foreign languages. (12-16 hours)
2. Sciences. 12 hours in biological, physical (chemistry, geology, and physics), and mathematical (mathematics, statistics, and computer science) sciences. A course for each of the biological, physical, and mathematical sciences is required. (12 hours)
3. Social Sciences. 12 hours in at least two of the following areas: economics, political science, psychology, and sociology. (12 hours)
4. Humanities. 12 hours to be represented in both literature and fine arts (art, music, and theatre). (12 hours)
5. 2 Communication Intensive courses are required.
6. 30 hours of philosophy courses. This is to include Phil 5, Phil 15, and at least 12 hours at the 300 level.

##### **Proposed Requirements for B.S. in Philosophy**

1. English 20 (3 hours)
2. Sciences. 21 hours in biological, physical (chemistry, geology, and physics), and mathematical (mathematics, statistics, computer science, and information science & technology) sciences. A course from each of the biological, physical, and mathematical sciences is required. Students may count up to 12 hours of engineering courses, at the discretion of the major advisor. Also, students may count up to 3 hours from the following list, but which may not be used to satisfy another requirement: History of Science Technology classes (History 270, 271, and 275), Philosophy of Science (Philosophy 345), or Symbolic Logic (number not yet assigned, 200-level course) (21 hours)
3. Social Sciences. 15 hours in social sciences. At least one course from two of the four areas must be taken: economics, sociology/anthropology, history/political science, and psychology. 6 hours from the biological, physical, and mathematical science, as well as engineering, not already used for the science requirement, may be substituted for 3 hours of social sciences; this substitution is only permitted once, unless allowed at the discretion of the major advisor. (15 hours)
4. Humanities. 12 hours in humanities other than philosophy. Courses may be taken in literature, foreign/modern languages, speech and media studies, art, music, or theatre. 3 hours from history not used for the social science requirement, and not History 175 or History 176, may be used to fulfill this requirement. (12 hours)
5. 2 Communication Intensive courses are required.

6. 30 hours of philosophy courses. This is to include Phil 5, Phil 15, and at least 12 hours at the 300 level.

### **Notes on the Current BA and Proposed BS Curricula**

By eliminating the requirements of 3 hours of further composition, 6 hours of western civilization, and 12/16 hours of modern/foreign languages, the requirement for 21 hours of non-elective coursework has been reduced. By adding an additional 9 hours of what is required for the sciences, and 3 hours of what is required for social sciences, 12 "new" non-elective hours have been added. This means that overall, there are 9 less hours required in non-elective work. In return, however, the student will receive a significantly, deeper grounding in both the natural and social sciences.

**Rationale for Change:** From the student's perspective, the BA degree requires foreign language credits, whereas the BS degree requires more hours in science and math. Since most students at Missouri S&T are drawn by its STEM orientation, the BS degree is more reasonable and attractive to them. Students seeking a second major in Philosophy have almost always fulfilled the math and science requirements as part of their primary majors, whereas they typically do not take a foreign language.

Additionally, philosophy faculty report that they often have students who are in their 3<sup>rd</sup> year or more of study, wanting to transfer from engineering to philosophy, or to get a second degree. These students have typically taken History 175 or History 176, but then are surprised that in addition to these courses, they will have to take both History 111 and History 112. Additionally, they find out that S&T's BA requirements generally treat history courses as humanities. Thus, they face a significant number of additional social science courses. With the elimination of the Western Civilization requirement, and by acknowledging the natural ambiguity of history as both social science and humanity, these problems are avoided. Otherwise, with the addition of the 12 hours of foreign language required, it is very unrealistic for 3<sup>rd</sup> year "major-transferring" students to graduate within even 5.5 yrs. Furthermore, any engineering major who wants to get a dual major (or as is the case now, a dual degree) in engineering and philosophy, and who has already planned this by the beginning of their 2<sup>nd</sup> year, would still require at least 6 years total coursework. By eliminating the foreign/modern language requirement, "major-transferring" students can more easily graduate within, say, 4.5 yrs, and double-majors within 4.5 to 5.5 years. Those students who come to Missouri S&T intending to major in philosophy, or have decided to major in it by the end of their 1<sup>st</sup> year, can still reasonably expect to graduate within 4 yrs with the B.S. degree; although they will be expected to take more science courses than S&T philosophy students in the past, it is very reasonable to expect them to do so at our STEM-oriented technological research university.

All in all, the new Bachelor of Science in Philosophy curriculum represents a course of study far more appropriate, useful, and accessible for the students of Missouri University of Science and Technology.

### **Example of Fulfilling Sciences Requirement (for those who are not getting another major in the sciences or engineering, as well as those who dropped engineering within their 1<sup>st</sup> year):**

BioSci 150 – 3hours  
Chemistry 1 – 3hours  
Math 4 – 3hours  
BioSci 151 – 3hours  
Physics 9 – 3hours

IS&T 50 – 3hours  
History 275 – 3hours  
= 21 hours total.

**Example of Fulfilling Social Sciences Requirement:**

Econ 121 – 3hours  
PoliticalSci 90 – 3hours  
PoliticalSci 226 – 3hours  
Psych 50 – 3hours  
Psych 308 – 3hours  
= 15 hours total.

**Example of 5 Year Plan for B.S. in Aerospace Engineering AND Philosophy, with no summer coursework, allowing for summer internships**

Semester 1  
FE 10 – 1 (hour)  
Chem 1,2, 4 – 6 (hours)  
English 20 – 3  
Math 14 – 4  
History 175 – 3  
17 hours

Semester 2  
IDE 20 -- 3  
Math 15 · 4  
Physics 23 – 4  
Comp Sci 74, 78 – 4  
Phil 5 – 3  
17 hours

Semester 3  
Comp Sci 74, 78 – 4  
IDE 50 – 3  
Math 22 -- 3  
Physics 24 – 4  
Ae Eng 161 · 3  
Phil 75 – 3  
17 hours

Semester 4  
Ae Eng 180 – 2  
Ae Eng 160 – 3  
Mc Eng 219 – 3  
Math 204 -- 3

Phil 223 – 3  
English 106 – 3  
17 hours

Semester 5  
IDE 110 – 3  
Ae Eng 213 – 3  
Ae Eng 231 – 3  
Ae Eng 377 – 3  
Math 208 – 3  
Phil 201 – 3  
18 hours

Semester 6  
El Eng 281 – 3  
Ae Eng 251 – 3  
Ae Eng 261 – 3  
Ae Eng 271 – 3  
Phil 345 – 3  
Econ 121 – 3  
18 hours

Semester 7  
Ae Eng 235 – 3  
Ae Eng 253 – 3  
Ae Eng 280 – 3  
Phil 399 – 3  
Art 85 – 3  
Psych 50 – 3  
18 hours

Semester 8  
Ae Eng 281 – 3  
Ae Eng 282 – 3  
Elective-Technical – 3  
Phil 15 – 3  
History 271 – 3  
PolSci 90 – 3  
18 hours

Semester 9  
Ae Eng 283 – 3  
Elective-Technical – 3  
Phil 399 – 3  
Phil 235 – 3  
English 245 – 3  
15 hours



Semester 10

Elective – Technical – 3

Sp&Med 85 – 3

Phil 320 – 3

BioSc 150 – 3

12 hours

(167 hours total)

DC # *CYSB-2013-000001 000001*

Effective Year: **2014** 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:  
**Ceramic Engineering - BS**

Department: **Materials Science and Engineering**

Briefly describe action requested (attach documentation as appropriate):  
**Two required courses are adding hours (Cer 261 and 262) and the required hours to graduate will remain at 128 by deleting Eng Mgt 124, reducing the hours of Cer 284 from 4 to 3, and deleting 1 hour of tech electives (see attached curriculum sheet)**

Recommended by Department: *Wayne Leebman* Date: *7/2/12*  
(Chair signature)

Recommended by DSCC: *[Signature]* Date:         
(Chair signature)

Approved by Curricula Committee:        Date:         
(Chair signature)

Approved by Faculty Senate:        Date:         
(Chair signature)

# Ceramic Engineering

The Ceramic Engineering program is offered under the Department of Materials Science and Engineering.

Ceramic engineers produce materials vital to many advanced and traditional technologies: electronic and optical assemblies, aerospace parts, biomedical components, nuclear components, high temperature, corrosion resistant assemblies, fuel cells, and electronic packaging. Ceramic engineers generally work with inorganic, nonmetallic materials processed at high temperatures. In the classroom, ceramic engineering students learn the relationships between engineering properties and the chemistry and structure of ceramic materials and go on to apply these scientific principles to the design of new formulations and manufacturing processes. If you are interested in the "why" behind material properties, ceramic engineering will definitely interest you.

Ceramic engineering usually appeals to those who have a strong interest in finding practical applications of the basic sciences, especially chemistry and physics, and can be described as one of the disciplines where 'science and engineering intersect'. Design occurs at the atomic or microstructural level of solid materials. The Missouri S&T department of ceramic engineering specializes in glass and optical materials, electronic materials, and high temperature materials, but the same scientific and engineering principles that are learned can be applied to the design of new materials for other applications, including biomaterials, high strength materials, materials for energy generation, etc.

Most ceramic engineering classes and laboratories are held in McNutt Hall, but other research laboratories on campus are available to our students. Equipment exists for X-ray investigation of materials, for detection of thermally induced changes in chemistry and structure, for high temperature processing, and for measuring a wide variety of electronic, optical, magnetic, mechanical and thermal properties. The Graduate Center for Materials Research makes additional research equipment available to ceramic engineers, including electron microscopes, optical, infrared, and X-ray spectrometers, thermal analyzers, and high temperature/controlled atmosphere furnaces. Students may broaden their experience by assisting faculty in research projects, either for academic credit or for pay.

Undergraduate student organizations are very active and participation in local and national activities is encouraged. Cooperative education and internships are available with companies and research agencies around the country. Additional information about the department is available at <http://mse.mst.edu/>.

## Mission Statement

The department will train the future industrial and academic leaders in ceramic engineering by providing a comprehensive, forward-looking and broad-based curriculum, which emphasizes fundamental principles, practical applications, oral and written communication skills, and professional practice and ethics. The department is distinguished by a nationally recognized graduate program that emphasizes research of significance to the State of Missouri and the nation while providing a stimulating educational environment.

The program educational objectives of the ceramic engineering program:

- Our graduates will be leaders in the science, technology, and management of ceramic engineering.

- Our graduates will serve their profession and society.
- Our graduates will continually enhance their professional skills and educational background.

The specific outcomes of the ceramic engineering program are:

- Ability to apply mathematical, science and engineering principles to ceramic systems;
- An ability to utilize experimental, statistical and computational methods to solve ceramic problems;
- Ability to design a system, component, or process to meet desired needs;
- Ability to function of diverse teams;
- Ability to identify, formulate, and solve engineering problems;
- Understanding of professional and ethical responsibility;
- Ability to communicate effectively;
- The broad education necessary to understand the impact of engineering solutions in a global and societal context;
- Recognition of the need for, and an ability to engage in life-long learning;
- knowledge and understanding of contemporary issues;
- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;
- Integrated understanding of scientific and engineering principles of ceramic structure;
- Integrated understanding of scientific and engineering principles of ceramic properties;
- Integrated understanding of scientific and engineering principles of ceramic processing;
- Integrated understanding of scientific and engineering principles of ceramic performance;
- Ability to apply and integrate knowledge of structure, properties, processing and performance to ceramic selection and process design.

## Bachelor of Science Ceramic Engineering

Entering freshmen desiring to study ceramic engineering will be admitted to the Freshman Engineering Program. They will be permitted to state a ceramic 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 Ceramic 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 Ceramic Engineering.

The Ceramic 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

## 2 Ceramic Engineering

of 18 credit hours of course work 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, HISTORY 175, HISTORY 176, or POL SCI 90. The economics course may be either ECON 121 or ECON 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. Each 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 selected as 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. Skill courses are not allowed to meet humanities and social sciences requirements except in foreign languages or on approved HSS list.
4. Special topics, special problems courses and honors seminars are allowed only by petition to and approval by the student's department chairman.

### Freshman Year

First Semester	Credits	Second Semester	Credits
FR ENG 10	1	MET ENG 125	3
CHEM 1	4	MATH 15	4
CHEM 2	1	PHYSICS 23	4
MATH 14	4	H/SS Elective <sup>1</sup>	3
ENGLISH 20	3	IDE 20	3
H/SS Elective <sup>1</sup>	3		
	18		17

### Sophomore Year

First Semester	Credits	Second Semester	Credits
CER ENG 102	3	CER ENG 103	3
CER ENG 104	2	CER ENG 122	2
CER ENG 111	2	CER ENG 259	3
MATH 22	4	MATH 204 (or Statistics Elective) <sup>3</sup>	3
PHYSICS 24	4	H/SS Elective <sup>1</sup>	3
		CIV ENG 50	3
	15		17

### Junior Year

First Semester	Credits	Second Semester	Credits
CER ENG 231	2	CER ENG 242	2
CER ENG 251	3	CER ENG 291	3
CIV ENG 110	3	PHYSICS 107	3
CER ENG 203	3	H/SS Elective <sup>1</sup>	3
H/SS Elective <sup>1</sup>	3	Technical Elective <sup>2</sup>	3
		Advanced Chemistry Elective <sup>5</sup>	3
	14		17

### Senior Year

First Semester	Credits	Second Semester	Credits
CER ENG 261	1	CER ENG 262	2

CER ENG 284	4	CER ENG 306	4
CER ENG 331	3	H/SS Elective <sup>1</sup>	3
CER ENG 338	3	Statistics Elective <sup>3</sup>	3
ENG MGT 124	1	Technical Electives <sup>2</sup>	3
ENG MGT 137	2		
Technical Elective <sup>2</sup>	3		
	17		15
Total Credits: 128			

**Note 1:** Students may replace CHEM 1, CHEM 2, and CHEM 3 with CHEM 5, but will need to also take an additional technical elective (with advisor's approval) to reach the 128 hour requirement.

**Note 2:** Students may substitute MATH 8 and MATH 21 for MATH 14 and MATH 15, respectively.

**Note 3:** Students may substitute CHEM 3 for MET ENG 125.

- 1 Eighteen hours of H/SS electives to be taken.
- 2 Technical electives must be selected from 200 and 300 level engineering and science courses with the advisor's approval.
- 3 All Ceramic Engineering students must either take MATH 204 and one statistics course (200-level or higher) or an introductory statistics course (200-level) plus an advanced statistics elective (ECON 211, ENG MGT 356, ENG MGT 366, ENG MGT 381, ENG MGT 382, ENG MGT 385, STAT 346, and STAT 356).
- 4 All Ceramic Engineering students must take the Fundamentals of Engineering Examination (FE) 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.
- 5 All Ceramic Engineering students must select an advanced chemistry elective with the advisor's approval. The courses that can be considered are CHEM 221, CHEM 225, CHEM 237, CHEM 241, CHEM 331, or CHEM 343.

## Specific Degree Requirements

1. Total number of hours required for a degree in Ceramic Engineering is 128.
2. The assumption is made that a student admitted in the department has completed 34 hours credit towards graduation. The academic program of students transferring from colleges outside Missouri S&T will be decided on a case-by-case basis.
3. The department requires a total of 18 credit hours of humanities and social science.

**Richard K Brow**, Curators Professor  
PHD Pennsylvania State University

**Fatih Dogan**, Professor  
PHD Technical University of Berlin

**A Curt Elmore**, Professor<sup>1</sup>  
PHD University Of Arizona

**William G Fahrenholtz**, Curators Professor  
PHD University Of New Mexico Main

**Gregory E Hilmas**, Curators Professor  
PHD Univ. of Michigan - Ann Arbor

**Wayne Huebner**, Professor  
PHD University Of Missouri-Rolla

**F Scott Miller**, Associate Teaching Professor  
PHD University of Missouri-Rolla

**Joseph W Newkirk**, Associate Professor  
PHD University Of Virginia Main Ca

**Mohamed N Rahaman**, Professor  
PHD University of Sheffield (UK)

**Mary R. Reidmeyer**, Associate Teaching Professor  
PHD University Of Missouri-Rolla

**Jeffrey D Smith**, Associate Professor  
PHD University of Missouri - Rolla

**Jeremy Lee Watts**, Research Assistant Professor  
PHD Missouri S&T

DC # 0484-2013 Metallurgical Engineering - BS

Effective Year: **2014** 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:

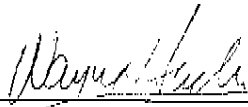
**Metallurgical Engineering - BS**

Department: **Materials Science and Engineering**

Briefly describe action requested (attach documentation as appropriate):

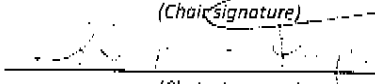
**Four required courses are adding hours (Met 216, 218, 261, 262) and the required hours to graduate will remain at 128 by deleting Core Elective III and 2 hrs of free elective (see attached curriculum sheet)**

Recommended by Department:

  
(Chair signature)

Date: 7/13

Recommended by DSCC:

  
(Chair signature)

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

Approved by Curricula Committee:

\_\_\_\_\_  
(Chair signature)

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

Approved by Faculty Senate:

\_\_\_\_\_  
(Chair signature)

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

# Metallurgical Engineering

Metallurgical engineering is one of two B.S. degrees offered by the Materials Science & Engineering Department. Metallurgical engineering is a broad discipline that studies metals production and recycling, the manufacturing of components from metals and alloys, the processing and treatment of metals to achieve improved properties, and the design of metallic materials for specific applications. Missouri S&T has one of the largest and most comprehensive metallurgical engineering departments in the United States. It is the only such department in Missouri or in any of the surrounding states.

The field of metallurgical engineering starts with the production and recycling of metals such as aluminum, steel, copper, magnesium and titanium. Once these metals are made, metallurgical engineers design forming and processing techniques to transform these metals into useful shapes with the properties required for their application. For example, light-weight magnesium is cast to make cell phones, zinc-coated steel is stamped to make corrosion resistant auto bodies, aluminum is formed to make the strong but lightweight wings of jet aircraft, tungsten powder is consolidated and drawn into filaments for incandescent light bulbs, and steel I-beams are hot-rolled for the construction of skyscrapers. Metallurgical engineers control the properties of metallic materials by altering the microscopic structure with alloying additions and special treatments. This approach leads to products such as corrosion-resistant stainless steels, ultra-lightweight alloys for aircraft, wear-resistant alloys for engines, and shape-memory alloys for space structures. In addition, investigating material failures and monitoring service life are tasks that are performed by metallurgists.

Although all metallurgical engineering students take the same basic required courses in metallurgical engineering, students can select several technical electives to emphasize their particular area of interest. Students are also encouraged to undertake summer and cooperative training employment to supplement both their academic studies and incomes. The department has also introduced a materials minor program for students from other engineering disciplines with an interest in materials.

The department is housed in McNutt Hall and has outstanding facilities for both classroom and laboratory learning. There are several optical and electron microscopes, a well equipped metals casting and joining laboratory, and comprehensive metal testing facilities. The department continuously upgrades its facilities for classroom and laboratory learning. The department has also enhanced its computer applications laboratory with the addition of new software and computers, and improved network access. Additional information is available at <http://mse.mst.edu/>.

## Mission Statement

The mission of the department is to provide a quality, comprehensive undergraduate and graduate education in the traditional areas of metallurgical engineering. The major program goal is to produce a Bachelor of Science graduate with a sound fundamental knowledge and extensive hands-on technical, communication, and leadership skills, capable of contributing in any technical area associated with metallurgy. The department is also committed to a strong graduate program, which ensures significant research activity, an active and involved faculty, and a robust, healthy environment for education. The provision of service course work for students in other engineering disciplines is also an important goal, as is interaction with professional societies and industry to promote continuing education, research, and technical information transfer. The utilization of the departmental resources to assist the state

agencies and industry of Missouri and the Mid-west is an integral part of the departmental mission.

The program educational objectives of the metallurgical engineering program:

- Our graduates will be leaders in the science, technology, and management of metallurgical engineering;
- Our graduates will serve their profession and society;
- Our graduates will continually enhance their professional skills and educational background;

The specific outcomes of the metallurgical engineering program are:

- Ability to apply mathematical, science and engineering principles to metallurgical systems;
- An ability to utilize experimental, statistical and computational methods to solve metallurgical problems;
- Ability to design a system, component, or process to meet desired needs;
- Ability to function on diverse teams;
- Ability to identify, formulate, and solve engineering problems;
- Understanding of professional and ethical responsibility;
- Ability to communicate effectively;
- The broad education necessary to understand the impact of engineering solutions in a global and societal context;
- Recognition of the need for, and an ability to engage in life-long learning;
- Knowledge and understanding of contemporary issues;
- Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;
- Integrated understanding of scientific and engineering principles of metals structure;
- Integrated understanding of scientific and engineering principles of metals properties;
- Integrated understanding of scientific and engineering principles of metals processing;
- Integrated understanding of scientific and engineering principles of metals performance;
- Ability to apply and integrate knowledge of structure, properties, processing and performance to metals selection and process design;

## Materials Minor Curriculum

A Materials Minor is available to any Missouri S&T student. The minor requires a total of 15 hours of materials related course work and must include MET ENG 121 or MET ENG 377 and MET ENG 221 or MECH ENG 153. An additional 3 hours must come from either Metallurgical or Ceramic Engineering courses. The remaining 6 hours may be from any combination of materials related courses approved by Materials Science and Engineering Department.

Approved Materials related courses:

**Approved courses in Metallurgical, Ceramic, or Materials Science & Engineering**

Additional hours may come from any 100, 200 or 300 level courses

**Approved courses in Chemistry**

## 2 Metallurgical Engineering

CHEM 381	Chemistry And Inherent Properties Of Polymers	3
<b>Approved courses in Aerospace Engineering</b>		
AERO ENG 311	Introduction To Composite Materials & Structures	3
AERO ENG 329	Smart Materials And Sensors	3
AERO ENG 336	Fracture Mechanics	3
AERO ENG 344	Fatigue Analysis	3
<b>Approved courses in Chemical Engineering</b>		
CHEM ENG 349	Structure And Properties Of Polymers	3
CHEM ENG 381	Corrosion And Its Prevention	3
<b>Approved course in Electrical Engineering</b>		
ELEC ENG 329	Smart Materials And Sensors	3
<b>Approved courses in Mechanical Engineering</b>		
MECH ENG 329	Smart Materials And Sensors	3
MECH ENG 336	Fracture Mechanics	3
MECH ENG 338	Fatigue Analysis	3
MECH ENG 382	Introduction To Composite Materials & Structures	3

\* Other than MET ENG 121, MET ENG 221, MET ENG 377, or MECH ENG 153

## Bachelor of Science Metallurgical Engineering

Entering freshmen desiring to study Metallurgical Engineering will be admitted to the Freshman Engineering Program. They will be permitted to state a Metallurgical 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 Metallurgical 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 Metallurgical Engineering.

The Metallurgical 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 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, HISTORY 175, HISTORY 176, or POL SCI 90. The economics course may be either ECON 121 or ECON 122.
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. Each 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. Skill courses are not allowed to meet humanities and social sciences requirements except in foreign languages or on approved HSS list.
4. Special topics, special problems courses and honors seminars are allowed only by petition to and approval by the student's department chairman.

### Freshman Year

First Semester	Credits	Second Semester	Credits
FR ENG 10		1 MET ENG 125 <sup>2</sup>	3
CHEM 1		4 MATH 15	4
CHEM 2		1 PHYSICS 23	4
MATH 14		4 History Elective (Government) <sup>1</sup>	3
ENGLISH 20		3 IDE 20	3
Hum/Soc Sci Elective <sup>1</sup>		3	
		18	17

### Sophomore Year

First Semester	Credits	Second Semester	Credits
PHYSICS 24	4	CER ENG 259	3
MATH 22	4	CIV ENG 110	3
MET ENG 121	3	MET ENG 217	3
CIV ENG 50	3	MET ENG 218	1
ECON 121 or 122 <sup>1</sup>	3	MET ENG 221	3
		MET ENG 222	1
		Hum/Soc Sci Elective <sup>1</sup>	3
		17	17

### Junior Year

First Semester	Credits	Second Semester	Credits
MET ENG 204	3	ENG MGT 124	1
MATH 204 <sup>3</sup>	3	ENG MGT 137	2
MET ENG 215	3	MET ENG 202	1
MET ENG 216	3	MET ENG 203	3
MET ENG 307	3	CER ENG 281	3
Communication Elective <sup>1</sup>	3	Out of Department Technical Elective <sup>4</sup>	3
		Core Elective <sup>5</sup>	3
		16	16

### Senior Year

First Semester	Credits	Second Semester	Credits
MET ENG 281	1	MET ENG 282	2
Statistics Course <sup>3</sup>	3	Hum/Soc Sci Elective <sup>1</sup>	3
MET ENG 355	3	Core Elective III <sup>5</sup>	3
Core Elective II <sup>5</sup>	3	Technical Elective <sup>6</sup>	3
Technical Elective <sup>6</sup>	3	Free Elective <sup>7</sup>	3
Free Elective <sup>7</sup>	3		
		15	14

Total Credits: 128



- <sup>1</sup> Eighteen hours of required H/SS electives of which three hours must be history (HISTORY 112, HISTORY 175, HISTORY 176, or POL SCI 90), three hours of economics (ECON 121 or ECON 122) and three hours communications (ENGLISH 60, ENGLISH 160, or SP&M S 85)
- <sup>2</sup> CHEM 3 can be substituted for MET ENG 125
- <sup>3</sup> All metallurgical engineering students must either take MATH 204 and one statistics course (STAT 213 or STAT 215) or an introductory statistics course (STAT 213 or STAT 215) plus an advanced statistics elective (ENG MGT 385, STAT 320, STAT 346, or STAT 353)
- <sup>4</sup> CER ENG 251 or CER ENG 364 or CER ENG 392, CHEM ENG 346, CHEM 221 or CHEM 237 or CHEM 241, ELEC ENG 151 & ELEC ENG 152 or ELEC ENG 281, GEOLOGY 113, MATH 204 (if two stat courses taken<sup>3</sup>) or MATH 303 or MATH 325, MECH ENG 312 or MECH ENG 320 or MECH ENG 329 or MECH ENG 336 or MECH ENG 338 or MECH ENG 382, MIN ENG 241, PHYSICS 107 or PHYSICS 207
- <sup>5</sup> Met Core Electives (9 hours) Core Elective I - Introduction to Particulate Materials (MET ENG 367) or Corrosion And Its Prevention (MET ENG 381) Core Elective II - Steelmaking (MET ENG 358) or Steels And Their Treatment (MET ENG 331)-Core Elective III, ~~Materials selection course (Material Selection, Fabrication, And Failure (MET ENG 329) or MS&E 325)~~
- <sup>6</sup> Technical Electives (Met Eng or Approved listing)
- <sup>7</sup> Free Electives (5 hours)-algebra, trigonometry, basic ROTC, and courses considered remedial excluded

**Note:** All Metallurgical 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, together with the department's Senior Assessment, 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.

**Lana Zakaria Alagha**, Assistant Professor  
PHD University of Texas at dallas

**Mohsen Asle Zaeem**, Assistant Professor  
PHD Washington State University

**A Curt Elmore**, Professor<sup>1</sup>  
PHD University Of Arizona

**Mohammad Tayeb Ghasr**, Research Assistant Professor  
PHD University Of Missouri-Rolla

**Gregory E Hilmas**, Curators Professor  
PHD Univ. of Michigan - Ann Arbor

**Wayne Huebner**, Professor  
PHD University Of Missouri-Rolla

**Ronald Allen Kohser**, Professor  
PHD Lehigh University

**Arvind Srivastava Kumar**, Professor  
PHD University Of California-Berke

**F Scott Miller**, Associate Teaching Professor

PHD University of Missouri-Rolla

**Michael Scott Moats**, Associate Professor  
PHD University of Arizona

**Joseph W Newkirk**, Associate Professor  
PHD University Of Virginia Main Ca

**Matthew J Okeefe**, Professor  
PHD University Of Illinois Urbana

~~**Kent Dean Peastee**, Curator Teaching Professor<sup>1</sup> -  
PHD University Of Missouri-Rolla -~~

**Von L Richards**, Professor  
PHD University Of Michigan Ann Arb

**David C Van Aken**, Curator Teaching Professor<sup>1</sup>  
PHD University Of Illinois Urbana

**Jeremy Lee Watts**, Research Assistant Professor  
PHD Missouri S&T

**Caizhi Zhou**, Assistant Professor  
DE Iowa State university

CC File # 8475-2013-Min Eng - 407-32

Effective Year: 2014 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: **Mining and Nuclear Engineering**  
 2. Discipline and Course Number: Present: **Min<sup>E</sup> 407** Proposed:  
 3. Course Title: Present: **Theory of High Explosives**

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:

Proposed:

5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture **3.0** Lab **0** Total **3.0**  
 Proposed: Lecture Lab Total

## 7. Prerequisites:

Present: **Successful background check and Graduate Standing. (Co-listed with Exp Eng 407)**Proposed: **Graduate Standing. (Co-listed with Exp Eng 407)**8. Required for Majors: ☐ Elective for Majors: ☒9. Justification: **Background check not required for this class. No explosives will be handled**

## 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) **Exp Eng 407** 3) 5)  
 2) 4) 6)

Recommended by Department

(Chair signature)

Date: **06/06/13**

Recommended by DSCC

(Chair signature)

Date: **6/26/13**

Approved by Curricula Committee:

(Chair signature)

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

Approved by Faculty Senate:

(Chair signature)

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

Effective Year: 2013

Term: Summer ☐ Fall ☒ Spring ☐CC File # 8476-2013-Econ-350-10**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 ~~345~~ 350

3. Course Title: Present:

Proposed: Ethical Problems in a Global Environment

Abbreviated Course Title: Ethical Probs Global Env

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

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

Present:

Proposed: Focuses on the international dimension of ethics including corporate responsibility from economic, social, and environmental perspectives. It address the ethical challenges of decision making, stakeholder engagement, and governance at micro- (personal), meso- (org), and macro levels (systems).

5. If course requires field trip check box: ☐

6. Credit Hours:

Present:

Lecture:

Lab:

Total:

Proposed:

Lecture: 3

Lab:

Total: 3

7. Prerequisites:

Present:

Proposed: Senior or graduate standing.

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

9. Justification: Taught as BUS 301-International Ethical Problems in International Business, SS 12 (6 Distance and 15 in-class students)/ECON 301-Ethical Problems in a Global Environment, SS 13 (3 Distance and 13 in-class students). This course was also taught last summer as part of a study abroad experience in Chin, is an elective for a minor (Global Sustainable Economics) and a graduate certificate.

10. Semesters

previously offered as an experimental course (101, 201, 301, 401): SS 12, SS 13

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: 6/14/13

Recommended by Discipline Specific Curricula Committee

Barry Flachsbart - AB

(Chair signature)

Date: 7/17/13

Approved by Curricula Committee:

(Chair signature)

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

Approved by Faculty Senate:

(Chair signature)

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

CC File # 8477-2013-Exp Eng-305-32

Effective Year: 2014 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: **Mining and Nuclear Engineering**  
 2. Discipline and Course Number: Present: **Exp 305** Proposed: **Exp Eng**

3. Course Title: Present: **Explosives Handling and Safety**

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:

Proposed:

5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture **3.0** Lab **0** Total **3**  
 Proposed: Lecture Lab Total

7. Prerequisites:

Present: **Min Eng 151, Min Eng 307, Successful background check. (Co-listed with Min Eng 305)**Proposed: ~~Co-listed with Min Eng 305~~ **Min Eng 307**8. Required for Majors: ☐ Elective for Majors: ☒9. Justification: **Background check not required for this class. No explosives will be handled**

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: **06/06/13**

Recommended by DSCC

(Chair signature)

Date: **6/26/13**

Approved by Curricula Committee:

(Chair signature)

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

Approved by Faculty Senate:

(Chair signature)

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

CC File # *8478-2013-MSE-325-32*Effective Year: **2014** 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 and Engineering**2. Discipline and Course Number: Present: *MSE* **MSE 325** Proposed:3. Course Title: Present: **Materials Selection in Mechanical Design**Proposed: **Integrated Computational Materials Engineering**Abbreviated Course Title (24 Spaces or Less. Only needed for New Courses or Title Changes.): **ICME**

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

Present: **This course will introduce the basics of materials selection in mechanical design. It will also introduce the benefits of computational materials and process selection. The students will also learn to use a commercially available materials selection software.**Proposed: **Introduction to different computational tools for studying materials at different length scales. Several atomistic, mesoscale and continuum models will be introduced and bridging between different modeling scales will be discussed. This course includes computer lab sessions to build models for solidification, solid state phase transformation, etc.**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: ~~Met Eng 217, Met Eng 218~~ *Met Eng 121*Proposed: *Met* **Met Eng 217, Math 204**8. Required for Majors: ☐ Elective for Majors: ☒

9. Justification:

10. Semesters previously offered as an experimental course (101, 201, 301, 401): **1**

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 Wayne Hudson Date: 6/6/13Recommended by DSCC Stephen A. Raper Date: 7-18-13

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

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

Effective Year: 2014  
Term: Summer ☐ Fall ☒ Spring ☐

CC File # 8479-2013-EnvEng-265-32

## 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: Civil, Arch., Env.

2. Discipline and Course Number: Present: EnvE 265<sup>NG</sup> Proposed:

3. Course Title: Present: Water And Wastewater Engineering

Proposed:

Abbreviated Course Title:

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

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

Present: A study of the engineering design principles dealing with the quantity, quality and treatment of water, and the quantity, characteristics, treatment and disposal of wastewater.

Proposed:

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: Civ Eng 230 with grade of "C" or better, Civ Eng 261

Proposed: Civ Eng 261

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

9. Justification: Fluids and piping (CE 230 content) are not a significant portion of CE 265.

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) CE 265 2) 3)  
4) 5)

Recommended by Department [Signature]  
(Chair signature)

Date: 5/15/13

Recommended by Discipline Specific Curricula Committee [Signature]  
(Chair signature)

Date: 5/25/13

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

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

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

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

(Revised 1/29/09)

Effective Year: 2014  
Term: Summer ☐ Fall ☐ Spring ☒

CC File # *2480-2013-Philos-*  
*254-10*

## 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: Arts, Languages, and Philosophy
2. Discipline and Course Number: Present: Philosophy 201 Proposed: Philosophy 254
3. Course Title: Present: Symbolic Logic in Argumentation  
Proposed:

Abbreviated Course Title: Symbolic Logic

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

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

Present: An introduction to sentential and predicate logic with an emphasis on the latter. It will include metatheoretic discussions of both syntax and semantics with a focus on various techniques used to examine logical relationships within an artificial language.

Proposed:

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

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

### 7. Prerequisites:

Present: None

Proposed: Any introductory (below 100) philosophy course. (Philosophy 15 is recommended.)

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

9. Justification: Students in this course will: (1) acquire an understanding of an artificial language that is governed with mathematically precise rules, (2) learn many important logical concepts, including meta-theoretical ones, and (3) learn various methods of exposing logical relationships between sentences, including truth tables, models, and proofs.

10. Semesters previously offered as an experimental course (101, 201, 301, 401): Spring 2012, Spring 2013

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

*[Signature]*  
(Chair signature)

Recommended by Discipline Specific Curricula Committee

*[Signature]*  
(Chair signature)

Approved by Curricula Committee

(Chair signature)

Approved by Faculty Senate

(Chair signature)

Date: *6/27/2013*

Date: *6/27/20*

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

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

CC File # 8481-2013-Cer Eng-284-31

Effective Year: 2014 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: **Ceramic Engineering**  
 2. Discipline and Course Number: Present: **Cer Eng 284** Proposed:  
 3. Course Title: Present: **Electrical Properties of Ceramics**

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: **The application of ceramic chemistry and physics to the development and evaluation of electronic, dielectric, magnetic, and optical properties. Emphasis is placed on the relationships between properties and crystal structure, defects, grain boundary nature, and microstructure. Prerequisite: PHYSICS 107.**

Proposed: **The application of ceramic chemistry and physics to the development and evaluation of electronic, dielectric, magnetic, and optical properties. Emphasis is placed on the relationships between properties and crystal structure, defects, grain boundary nature, and microstructure. Prerequisite: PHYSICS 107 with a "C" or better.**

5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture **3** Lab **1** Total **4**  
 Proposed: Lecture **3** Lab **0** Total **3**

## 7. Prerequisites:

Present: **Physics 107**Proposed: **PHYSICS 107 with a "C" or better in Physics 107**8. Required for Majors: ☒ Elective for Majors: ☐9. Justification: **Prerequisite "C" - new departmental standard to improve student success, reduce credit hours to reflect effort**

## 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: 7/12/13

Recommended by DSCC

(Chair signature)

Date: 7-18-13

Approved by Curricula Committee:

(Chair signature)

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

Approved by Faculty Senate:

(Chair signature)

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



EC # 2471-FS2013-Met Eng-301

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: **Materials Science & Engineering**

Discipline and Course Number: **Met<sup>Eng</sup> 301**

Course Title: **Hydrometallurgy**

Abbreviated Title (24 spaces or less):

Instructor(s): **Michael Moats**

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

Prerequisites: **Ger 259 or Met 203 with "C" or better; substitutions with approval by Instructor** *in Cer Eng or Met Eng 203*

Semester(s) previously taught:

Brief Course Description (360 character spaces or less): **Thermodynamic, kinetic, and engineering consideration of common hydrometallurgical unit operations - leaching, precipitation, solvent extraction, ion exchange, electrowinning and reduction.**

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)

Date: 5/15/13

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

(Chair signature)

Date: 5/25/13

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

(Chair signature)

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

EC # 2472 - Sp2014 - MSE - 401

Effective Year: SP14 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: **Materials Science & Engineering**

Discipline and Course Number: <sup>MSE</sup> **MSE 401**

Course Title: **Advanced Integrated Computational Materials Engineering**

Abbreviated Title (24 spaces or less): **AICME**

Instructor(s): **Mohsen Asle Zaeem**

Credit Hours: **Lecture 3.0 Lab 0 Total 3.0**

Prerequisites: <sup>Met Eng</sup> **MetE 217** and **Math 204** or consent of instructor

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

Brief Course Description (360 character spaces or less): **Advanced different computational tools for studying materials at different length scales. Several atomistic, mesoscale and continuum models will be introduced and bridging between different modeling scales will be discussed. This course includes computer lab sessions to build models for solidification, etc. Final project is required.**

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)

Date: 6/19/13

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

(Chair signature)

Date: 7-18-13

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

(Chair signature)

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

EC # 2473-Fs 2013-Env Eng-301Effective 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: **Civil, Architectural, and Environmental Engin**

Discipline and Course Number: **Env Eng  
EnvE-301**

Course Title: **Sustainable Stormwater Management**

Abbreviated Title (24 spaces or less): **Sustain. Stormwater Mgt**

Instructor(s): **Jay Hoskins**

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

Prerequisites:

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

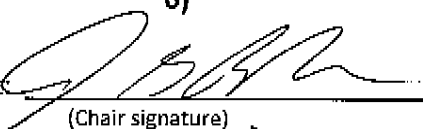
Brief Course Description (360 character spaces or less): **This course addresses the policy drivers for sustainable water management approaches and design, construction, and maintenance of green infrastructure such as rain gardens (bioretention) and permeable pavement. Students will also be provided an opportunity to take site visits and complete a small design project.**

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

1) 3) 5)

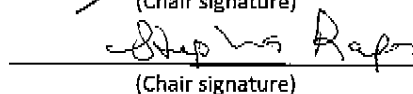
2) 4) 6)

Recommended by Department:

  
(Chair signature)

Date: 5-20-13

Recommended by DSCC:

  
(Chair signature)

Date: 7-18-13

Approved by Curricula Committee:

(Chair signature)

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

EC # 2474 Sp 2014 History 301

Effective Year: 2014 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: **History and Political Science**Discipline and Course Number: **History 301**Course Title: **History of Las Vegas, Nevada**Abbreviated Title (24 spaces or less): **History of Vegas**Instructor(s): **Larry Gragg**Credit Hours: **Lecture 3 Lab 0 Total 0**Prerequisites: **History 175 or 176**

Semester(s) previously taught:

Brief Course Description (360 character spaces or less): **The course will use the history of Las Vegas to explore urbanization, Americans' leisure time activities, entertainment and popular culture, compulsive gambling, government support for economic development, civic promotion, and organized crime in the twentieth century.**

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)

Date: 7/9/13

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

(Chair signature)

Date: 7/11/13

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

(Chair signature)

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

Effective Year: 2013

Effective Term: Summer ☐ Fall ☒ Spring ☐

EC File #2475-FS-2013-ELEC ENG-401

## Experimental Course Form (EC)

An EC form must be submitted before an experimental course is to be offered. EC forms approved SP2009 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: Electrical and Computer Eng.

Discipline and Course Number: <sup>Elec Eng</sup> EE 401

Course Title: Energy Storage Devices

Abbreviated Title (24 spaces or less): Energy Storage Devices

Instructor(s): Mehdi Ferdowsi

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

Prerequisites: ~~Chemistry I and Calculus II~~  
Chem I And MATH 15

Semester(s) previously taught: none

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

This course provides an overview on energy storage schemes/devices with major focus on electrochemical storages including advanced rechargeable batteries, electrochemical capacitors, and fuel cells. The course will cover operating principles, electrochemical mechanisms, physics behind them, characterization methods, and applications. Other energy storage technologies will also briefly discuss

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

1) 2) 3)

4) 5) 6)

Department Chair: Kelli Enslin  
(Chair Signature)

Date: July 18, 2013

Discipline Specific Curricula Committee: Diana Raper  
(Chair signature)

Date: July 18, 2013

Curricula Committee: \_\_\_\_\_  
(Chair Signature)

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

EC # 2476 - Sp 2014 - Art 201

Effective Year: **2014** 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: **ALP**

Discipline and Course Number: **Art 201**

Course Title: **Topics in Visual Culture and Aesthetics**

Abbreviated Title (24 spaces or less): **Vis. Culture/Aesthetics**

Instructor(s): **Andrew M. Tohline**

Credit Hours: **Lecture 3** Lab Total

Prerequisites: **None**

Semester(s) previously taught: **N/A**

Brief Course Description (360 character spaces or less): **An exploration of contemporary visual culture and aesthetics topics, including inquiries into the role of technology and copyright in art and media, representations of gender and identity in advertising and art, questions of taste, and the constantly-shifting definition of art. An art and philosophy class for people who like ideas and the occasional movie.**

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

1) **Phil 201** 3) 5)

2) 4) 6)

Recommended by Department:

(Chair signature)

Date: 7/17/2013

Recommended by DSCC:

(Chair signature)

Date: 7/17/2013

Approved by Curricula Committee:

(Chair signature)

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

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 <sup>Eng</sup> 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 1Proposed: 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

(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 # 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** <sup>ENG</sup> 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 ☐ Lab **1** Total **1**Proposed: Lecture **1** Lab **1** Total **2**

7. Prerequisites:

Present: **Met 121, and preceded or accompanied by Met 215** <sup>ENG</sup>Proposed: **Met 121 with "C" or better, and preceded or accompanied by Met 215** <sup>ENG</sup>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** <sup>ENG</sup>  
 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 ☒ Lab 1 Total 1  
 Proposed: Lecture 1 Lab 1 Total 2

7. Prerequisites: <sup>ENG</sup>  
 Present: **Met 121, accompanied or preceded by Met 217** <sup>ENG</sup>  
 Proposed: **Accompanied or preceded by Met 217** <sup>ENG</sup>

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: <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 261** <sup>ENG</sup> 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** <sup>ENG</sup> and **Met 218** <sup>ENG</sup>, or **Cer 231** <sup>ENG</sup> with a "C" or better8. 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** <sup>ENG</sup>

3)

5)

2)

4)

6)

Recommended by Department

(Chair signature)

Date: 2/22/12

Recommended by DSCC

(Chair signature)

Date: 3-13-13

Approved by Curricula Committee:

(Chair signature)

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

Approved by Faculty Senate:

(Chair signature)

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

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 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 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: <sup>ENG</sup> Present: **Cer 261 or Met 261**Proposed: <sup>ENG</sup> ~~Cer 261 or Met 261~~ with "C" or better in either CER ENG 261 or MET ENG 2618. Required for Majors: ☒ Elective for Majors: ☐9. Justification: **Increased hours needed to expand course content & expectations; Prerequisite grade requirement - new dept.**10. Semesters previously offered as an experimental course (101, 201, 301, 401): **standard to improve student success**

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

1) **Cer 262** <sup>ENG</sup> 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 # 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 **2**  
 Proposed: Lecture ☐ Lab **3** Total **3**

7. 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** **ENG** 3) 5)  
 2) 4) 6)

Recommended by Department Wayne Hudson Date: 2/22/13  
(Chair signature)Recommended by DSCC Stephen Raper Date: 3-11-13  
(Chair signature)Approved by Curricula Committee: \_\_\_\_\_ Date: \_\_\_\_\_  
(Chair signature)Approved by Faculty Senate: \_\_\_\_\_ Date: \_\_\_\_\_  
(Chair signature)