



MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Formerly University of Missouri-Rolla

Minutes of the Campus Curricula Committee Meeting

August 13, 2013

1 pm, Room 106B Parker Hall

Attendees: Lahne Black, Barry Flachsbart, Irina Ivliyeva, Keith Nisbett, Steve Raper, Tom Schuman, Daniel Tauritz, and Jennifer Thorpe.

The meeting agenda was amended to

- Include the election of the 2013-2014 CCC Chair
- Set the 2013-2014 CCC meeting dates

The following curriculum forms were discussed and approved:

Degree Change Forms:

DC #0479	DC #0483
DC #0480	DC #0484
DC #0481	

Course Change Forms:

CC #8385	CC #8446
CC #8406	CC #8447
CC #8407	CC #8481
CC #8445	

Experimental Course Forms:

EC #2471	EC #2474
EC #2472	EC #2475
EC #2473	EC #2476

The items below were returned to the department as the requested action is not within the purview of the CCC:

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

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

The CCC expresses concern about DC #0477 and DC #0478, because they appear to establish separate degrees, both in terms of required courses and total number of credit hours, for campus versus distance students.

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MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

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The following item was tabled pending further action/clarification to be provided by the academic department:

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

The items below were tabled due to the freeze required by the ongoing Course Renumbering Initiative:

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

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

CC #8477, Explosives Engineering 305, Explosives Handling and Safety.

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

CC #8479, Environmental Engineering 265, Water and Wastewater Engineering.

CC #8480, Philosophy 201, Symbolic Logic in Argumentation.

Daniel Tauritz was re-elected as CCC Chair for 2013-2014.

CCC meeting dates for 2013-2014 were scheduled as follows:

- September 4, 2013 10:00-11:30 am
- October 9, 2013 10:00-11:30 am
- October 30, 2013 10:00-11:30 am
- December 4, 2013 10:00-11:30 am
- January 14, 2014 3:30-5:00 pm
- February 5, 2014 10:00-11:30 am
- March 5, 2014 10:00-11:30 am
- April 2, 2014 10:00-11:30 am
- May 14, 2014 TBD

Course Renumbering Initiative:

- The Committee reviewed the crosswalk tables submitted by each department. Suggested changes and requests for clarification were returned to the departments as necessary. The deadline for revisions is Friday, August 23, 2013 at noon.
- Departments may up till noon on Friday, August 23, email Lahne Black in the Registrar's Office a list of their courses which they request to be deleted rather than renumbered and which have not been taught since spring semester 2011 for consideration at the CCC meeting on September 4, 2013.

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MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

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- To minimize the workload on the departments, renumbering of all prerequisite course numbers will be performed by default by the Registrar's Office as follows:
 1. Any 200 or below level course number being mapped solely to a 4000 or lower level course number will be renumbered accordingly in all prerequisite occurrences
 2. Any 300 level course number being mapped to a single course will be renumbered accordingly in all prerequisite occurrences (this means that potentially some 6000 level courses will by default have 4000 level prerequisites, so departments are urged to identify such occurrences and, if appropriate, submit non-default prerequisite renumberings to correct unwanted occurrences)
 3. Any 300 level course number being dual-career mapped to a 4000 and 5000 level course pair will be renumbered in all prerequisite occurrences as follows:
 - If the course of which it is a prerequisite is 4000 or below level, then for that course it will be renumbered to the 4000 level course; otherwise, it will be renumbered to the 5000 level course
 4. Any 400 level course number being mapped solely to a 6000 or lower course number will be renumbered accordingly in all prerequisite occurrences
 5. The Registrar's Office will send all departments a cross-walk table augmented with current and new prerequisite columns to use for submitting non-default prerequisite renumberings (leave the new prerequisite column blank when you desire default renumbering; also, do not make any other changes to the prerequisites, that will require an EC/CC form)
 6. The deadline for emailing the prerequisite renumberings to Lahne Black in the Registrar's Office is noon on Friday, August 23, 2013 to make the CCC meeting on September 4, 2013.

Online Curricula Workflow: Jennifer Thorpe presented a brief demonstration of CourseLeaf Curriculum Management, S&T's new online curricula workflow system.

The meeting adjourned at 6:50 pm.

A handwritten signature in cursive script, reading "Daniel Tauritz".

Daniel Tauritz, Chair
Missouri S&T Campus Curricula Committee

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Effective Year: 2014

Effective Term: Summer ☐ Fall ☒ Spring ☐

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

DC # 0479-2013 - Arch Eng -
000-00

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: 8/26/2013

Approved by Faculty Senate:

(Chair signature)

Date: _____

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- 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
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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
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ArchE 3xx	Special Concretes
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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-Civ Eng-000-00

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.

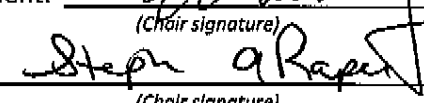
Recommended by Department:


(Chair signature)

Date:

5/14/13

Recommended by DSCC:


(Chair signature)

Date:

5-21-13

Approved by Curricula Committee:


(Chair signature)

Date:

8/26/2013

Approved by Faculty Senate:

(Chair signature)

Date:

Civil Engineering — 101

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 ²	1
Chem 1 & 2-Gen Chem	5
Math 14-Calc for Engineers I	4
English 20-Expos & Argumentation	3
General Ed Elective ¹	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 ¹	3
General Ed Elective ¹	3
	17

SOPHOMORE YEAR

First Semester	Credit
CE 1-Fund of Surveying ²	3
CE 3-Eng Communications	2
IDE 50-Eng Mech-Statics ²	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 ²	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 ²	2
CE 217-Structural Analysis I ²	3
CE 215-Fundamentals of Geotechnical Engr	3
CE 230-Engr Fluid Mech ²	3
CE 261-Fund of Environmental	3
General Ed Elective ¹	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 ^{3,4}	6
CE 248-Contracts & Const Eng	3
CE 221-Structural Design Metals	3
General Ed Elective ¹	3
	16

Second Semester

CE 298-Civil Eng Design Project	3
CE Tech Elective ^{3,5}	3
CE Depth Elective ^{3,4}	3
General Ed Elective ¹	3
CE Tech Elective ^{3,5}	3
	15

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. One general education elective must be from Engl 60, Engl 160, or SP&MS 85.

²⁾ A grade of 'C' or better required to satisfy graduation requirements.

³⁾ 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.

⁴⁾ Choose depth electives using Guidelines for Depth and Technical Electives.

⁵⁾ 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 # 0481-2013 - Civ Eng - 000-00

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):

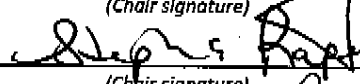
A maximum total of 6 credit hours of independent study (EnvE 300 or EnvE 390) can be used as depth or technical electives in the B.S. Environmental Engineering curriculum.

Recommended by Department:


(Chair signature)

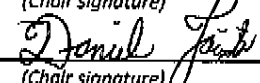
Date: 5/14/13

Recommended by DSCC:


(Chair signature)

Date: 5/25/13

Approved by Curricula Committee:


(Chair signature)

Date: 8/26/2013

Approved by Faculty Senate:

(Chair signature)

Date: _____

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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	Credit
EnvE 265-Water & Wastewater Eng ¹	3
EnvE 263-Env Eng Chem Fund	3
CE 230-Elem Fluid Mech ²	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 ^{5,6}	3
Communications Elective ⁷	3
	15

SENIOR YEAR

First Semester	Credit
CE 248-Contracts & Construc Eng	3
EnvE 210-Senior Seminar ³	1
CE 234-Hydraulic Eng	4
EnvE Air Pollution Elective ^{4,6}	3
Hist 270-History of Technology	3
EnvE Depth Elective ^{4,5}	3
	17

Second Semester

EnvE 298-CE Design Project ³	3
EnvE Depth Elective ^{4,5}	3
EnvE Depth Elective ^{4,5}	3
EnvE Technical Elective ^{5,6}	3
EnvE 269-Research in Env Eng	1
General Education Elective ¹	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, Engl 60, Engl 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

DC# 0483-2013-Cer Eng-000.00

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 Heubner
(Chair signature)

Date: 7/12/13

Recommended by DSCC:

John R. Baper
(Chair signature)

Date: 7-18-13

Approved by Curricula Committee:

Daniel J. Fink
(Chair signature)

Date: 8/26/2013

Approved by Faculty Senate:

(Chair signature)

Date: _____

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 ¹	3
ENGLISH 20	3	IDE 20	3
H/SS Elective ¹	3		
	16		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) ³	3
PHYSICS 24	4	H/SS Elective ¹	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 281	3
CIV ENG 110	3	PHYSICS 107	3
CER ENG 203	3	H/SS Elective ¹	3
H/SS Elective ¹	3	Technical Elective ²	3
		Advanced Chemistry Elective ⁵	3
	14		17

Senior Year

First Semester	Credits	Second Semester	Credits
CER ENG 261	3	CER ENG 262	3

CER ENG 284		CER ENG 306	4
CER ENG 331	3	H/SS Elective ¹	3
CER ENG 338	3	Statistics Elective ³	3
ENG MGT 124	not req'd.	Technical Electives ²	3
ENG MGT 137	2		
Technical Elective ²	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, Professor¹
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-Met Eng-000-00

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)

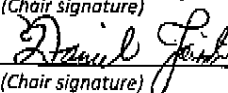
Date: 7/12/13

Recommended by DSCC:


(Chair signature)

Date: 7-18-13

Approved by Curricula Committee:


(Chair signature)

Date: 8/26/2013

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 McNitt 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
Approved courses in Aerospace Engineering		
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
Approved courses in Chemical Engineering		
CHEM ENG 349	Structure And Properties Of Polymers	3
CHEM ENG 381	Corrosion And Its Prevention	3
Approved course in Electrical Engineering		
ELEC ENG 329	Smart Materials And Sensors	3
Approved courses in Mechanical Engineering		
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 ²	3
CHEM 1	4	MATH 15	4
CHEM 2	1	PHYSICS 23	4
MATH 14	4	History Elective (Government) ¹	3
ENGLISH 20	3	IDE 20	3
Hum/Soc Sci Elective ¹	3		
	16		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	3
ECON 121 or 122 ¹	3	MET ENG 221	3
		MET ENG 222	1
		Hum/Soc Sci Elective ¹	3
	17		18

Junior Year

First Semester	Credits	Second Semester	Credits
MET ENG 204	3	ENG MGT 124	1
MATH 204 ³	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 291	3
Communication Elective ¹	3	Out of Department Technical Elective ⁴	3
		Core Elective I ⁵	3
	16		15

Senior Year

First Semester	Credits	Second Semester	Credits
MET ENG 281	3	MET ENG 262	3
Statistics Course ³	3	Hum/Soc Sci Elective ¹	3
MET ENG 355	3	Core Elective II ⁵	3
Core Elective II ⁵	3	Technical Elective ⁶	3
Technical Elective ⁶	3	Free Elective ⁷	3
Free Elective ⁷	3		
	15		12

Total Credits: 128

- ¹ 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)
- ² CHEM 3 can be substituted for MET ENG 125
- ³ 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)
- ⁴ 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 taken³) 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
- ⁵ 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 MSE 325)~~
- ⁶ Technical Electives (Met Eng or Approved listing)
- ⁷ 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, Professor¹
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 Peaslee**, Curator Teaching Professor¹
PHD University Of Missouri-Rolla~~

Von L Richards, Professor
PHD University Of Michigan Ann Arb

David C Van Aken, Curator Teaching Professor¹
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 # 8385-2013-CER ENG-261-31

Effective Year: ²⁰¹⁴~~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 ^{Eng} 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: 8/26/2013

Approved by Faculty Senate:

(Chair signature)

Date: _____

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

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

This form is for creating or modifying permanent courses.

Course Changes (Check all changes.)

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

Course Information (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)1. Department: **Materials Science & Engineering**2. Discipline and Course Number: Present: **Met 216** Proposed:3. Course Title: Present: **Mechanical Testing of Materials**

Proposed:

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

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

Present: **Deformation of materials and mechanical testing of materials; tensile testing, creep; impact testing; fracture mechanics and fatigue. Prerequisites: Met Eng 121, accompanied by Met Eng 215.**Proposed: **Deformation of materials and mechanical testing of materials; tensile testing, creep; impact testing; fracture mechanics and fatigue. Prerequisites: Met Eng 121 with a "C" or better, preceded or accompanied by Met Eng 215.**5. If course requires field trip check box: ☐6. Credit Hours: Present: Lecture ☐ Lab 1 Total 1

Proposed: Lecture 1 Lab 1 Total 2

7. Prerequisites:

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

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

1)

3)

5)

2)

4)

6)

Recommended by Department

(Chair signature)

Date: 2/22/13

Recommended by DSCC

(Chair signature)

Date: 3-11-13

Approved by Curricula Committee:

(Chair signature)

Date: 8/26/2013

Approved by Faculty Senate:

(Chair signature)

Date: _____

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

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

This form is for creating or modifying permanent courses.

Course Changes (Check all changes.)New Course ☐Course Deletion ☐Credit Hours ☒Prerequisites ☒Course Title ☐Catalog Description ☐Course Number ☐Co-listing ☐**Course Information** (Sections 1-9 must be completed. Leave "Proposed" items blank if no change is being made.)1. Department: **Materials Science & Engineering** *ENG*2. Discipline and Course Number: Present: **Met 218** Proposed:3. Course Title: Present: **Microstructural Development Laboratory**

Proposed:

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

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

Present: **Investigation of the relationships between microstructures, and processing for various materials.****Prerequisites: Met Eng 121, accompanied by Met Eng 217.**Proposed: **Investigation of the relationships between microstructures, and processing for various materials.****Prerequisites: Accompanied or preceded by Met Eng 217.**5. If course requires field trip check box: ☐6. Credit Hours: Present: Lecture ☒ Lab 1 Total 1

Proposed: Lecture 1 Lab 1 Total 2

7. Prerequisites:

Present: *ENG* **Met 121; accompanied or preceded by Met 217** *ENG*Proposed: *ENG* **Accompanied or preceded by Met 217**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)

*Wayne Huch*Date: *2/22/13*

Recommended by DSCC

(Chair signature)

*Stephan Raper*Date: *3-11-13*

Approved by Curricula Committee:

(Chair signature)

*Daniel Jank*Date: *8/26/2013*

Approved by Faculty Senate:

(Chair signature)

Date: _____

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

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

Course Change Form (CC)

This form is for creating or modifying permanent courses.

Course Changes (Check all changes.)

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

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

1. Department: **Materials Science & Engineering**

2. Discipline and Course Number: Present: **Met 261** Proposed:

3. Course Title: Present: **Materials Senior Design I**

Proposed:

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

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

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

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

5. If course requires field trip check box: ☐

6. Credit Hours: Present: Lecture ☐ Lab ☐ Total ☐

Proposed: Lecture ☒ Lab ☐ Total ☒

7. Prerequisites:

Present: **Senior Standing**

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

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

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

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

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

1) **Cer 261**

3)

5)

2)

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: **8/26/2013**

Approved by Faculty Senate:

(Chair signature)

Date:

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

Effective Year: ²⁰¹⁴ ~~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** ^{ENG} 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: ^{ENG} Present: **Cer 261 or Met 261**

Proposed: ^{ENG} **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 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** ^{ENG} 3) 5)
 2) 4) 6)

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

Recommended by DSCC Stephen Rader Date: 3-11-13
 (Chair signature)

Approved by Curricula Committee: David Smith Date: 8/26/2013
 (Chair signature)

Approved by Faculty Senate: _____ Date: _____
 (Chair signature)

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

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

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 ^{ENG} 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 ^{ENG} 261 or Met ^{ENG} 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

(Chair signature)

Date: **2/22/13**

Recommended by DSCC

(Chair signature)

Date: **3-11-13**

Approved by Curricula Committee:

(Chair signature)

Date: **8/26/2013**

Approved by Faculty Senate:

(Chair signature)

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: 8/26/2013

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 ^{Eng} 301**

Course Title: **Hydrometallurgy**

Abbreviated Title (24 spaces or less):

Instructor(s): **Michael Moats**

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

Prerequisites: **Cer 259 or Met 203 with "C" or better; ^{either 259 in Cer Eng or Met Eng 203} substitutions with approval by instructor**
substitutions

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: 8/26/2013

EC # 2472-Sp2014-MSEE-401Effective 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: ^{MSEE} **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: ^{Mat Eng} **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: 8/26/2013

EC # *2473-Fs 2013-Env 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: **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:

[Signature]
(Chair signature)

Date: *5-20-13*

Recommended by DSCC:

[Signature]
(Chair signature)

Date: *7-18-13*

Approved by Curricula Committee:

[Signature]
(Chair signature)

Date: *8/26/2013*

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 **3**

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:

[Signature]
(Chair signature)

Date: 7/9/13

Recommended by DSCC:

[Signature]
(Chair signature)

Date: 7/11/13

Approved by Curricula Committee:

[Signature]
(Chair signature)

Date: 8/26/2013

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: ^{Elec Eng} 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 be discussed.

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 Easli
(Chair Signature)

Date: July 18, 2013

Discipline Specific Curricula Committee: Suparna Daper
(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 0 Total 3

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: 8/26/2013