



Campus Curricula Committee Meeting Agenda

February 5, 2020

8:15am – 9:45am, Fulton 120

(For Faculty Senate Meeting of February 20, 2019)

Review of submitted Course Change forms:

File: 1090.1	BIO SCI 4383: Toxicology
File: 2394.1	BIO SCI 6383: Advanced Toxicology
File: 1117.1	CHEM 1110: Orientation for Chemistry Majors
File: 2593.1	CHEM 1301: Introductory Chemistry
File: 1321.1	CHEM ENG 5100: Intermediate Transport Phenomena
File: 1782.1	CHEM ENG 5120: Interfacial Phenomena In Chemical Engineering
File: 1419.1	CHEM ENG 5170: Physical Property Estimation
File: 4292.8	CHEM ENG 5241: Intermediate Process Safety in the Chemical and Biochemical Industries
File: 1012.1	CHEM ENG 5310: Structure and Properties of Polymers
File: 1693.1	CHEM ENG 5330: Alternative Fuels
File: 1731.1	CHEM ENG 5340: Principles of Environmental Monitoring
File: 106.1	CHEM ENG 5350: Environmental Chemodynamics
File: 2393.1	CHEM ENG 6241: Intermediate Chemical Process Safety
File: 1868.1	FR ENG 1100: Study And Careers In Engineering and Computing
File: 931.1	MECH ENG 4480: Control System Laboratory

Review of submitted Certificate forms:

File: 347	PROPOSED: Geophysics Graduate CT
File: 348	PROPOSED: Petroleum Systems CT

Review of submitted Degree Change forms:

File: 141.31	AE ENG-BS: Aerospace Engineering BS
File: 143.35	ARC ENG-BS: Architectural Engineering BS
File: 150.77	CH ENG-BS: Chemical Engineering BS
File: 151.12	CHEM-BA: Chemistry BA
File: 28.64	CMP SC-BS: Computer Science BS
File: 153.67	CP ENG-BS: Computer Engineering BS
File: 149.27	CR ENG-BS: Ceramic Engineering BS
File: 152.18	CV ENG-BS: Civil Engineering BS
File: 155.54	EL ENG-BS: Electrical Engineering BS
File: 44.33	ENG MG-BS: Engineering Management BS



MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Formerly University of Missouri-Rolla

File: 51.15
File: 261.4
File: 156.32
File: 86.43
File: 95.28
File: 90.30
File: 104.16
File: 108.41

EV ENG-BS: Environmental Engineering BS
FR ENG-UN: Foundational Engineering and Computing
GE ENG-BS: Geological Engineering BS
MC ENG-BS: Mechanical Engineering BS
MI ENG-BS: Mining Engineering BS
MT ENG-BS: Metallurgical Engineering BS
NU ENG-BS: Nuclear Engineering BS
PE ENG-BS: Petroleum Engineering BS

Course Change Request

Date Submitted: 01/08/20 8:16 am

Viewing: **BIO SCI 4383 : Toxicology**

File: 1090.1

Last edit: 01/17/20 3:39 pm

Changes proposed by: shannonk

- In Workflow
1. **RBIOLSCI Chair**
 2. **CCC Secretary**
 3. **Sciences DSCC Chair**
 4. **Pending CCC Agenda post**
 5. **CCC Meeting Agenda**
 6. Campus Curricula Committee Chair
 7. FS Meeting Agenda
 8. Faculty Senate Chair
 9. Registrar
 10. CAT entry
 11. Peoplesoft

- Approval Path
1. 01/08/20 9:43 am
David Duvernell (duvernell): Approved for RBIOLSCI Chair
 2. 01/13/20 10:44 am
Brittany Parnell (ershenb): Approved for CCC Secretary
 3. 01/17/20 3:39 pm
Katie Shannon (shannonk): Approved for Sciences DSCC Chair
 4. 01/20/20 8:52 pm
Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

Programs referencing this course

- [BIOMED-MI: Biomedical Engineering Minor](#)
- [SFTYENG-CT: Safety Engineering](#)
- [EV ENG-BS: Environmental Engineering BS](#)

Requested **Fall 2020** ~~08/14/2018~~

Effective Change Date

Department Biological Sciences

Discipline Biological Sciences (BIO SCI)

Course Number 4383

Title Toxicology

Abbreviated Course Title Toxicology

Catalog Description: A study of natural and man-made toxicants, various possible routes of exposure, absorption, distribution, biotransformation, specific target sites, and mechanisms involved in elicitation of toxic effects, as well as detoxification and excretion.

Prerequisites: Bio Sci 2213, ~~Bio Sci 2223~~, at least Junior standing.

Field Trip Statement

Credit Hours: LEC: 3 LAB: 0 IND: 0 RSD: 0 Total: 3

Required for Majors: No

Elective for Majors: **Yes** ~~No~~

Justification for change: Instructor wants to delete Genetics as a prerequisite

Semesters previously offered as an experimental course

Co-Listed

Courses:

Course Reviewer

Comments

Key: 1090

[Preview Bridge](#)

Course Change Request

Date Submitted: 01/08/20 8:17 am

Viewing: **BIO SCI 6383 : Advanced Toxicology**

File: 2394.1

Last edit: 01/13/20 10:45 am

Changes proposed by: shannonk

Requested **Fall 2020** ~~08/01/2014~~

Effective Change

Date

Department Biological Sciences

Discipline Biological Sciences (BIO SCI)

Course Number 6383

Title Advanced Toxicology

Abbreviated Advanced Toxicology

Course Title

Catalog Description We will discuss the toxicity and mechanisms of action of natural and man-made toxicants. The impact of toxicants on both human health and the environment will be considered. Students will be assigned to independent literature search and write a report.

Prerequisites Bio Sci **2213**. ~~2213 and Bio Sci 2223~~.

Field Trip Statement

Credit Hours LEC: 3 LAB: 0 IND: 0 RSD: 0 Total: 3

Required for Majors No

Elective for Majors No

Justification for change: Instructor wants to remove Genetics prerequisite

Semesters previously offered as an experimental course

Co-Listed Courses:

In Workflow

1. **RBIOLSCI Chair**
2. **CCC Secretary**
3. **Sciences DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 01/08/20 9:43 am
David Duvernell (duvernell):
Approved for
RBIOLSCI Chair
2. 01/13/20 10:45 am
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 01/17/20 3:39 pm
Katie Shannon (shannonk):
Approved for Sciences DSCC Chair
4. 01/20/20 8:52 pm
Brittany Parnell (ershenb):
Approved for

Course Reviewer
Comments

Pending CCC
Agenda post

Key: 2394

[Preview Bridge](#)

Course Change Request

Date Submitted: 01/11/20 3:59 pm

Viewing: **CHEM 1110 : Orientation for Chemistry Majors**~~Introduction To Chemistry~~

File: 1117.1

Last edit: 01/17/20 5:09 pm

Changes proposed by: glaserr

In Workflow

1. **RCHEMIST Chair**2. **CCC Secretary**3. **Sciences DSCC
Chair**4. **Pending CCC
Agenda post**5. **CCC Meeting
Agenda**6. Campus Curricula
Committee Chair7. FS Meeting
Agenda8. Faculty Senate
Chair

9. Registrar

10. CAT entry

11. Peoplesoft

Approval Path

1. 01/11/20 4:06 pm
Rainer Glaser
(GlaserR):Approved for
RCHEMIST Chair2. 01/13/20 10:48
amBrittany Parnell
(ershenb):Approved for CCC
Secretary

3. 01/17/20 5:09 pm

Katie Shannon
(shannonk):Approved for
Sciences DSCC
Chair

4. 01/20/20 8:52 pm

Brittany Parnell
(ershenb):

Approved for

Programs
referencing this
course

[CHEM-BS: Chemistry BS](#)

Requested **Fall 2020** ~~08/01/2014~~Effective Change
Date

Department Chemistry

Discipline Chemistry (CHEM)

Course Number 1110

Title **Orientation for Chemistry Majors** ~~Introduction To Chemistry~~Abbreviated **Orientation Chem Majors**Course Title ~~Intro To Chemistry~~

Catalog Description Introduction to ~~chemistry, its~~-intellectual and professional **opportunities in chemistry. opportunities**-Students will be acquainted with various areas of **chemistry, chemistry and** with departmental and campus facilities useful to their **studies, and with undergraduate research opportunities in the department. future studies**-Required of all freshman chemistry majors; **including encouraged for undergraduate**-transfer chemistry majors.

Prerequisites

Field Trip
Statement

Credit Hours LEC: 1 LAB: 0 IND: 0 RSD: 0 Total: 1

Required for
Majors **Yes** ~~No~~Elective for
Majors No

Justification for change: The title "Introduction to Chemistry" currently used for CHEM1110 causes confusion because such a title usually refers to MOTR-CHEM100 ("Introductory Chemistry" or

“Essentials of Chemistry”). Thus, we request to retitle CHEM1301 from “General Chemistry for Non-Science Majors” to “Introductory Chemistry” (in a separate form) and we request here to retitle CHEM1110 from “Introduction to Chemistry” to “Orientation for Chemistry Majors”. Minor changes are made to the course descriptions of both courses to better reflect their current content.

Pending CCC
Agenda post

Semesters
previously
offered as an
experimental
course

Co-Listed
Courses:

Course Reviewer
Comments

Key: 1117

[Preview Bridge](#)

Course Change Request

Date Submitted: 01/11/20 4:04 pm

Viewing: **CHEM 1301 : Introductory Chemistry** ~~General Chemistry~~
For Non-Science Majors

File: 2593.1

Last edit: 01/11/20 4:04 pm

Changes proposed by: glaserr

In Workflow

1. **RCHEMIST Chair**
2. **CCC Secretary**
3. **Sciences DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**

6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 01/11/20 4:07 pm
Rainer Glaser (GlaserR):
Approved for RCHEMIST Chair
2. 01/13/20 10:49 am
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 01/17/20 5:09 pm
Katie Shannon (shannonk):
Approved for Sciences DSCC Chair
4. 01/20/20 8:52 pm
Brittany Parnell (ershenb):
Approved for

Other Courses referencing this course

In The Prerequisites: _____

[CIV ENG 2601 : Fundamentals Of Environmental Engineering And Science](#)

[ENV ENG 2601 : Fundamentals Of Environmental Engineering and Science](#)

Requested **Fall 2020** ~~08/13/2018~~

Effective Change Date

Department Chemistry

Discipline Chemistry (CHEM)

Course Number 1301

Title **Introductory Chemistry** ~~General Chemistry For Non-Science Majors~~Abbreviated **Introductory Chemistry** ~~Gen~~Course Title **Chem For Non-Sci Maj**

Catalog

Description

A **one-semester** ~~one-semester~~ introduction to chemistry designed to acquaint the student with the philosophy of the chemist's approach to problem solving and the contribution of chemistry to society.

Prerequisites

Entrance requirements.

Field Trip

Statement

Credit Hours	LEC: 3	LAB: 0	IND: 0	RSD: 0	Total: 3
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Required for Majors	No
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	No
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Elective for
Majors

Pending CCC
Agenda post

Justification for
change:

The title "Introduction to Chemistry" currently used for CHEM1110 causes confusion because such a title usually refers to MOTR-CHEM100 ("Introductory Chemistry" or "Essentials of Chemistry"). Thus, we request here to retitle CHEM1301 from "General Chemistry for Non-Science Majors" to "Introductory Chemistry" and we request (in a separate form) to retitle CHEM1110 from "Introduction to Chemistry" to "Orientation for Chemistry Majors". Minor changes are made to the course descriptions of both courses to better reflect their current content.

Semesters
previously
offered as an
experimental
course

Co-Listed
Courses:

Course Reviewer
Comments

Key: 2593

[Preview Bridge](#)

Course Change Request

Date Submitted: 12/03/19 2:32 pm

Viewing: **CHEM ENG 5100 : Intermediate Transport Phenomena**

File: 1321.1

Last edit: 12/23/19 12:52 pm

Changes proposed by: luksc

In Workflow

1. **RCHEMENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 12/03/19 5:24 pm Joseph Smith (smithjose): Approved for RCHEMENG Chair
2. 12/06/19 4:01 pm Brittany Parnell (ershenb): Approved for CCC Secretary
3. 12/06/19 4:09 pm Brittany Parnell (ershenb): Approved for Engineering DSCC Chair
4. 12/06/19 4:11 pm Brittany Parnell (ershenb): Rollback to Engineering DSCC

Programs referencing this course	CH ENG-MS: Chemical Engineering MS
Other Courses referencing this course	In The Prerequisites: CHEM ENG 6110 : Advanced Transport Phenomena CHEM ENG 6180 : Advanced Applications of Computational Fluid Dynamics

Requested **Fall 2020** ~~08/14/2018~~
 Effective Change Date
 Department Chemical and Biochemical Engineering
 Discipline Chemical Engineering (CHEM ENG)
 Course Number 5100
 Title Intermediate Transport Phenomena
 Abbreviated Intrmed Transport Phenom
 Course Title

Catalog Description	The similarities of flow of momentum, heat and mass transfer and the applications of these underlying principles are stressed. Course is primarily for seniors and beginning graduate students.				
Prerequisites	Chem Eng 3101 3140 or Chem Eng 3200 or graduate standing.				
Field Trip Statement					
Credit Hours	LEC: 3	LAB: 0	IND: 0	RSD: 0	Total: 3
Required for Majors	No				

Elective for Majors Yes No	Chair for Pending CCC Agenda post
Justification for change: updated for courses in current curriculum Semesters previously offered as an experimental course Co-Listed Courses:	5. 12/23/19 12:53 pm Stephen Raper (sraper): Approved for Engineering DSCC Chair 6. 01/16/20 4:13 pm Brittany Parnell (ershenb): Approved for Pending CCC Agenda post
Course Reviewer Comments	<p>ershenb (12/06/19 4:11 pm): Rollback: accidently approved form. DSCC needs to review it.</p> <p>sraper (12/23/19 12:52 pm): checked elective for majors</p>

Key: 1321

[Preview Bridge](#)

Course Change Request

Date Submitted: 12/03/19 2:31 pm

Viewing: **CHEM ENG 5120 : Interfacial Phenomena In Chemical Engineering**

File: 1782.1

Last edit: 12/23/19 12:53 pm

Changes proposed by: luksc

Requested **Fall 2020** ~~08/01/2014~~

Effective Change

Date

Department Chemical and Biochemical Engineering

Discipline Chemical Engineering (CHEM ENG)

Course Number 5120

Title Interfacial Phenomena In Chemical Engineering

Abbreviated Interfac Phenomena Ch E

Course Title

Catalog

Description

The course deals with the effects of surfaces on transport phenomena and on the role of surface active agents. Topics include fundamentals of thermodynamics, momentum, heat and mass transfer at interfaces and of surfactants. Some applications are included.

Prerequisites

Chem Eng ~~3131 3140~~ or ~~Chem Eng 3200~~ or graduate standing.

Field Trip

Statement

Credit Hours LEC: 3 LAB: 0 IND: 0 RSD: 0 Total: 3

Required for No

Majors

Elective for **Yes** ~~No~~

Majors

Justification for

change:

updated for courses in current curriculum

In Workflow

1. **RCHEMENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 12/03/19 5:24 pm
Joseph Smith (smithjose):
Approved for RCHEMENG Chair
2. 12/06/19 4:02 pm
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 12/23/19 12:53 pm
Stephen Raper (sraper):
Approved for Engineering DSCC Chair
4. 01/16/20 4:13 pm
Brittany Parnell (ershenb):
Approved for

Semesters
previously
offered as an
experimental
course

Pending CCC
Agenda post

Co-Listed
Courses:

Course Reviewer **sraper (12/23/19 12:53 pm):** checked elective for majors
Comments

Key: 1782

[Preview Bridge](#)

Course Change Request

Date Submitted: 12/03/19 2:30 pm

Viewing: **CHEM ENG 5170 : Physical Property Estimation**

File: 1419.1

Last edit: 12/23/19 12:54 pm

Changes proposed by: luksc

Requested **Fall 2020** ~~08/01/2014~~
 Effective Change
 Date
 Department Chemical and Biochemical Engineering
 Discipline Chemical Engineering (CHEM ENG)
 Course Number 5170
 Title Physical Property Estimation
 Abbreviated Physical Property Estima
 Course Title

Catalog
 Description
 Study of techniques for estimating and correlating thermodynamic and transport properties of gases and liquids.

Prerequisites
 Chem Eng **3131** ~~3130~~ or graduate standing.

Field Trip
 Statement

Credit Hours LEC: 3 LAB: 0 IND: 0 RSD: 0 Total: 3

Required for
 Majors No

Elective for
 Majors **Yes** ~~No~~

Justification for
 change:
 updated to courses in current curriculum

Semesters
 previously
 offered as an

In Workflow

1. **RCHEMENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 12/03/19 5:24 pm
Joseph Smith (smithjose):
Approved for RICHEMENG Chair
2. 12/06/19 4:03 pm
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 12/23/19 12:54 pm
Stephen Raper (sraper):
Approved for Engineering DSCC Chair
4. 01/16/20 4:13 pm
Brittany Parnell (ershenb):
Approved for

experimental
course

Pending CCC
Agenda post

Co-Listed
Courses:

Course Reviewer **sraper (12/23/19 12:54 pm)**: checked elective for majors
Comments

Key: 1419

[Preview Bridge](#)

Course Change Request

A deleted record cannot be edited

Course Deactivation Proposal

Date Submitted: 11/26/19 2:30 pm

Viewing: **CHEM ENG 5241 : Intermediate Process Safety in the Chemical and Biochemical Industries**

File: 4292.8

Last approved: 11/12/18 8:10 am

Last edit: 12/06/19 4:05 pm

Changes proposed by: luksc

Requested **Fall 2020** ~~Spring 2019~~

Effective Change

Date

Department Chemical and Biochemical Engineering

Discipline Chemical Engineering (CHEM ENG)

Course Number 5241

Title Intermediate Process Safety in the Chemical and Biochemical Industries

Abbreviated Bioprocess Safety

Course Title

Catalog

Description

This course covers risk assessment, biohazard containment and inactivation practices, and other biosafety issues relevant to industrial bioprocessing. Considerations relating to the release of genetically modified organisms are also discussed.

Prerequisites

Graduate Standing.

Field Trip

Statement

Credit Hours LEC: 3 LAB: 0 IND: 0 RSD: 0 Total: 3

Required for No

Majors

Elective for Yes

Majors

In Workflow

1. **RCHEMENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
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8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 12/03/19 5:24 pm
Joseph Smith (smithjose):
Approved for RCHEMENG Chair
2. 12/06/19 4:05 pm
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 12/23/19 12:54 pm
Stephen Raper (sraper):
Approved for Engineering DSCC Chair
4. 01/16/20 4:13 pm
Brittany Parnell (ershenb):

Justification for
change:

We are combining ChemEng 4140 and 4241 to ChemEng 4241 for undergraduate students and co-listing the variation for graduate students which has the same lecture + a project as ChemEng 6241. We currently have 4 courses that all co-list.

Semesters
previously
offered as an
experimental
course

Removed "Special project" from end of prereq. Email from Chem Eng.

Co-Listed
Courses:

Course Reviewer
Comments

Approved for
Pending CCC
Agenda post

History

1. May 24, 2016 by
Daniel Forciniti
(forcinit)
2. Nov 12, 2018 by
jcwang (4292.5)

Key: 4292

[Preview Bridge](#)

Course Change Request

Date Submitted: 12/03/19 2:29 pm

Viewing: **CHEM ENG 5310 : Structure and And-Properties of Of Polymers**

File: 1012.1

Last edit: 01/20/20 9:11 pm

Changes proposed by: luksc

In Workflow

1. **RCHEMENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 12/03/19 5:24 pm
Joseph Smith (smithjose):
Approved for RCHEMENG Chair
2. 12/06/19 4:07 pm
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 12/23/19 12:55 pm
Stephen Raper (sraper):
Approved for Engineering DSCC Chair
4. 01/16/20 4:13 pm
Brittany Parnell (ershenb):
Approved for

Other Courses referencing this course

In The Prerequisites:

[CHEM 5819 : Polymer Synthesis and Characterization Lab](#)[MS&E 5819 : Polymer Synthesis and Characterization Lab](#)Requested **Fall 2020** ~~08/14/2018~~

Effective Change

Date

Department Chemical and Biochemical Engineering

Discipline Chemical Engineering (CHEM ENG)

Course Number 5310

Title Structure **and And**-Properties **of Of**-PolymersAbbreviated **Struct and Prop Polymers**Course Title ~~Struct&Prop Polymers~~

Catalog

Description

A study of the parameters affecting structure and properties of polymers. Syntheses, mechanisms, and kinetic factors are emphasized from the standpoint of structural properties.

Prerequisites

Chem Eng **3131** ~~3130~~ or graduate standing.

Field Trip

Statement

Credit Hours	LEC: 3	LAB: 0	IND: 0	RSD: 0	Total: 3
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Required for Majors No

Elective for Majors

Yes ~~No~~

Majors

Justification for
change:

updated to courses in current curriculum

Pending CCC
Agenda post

Semesters

previously
offered as an
experimental
course

Co-Listed

Courses:

Course Reviewer **sraper (12/23/19 12:55 pm):** checked elective for majors

Comments

Key: 1012

[Preview Bridge](#)

Course Change Request

Date Submitted: 12/03/19 2:28 pm

Viewing: **CHEM ENG 5330 : Alternative Fuels**

File: 1693.1

Last edit: 12/23/19 12:55 pm

Changes proposed by: luksc

Requested **Fall 2020** ~~08/01/2014~~
 Effective Change
 Date
 Department Chemical and Biochemical Engineering
 Discipline Chemical Engineering (CHEM ENG)
 Course Number 5330
 Title Alternative Fuels
 Abbreviated Alternative Fuels
 Course Title

Catalog

Description

Global energy outlook and available resources are discussed. Alternative energy options and their technologies are covered. Associated environmental concerns and technology are assessed. Special emphases are placed on renewable energies, transportation fuels, energy efficiencies, and clean technologies.

Prerequisites

Chem Eng **3131** ~~3130~~ or ~~senior or~~ graduate standing.

Field Trip

Statement

Credit Hours LEC: 3 LAB: 0 IND: 0 RSD: 0 Total: 3

Required for No

Majors

Elective for **Yes** ~~No~~

Majors

Justification for

change:

changed to match courses in current curriculum

Semesters

previously

In Workflow

1. **RCHEMENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 12/03/19 5:25 pm
Joseph Smith (smithjose):
Approved for RCHEMENG Chair
2. 12/06/19 4:12 pm
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 12/23/19 12:55 pm
Stephen Raper (sraper):
Approved for Engineering DSCC Chair
4. 01/16/20 4:13 pm
Brittany Parnell (ershenb):
Approved for

offered as an
experimental
course

Pending CCC
Agenda post

Co-Listed
Courses:

Course Reviewer **sraper (12/23/19 12:55 pm):** checked elective for majors
Comments

Key: 1693

[Preview Bridge](#)

Course Change Request

Date Submitted: 12/03/19 2:27 pm

Viewing: **CHEM ENG 5340 : Principles of ~~Of~~ Environmental Monitoring**

File: 1731.1

Last edit: 01/21/20 11:03 am

Changes proposed by: luksc

Programs [EV ENG-BS: Environmental Engineering BS](#)
referencing this course

Requested **Fall 2020** ~~08/01/2014~~Effective Change
Date

Department Chemical and Biochemical Engineering

Discipline Chemical Engineering (CHEM ENG)

Course Number 5340

Title Principles **of** ~~Of~~ Environmental MonitoringAbbreviated Prin **of** ~~Of~~ Env Monitoring
Course Title

Catalog

Description

This course introduces the fundamentals of particle technology, including particle characterization, transport, sampling, and processing. In addition, students will learn about the basic design of some industrial particulate systems and environmental and safety issues related to particulate handling.

Prerequisites

Chem Eng **3101** ~~3100 and Physics 2135~~, or graduate standing.

Field Trip

Statement

Credit Hours	LEC: 3	LAB: 0	IND: 0	RSD: 0	Total: 3
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Required for
Majors NoElective for
Majors **Yes** ~~No~~

In Workflow

1. **RCHEMENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 12/03/19 5:25 pm Joseph Smith (smithjose):
Approved for RCHEMENG Chair
2. 12/06/19 4:14 pm Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 12/23/19 12:56 pm Stephen Raper (sraper):
Approved for Engineering DSCC Chair
4. 01/16/20 4:13 pm Brittany Parnell (ershenb):
Approved for

Pending CCC
Agenda post

Justification for
change:

modified to match courses in current curriculum

Semesters
previously
offered as an
experimental
course

Co-Listed
Courses:

Course Reviewer **sraper (12/23/19 12:56 pm)**: checked elective for majors
Comments

Key: 1731

[Preview Bridge](#)

Course Change Request

Date Submitted: 12/03/19 2:26 pm

Viewing: **CHEM ENG 5350 : Environmental Chemodynamics**

File: 106.1

Last edit: 12/23/19 12:56 pm

Changes proposed by: luksc

Requested **Fall 2020** ~~08/01/2014~~
 Effective Change
 Date
 Department Chemical and Biochemical Engineering
 Discipline Chemical Engineering (CHEM ENG)
 Course Number 5350
 Title Environmental Chemodynamics
 Abbreviated Env Chemodynamics
 Course Title

Catalog Description Interphase transport of chemicals and energy in the environment. Application of the process oriented aspects of chemical engineering and science to situations found in the environment.
 Prerequisites Chem Eng ~~3131 3140~~ or ~~Chem Eng 3200~~ or graduate standing.
 Field Trip Statement
 Credit Hours LEC: 3 LAB: 0 IND: 0 RSD: 0 Total: 3
 Required for Majors No
 Elective for Majors **Yes** ~~No~~

Justification for change: update to agree with courses in current curriculum

Semesters previously offered as an experimental course **checked elective for majors**

Co-Listed Courses:

Course Reviewer Comments

- In Workflow
1. **RCHEMENG Chair**
 2. **CCC Secretary**
 3. **Engineering DSCC Chair**
 4. **Pending CCC Agenda post**
 5. **CCC Meeting Agenda**
 6. Campus Curricula Committee Chair
 7. FS Meeting Agenda
 8. Faculty Senate Chair
 9. Registrar
 10. CAT entry
 11. Peoplesoft

- Approval Path
1. 12/03/19 5:25 pm Joseph Smith (smithjose): Approved for RCHEMENG Chair
 2. 12/06/19 4:25 pm Brittany Parnell (ershenb): Approved for CCC Secretary
 3. 12/23/19 12:56 pm Stephen Raper (sraper): Approved for Engineering DSCC Chair
 4. 01/16/20 4:14 pm Brittany Parnell (ershenb): Approved for

Key: 106

Pending CCC

Agenda post

[Preview Bridge](#)

Course Change Request

Date Submitted: 11/26/19 2:27 pm

Viewing: **CHEM ENG 6241 5140-: Intermediate Chemical Process Safety**

File: 2393.1

Last edit: 12/10/19 2:23 pm

Changes proposed by: luksc

Requested	Fall 2020 08/01/2014
Effective Change Date	
Department	Chemical and Biochemical Engineering
Discipline	Chemical Engineering (CHEM ENG)
Course Number	6241 5140
Title	Intermediate Chemical Process Safety
Abbreviated Course Title	Int Chem Process Safety

In Workflow

1. **RCHEMENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Catalog

Description

The identification and quantification of risks involved in the processing of hazardous and/or toxic materials are studied. Methods to design safety systems or alter the chemical process to reduce or eliminate the risks are covered.

Prerequisites

Graduate Standing.

Field Trip

Statement

Credit Hours	LEC: 3	LAB: 0	IND: 0	RSD: 0	Total: 3
--------------	--------	--------	--------	--------	----------

Required for Majors	No
---------------------	----

Elective for Majors	No
---------------------	----

Justification for change:

This course is an elective for graduate students only. With the current course number, undergraduates continue to enroll in the course and then must be notified

Approval Path

1. 12/03/19 5:25 pm
Joseph Smith (smithjose):
Approved for RCHEMENG Chair
2. 12/10/19 2:23 pm
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 12/23/19 12:56 pm
Stephen Raper (sraper):
Approved for Engineering DSCC Chair
4. 01/16/20 4:14 pm
Brittany Parnell (ershenb):
Approved for

that the course will not count as their technical elective. This change will better meet all needs for this course.

Pending CCC
Agenda post

Semesters
previously
offered as an
experimental
course

Co-Listed
Courses:

CHEM ENG 4241 - Process Safety in the Chemical and Biochemical Industries

Course Reviewer
Comments

Key: 2393

[Preview Bridge](#)

Course Change Request

Date Submitted: 01/09/20 11:05 am

Viewing: **FR ENG 1100 : Study And Careers In Engineering and Computing**

File: 1868.1

Last edit: 01/14/20 1:15 pm

Changes proposed by: dludlow

Programs referencing this course

- [NU ENG-BS: Nuclear Engineering BS](#)
- [PE ENG-BS: Petroleum Engineering BS](#)
- [AE ENG-BS: Aerospace Engineering BS](#)
- [ARC ENG-BS: Architectural Engineering BS](#)
- [CR ENG-BS: Ceramic Engineering BS](#)
- [CH ENG-BS: Chemical Engineering BS](#)
- [CV ENG-BS: Civil Engineering BS](#)
- [CP ENG-BS: Computer Engineering BS](#)
- [EL ENG-BS: Electrical Engineering BS](#)
- [GE ENG-BS: Geological Engineering BS](#)
- [FR ENG-UN: Freshman Engineering Program](#)
- [CMP SC-BS: Computer Science BS](#)
- [ENG MG-BS: Engineering Management BS](#)
- [EV ENG-BS: Environmental Engineering BS](#)
- [MC ENG-BS: Mechanical Engineering BS](#)
- [MT ENG-BS: Metallurgical Engineering BS](#)
- [MI ENG-BS: Mining Engineering BS](#)

Requested **Fall 2020** ~~08/01/2014~~

Effective Change Date

Department Basic Engineering

Discipline Freshman Engineering (FR ENG)

Course Number 1100

Title Study And Careers In Engineering **and Computing**

Abbreviated Course Title Study & Careers ~~In-Engr~~

Catalog Description

Examination of engineering **and computer science** degree programs available at Missouri S&T **and** ~~and~~-career **opportunities**. ~~opportunities in engineering.~~

In Workflow

1. **FR ENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 01/15/20 1:10 pm Douglas Ludlow (dludlow): Approved for FR ENG Chair
2. 01/15/20 1:18 pm Brittany Parnell (ershenb): Approved for CCC Secretary
3. 01/17/20 9:57 am Stephen Raper (sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm Brittany Parnell (ershenb): Approved for

Introduction to non-engineering majors and minors at Missouri S&T. Academic, professional and ethical expectations of the student and **professionals. engineering professional.** ~~Introduction to campus facilities and resources for assisting in student success success.~~

Pending CCC
Agenda post

Prerequisites

Field Trip

Statement

Credit Hours	LEC: 1	LAB: 0	IND: 0	RSD: 0	Total: 1
--------------	--------	--------	--------	--------	----------

Required for Majors	No
---------------------	----

Elective for Majors	No
---------------------	----

Justification for change: Computer Science majors in the College of Engineering and Computing are now required to take this course. This title is more representative of the students expected to take this course

Semesters previously offered as an experimental course

Co-Listed Courses:

Course Reviewer
Comments

Key: 1868

[Preview Bridge](#)

Course Change Request

Date Submitted: 11/25/19 2:13 pm

Viewing: **MECH ENG 4480 : Control System Laboratory**

File: 931.1

Last edit: 11/25/19 2:13 pm

Changes proposed by: nisbett

In Workflow

1. RMECHENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 11/25/19 2:14 pm
J. Keith Nisbett (nisbett):
Approved for RMECHENG Chair
2. 11/25/19 4:06 pm
Brittany Parnell (ershenb):
Approved for CCC Secretary
3. 12/23/19 12:57 pm
Stephen Raper (sraper):
Approved for Engineering DSCC Chair
4. 01/16/20 4:14 pm
Brittany Parnell (ershenb):
Approved for

Programs [MC ENG-BS: Mechanical Engineering BS](#)
referencing this course

Requested **Fall 2020** ~~08/14/2018~~
Effective Change Date
Department Mechanical & Aerospace Engineering
Discipline Mechanical Engineering (MECH ENG)
Course Number 4480
Title Control System Laboratory
Abbreviated Control System Lab
Course Title

Catalog Description
Experiments dealing with data acquisition, manipulation, and control of systems with particular emphasis on computer data acquisition and control applied to mechanical engineering systems. Microcomputer systems are used as measurement and control devices.

Prerequisites
~~Preceded or accompanied by~~ Mech Eng 4479.

Field Trip Statement

Credit Hours LEC: 0 LAB: 1 IND: 0 RSD: 0 Total: 1

Required for Majors **Yes** ~~No~~

Elective for Majors No

Justification for
change:

Content of the ME 4480 lab is changing, such that ME 4479 needs to be a prerequisite, and no longer acceptable as an accompanying course.

Semesters
previously
offered as an
experimental
course

Co-Listed
Courses:

Pending CCC
Agenda post

Course Reviewer
Comments

Key: 931

[Preview Bridge](#)

Program Change Request

New Program Proposal

Date Submitted: 12/05/19 3:13 pm

Viewing: **PROPOSED : Geophysics Graduate CT**

File: 347

Last edit: 12/10/19 4:05 pm

Changes proposed by: sbrower

Start Term	Fall 2020
Program Code	PROPOSED
Department	Geosciences and Geological and Petroleum Engineering
Title	Geophysics Graduate CT

In Workflow

1. **RGEOSNG Chair**
2. **CCC Secretary**
3. **Sciences DSCC Chair**
4. **Engineering DSCC Chair**
5. **Pending CCC Agenda post**
6. **CCC Meeting Agenda**
7. **Campus Curricula Committee Chair**
8. **FS Meeting Agenda**
9. **Faculty Senate Chair**
10. **Registrar**
11. **Kristy Giacomelli-Feys**

Program Requirements and Description

Approval Path

1. 12/05/19 3:09 pm
David Borrok (borrokd): Rollback to Initiator
2. 12/05/19 3:15 pm
David Borrok (borrokd): Approved for RGEOSNG Chair
3. 12/11/19 11:53 am
Brittany Parnell (ershenb): Approved for CCC Secretary
4. 12/17/19 3:01 pm
Katie Shannon (shannonk): Approved for Sciences DSCC Chair
5. 01/16/20 2:13 pm
Stephen Raper (sraper): Approved for Engineering DSCC Chair
6. 01/16/20 4:14 pm
Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

Geophysics

The graduate certificate in Geophysics is designed to provide graduate students who want to emphasize this area of research with course guidance and a formal recognition. A certificate in Geophysics will give students an advantage when applying for careers in oil and gas, mining, and other fields.

The Geophysics Certificate Program is open to all persons holding a B.S., M.S., or Ph.D. degree in Geology, Geophysics, Geological Engineering, Petroleum Engineering, or Civil Engineering or are currently accepted into a graduate degree program in one of these fields at Missouri S&T. Once admitted to the program, the student must take the four designated courses (provided in the curriculum section). In order to receive a Graduate Certificate, the student must have an average cumulative grade point of 3.0 or better in the certificate courses. Once admitted to the program, a student will be given three years to complete the program.

Students admitted to the Geophysics Certificate Program will have non-degree graduate status, however, they will earn graduate credit for the courses they complete. If the student completes the four-course sequence with a grade of B or better in each of the courses taken, they, upon application, will be admitted to the non-thesis M.S. degree program in Geology and Geophysics. The certificate credits taken by the students admitted to the M.S. degree program will count towards their master's degree. Students who do not have all of the prerequisite courses necessary to begin the courses in the Geophysics Certificate Program will be allowed to take "bridge" courses at either the graduate or undergraduate level to prepare for the formal certificate courses.

Four of the following courses are required:		
GEOPHYS 4231	Seismic Interpretation	3
GEOPHYS 5096	Global Tectonics	3
GEOPHYS 5202	Exploration and Development Seismology	3
GEOPHYS 5211	Seismic Stratigraphy	3
GEOPHYS 5221	Wave Propagation	3
GEOPHYS 5231	Seismic Data Processing	3
GEOPHYS 5241	Advanced Electrical And Electromagnetic Methods In Geophysical Exp	3
GEOPHYS 5261	Computational Geophysics	3
GEOPHYS 5736	Geophysical Field Methods	3
GEOPHYS 5761	Transportation Applications of Geophysics	3
GEOPHYS 5782	Environmental and Engineering Geophysics	3
GEOPHYS 6211	Advanced Seismic Interpretation	3
GEOPHYS 6231	Advanced Seismic Data Processing	3
GEOPHYS 6241	The Theory of Elastic Waves	3
GEOPHYS 6251	Geophysical Inverse Theory	3
GEO ENG 6782	Surface Waves (MASW) and Ground Penetrating Radar (GPR)	3

Justification for request

CIP Code: 400603

The students targeted for this certificate are primarily on-campus graduate students already admitted to one of the degree programs within GGPE. The purpose of the certificate is to provide the students in GGPE who are interested in geophysical-intensive careers (e.g., oil and gas, mining, environmental) a formal recognition of this accomplishment, as we do not offer a graduate degree in this area. Additionally, the Geosciences and Geological and Petroleum Engineering department can market the certificate and use it for branding to recruit more graduate students.

Supporting Documents

[Graduate Certificate in Geophysics 11 7 2018.pdf](#)

[MDHE approval.pdf](#)

Course Reviewer Comments

borrokd (12/05/19 3:09 pm): Rollback: attachments missing

ershenb (12/10/19 4:05 pm): attached MDHE approval

Key: 347



October 30, 2018

MEMORANDUM TO: Robert J. Marley
Provost and Executive Vice Chancellor

FROM: Costas Tsatsoulis *C.T.*
Vice Chancellor of Research and Dean of Graduate Studies

RE: Graduate Certificate in Geophysics

With the recommendation of the Department of Geosciences and Geological and Petroleum Engineering and the Office of the Vice Provost and Dean of College of Engineering and Computing, I agree and request that the Geophysics Graduate Certificate in its form be accepted as a graduate certificate by the Missouri University of Science & Technology.

Please contact me if you have any questions or need additional information.

Approved by:


Robert J. Marley,
Provost and Executive Vice Chancellor
for Academic Affairs

Attachment



Geosciences and Geological and Petroleum Engineering Department


An equal opportunity institution

129 McNutt Hall | 1400 N. Bishop | Rolla, MO 65409
573-341-4616 | rocks@mst.edu | ggpe.mst.edu

Received
OCT 02 2018
GRAD STUDIES

September 20, 2018

To: Richard Wlezien, Vice-Provost and Dean, College of Engineering and Computing 

Costas Tsatsoulis, Vice-Chancellor of Research and Dean of Graduate Studies 

From:

David Borrok, Chair, Department of Geosciences and Geological and
Petroleum Engineering



Subject: Proposal for a Graduate Certificate in Geophysics

We are submitting the attached proposal for a Graduate Certificate in Geophysics. The Department of Geosciences and Geological and Petroleum Engineering will be the home department and primary overseer of the proposed program.



PROGRAM CHANGE FORM

1. Submitted by: Missouri University of Science and Technology
 Name of Institution (Campus or off-campus residential center in the case of multi-campus institutions)

2. Type of Program Change (Check all 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
Geology and Geophysics Program	B.S. M.S. Ph.D.	400601	Geophysics	Graduate Certificate	400603 14.0603

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":
 August/2019 _____
 Month/Year

AUTHORIZATION

Steve Graham, Sr. Associate VP for Academic Affairs

 Name/Title of Institutional Officer Signature Date

Jessi Whitehorse – Academic Affairs 573-884-3360

 Person to Contact for More Information Telephone Number

GRADUATE CERTIFICATE IN GEOPHYSICS

OFFERED BY:

*Department of Geosciences and Geological and Petroleum Engineering (GGPE)
Program of Geology and Geophysics*

PARENT DEPARTMENT AND DEGREE:

Geosciences and Geological and Petroleum Engineering, Geology and Geophysics, MS

INTENDED AUDIENCE: X Main Campus Students Distance Students Both

PROGRAM DESCRIPTION:

The graduate certificate in Geophysics is designed to provide graduate students who want to emphasize this area of research with course guidance and a formal recognition. A certificate in Geophysics will give students an advantage when applying for careers in oil and gas, mining, and other fields. The certificate requires that students take 4 graduate-level geophysics courses.

PURPOSE:

The students targeted for this certificate are primarily on-campus graduate students already admitted to one of the degree programs within GGPE. The purpose of the certificate is to provide the students in GGPE who are interested in geophysical-intensive careers (e.g., oil and gas, mining, environmental) a formal recognition of this accomplishment, as we do not offer a graduate degree in this area.

ADMISSION:

The Geophysics Certificate Program is open to all persons holding a B.S., M.S., or Ph.D. degree in Geology, Geophysics, Geological Engineering, Petroleum Engineering, or Civil Engineering or are currently accepted into a graduate degree program in one of these fields at Missouri S&T. Once admitted to the program, the student must take the four designated courses (provided in the curriculum section). In order to receive a Graduate Certificate, the student must have an average cumulative grade point of 3.0 or better in the certificate courses. Once admitted to the program, a student will be given three years to complete the program.

Students admitted to the Geophysics Certificate Program will have non-degree graduate status, however, they will earn graduate credit for the courses they complete. If the student completes the four-course sequence with a grade of B or better in each of the courses taken, they, upon application, will be admitted to the non-thesis M.S. degree program in Geology and Geophysics. The certificate credits taken by the students admitted to the M.S. degree program will count towards their master's degree. Students who do not have all of the prerequisite courses necessary to begin the courses in the Geophysics Certificate Program will be allowed to take "bridge" courses at either the graduate or undergraduate level to prepare for the formal certificate courses.

CONTRIBUTING FACULTY:

Existing faculty within the Geology and Geophysics and Geological Engineering programs.

CURRICULUM:

FOUR OF THE FOLLOWING COURSES ARE REQUIRED:

1. **GEOPHYS 4231 Seismic Interpretation**
2. **GEOPHYS 5096 Global Tectonics**
3. **GEOPHYS 5202 Exploration and Development Seismology**

4. **GEOPHYS 5211 Seismic Stratigraphy**
5. **GEOPHYS 5221 Wave Propagation**
6. **GEOPHYS 5231 Seismic Data Processing**
7. **GEOPHYS 5241 Advanced Electrical And Electromagnetic Methods In Geophysical Exp**
8. **GEOPHYS 5261 Computational Geophysics**
9. **GEOPHYS 5736 Geophysical Field Methods**
10. **GEOPHYS 5761 Transportation Applications of Geophysics**
11. **GEOPHYS 5782 Environmental and Engineering Geophysics**
12. **GEOPHYS 6211 Advanced Seismic Interpretation**
13. **GEOPHYS 6231 Advanced Seismic Data Processing**
14. **GEOPHYS 6241 The Theory of Elastic Waves**
15. **GEOPHYS 6251 Geophysical Inverse Theory**
16. **GEO ENG 6782 Surface Waves (MASW) and Ground Penetrating Radar (GPR)**

COURSE DESCRIPTIONS:

Please include the delivery method (online/campus/both) for each course.

*THE DELIVERY MODE FOR ALL COURSES WILL BE TRADITIONAL LECTURE ON CAMPUS

- **GEOPHYS 4231 Seismic Interpretation (LEC 3.0)**
An introduction to 2-D/3-D seismic structural interpretation, stratigraphic interpretation, reservoir identification and evaluation, and horizon and formation attributes. The students are expected to master interactive 2-D/3-D seismic interpretation software packages that are routinely used in the petroleum industry. Prerequisites: Math 1208 or Math 1214; Geology 1110 or Geo Eng 1150.
- **GEOPHYS 5096 Global Tectonics (LEC 3.0)**
An integrated view of the Earth's structure and dynamics with an emphasis on information gained through geophysical methods. Topics include seismology, heat flow, gravity, rheological and compositional structure, plate motions and intermotions, and mantle driving mechanisms for plate tectonics. Prerequisite: Geology 3310.
- **GEOPHYS 5202 Exploration and Development Seismology (LAB 1.0 and LEC 2.0)**
Principles of reflection seismology as applied to the delineation of geologic structures and the determination of stratigraphy and lithology. Emphasis on both the capabilities and limitations of the seismic method. The laboratory utilizes both modeled and actual seismic data. Prerequisites: Math 1208 or Math 1214; Geology 1110 or Geo Eng 1150.
- **GEOPHYS 5211 Seismic Stratigraphy (LEC 2.0 and LAB 1.0)**
A study of the seismic expression of depositional models. Reflection patterns and reflection amplitudes are interpreted to determine bed thicknesses, fluid content, depositional environment, and lithology. Special data acquisition and processing techniques are examined. Prerequisites: Geophys 4521, Geology 3310, 3620.
- **GEOPHYS 5221 Wave Propagation (LEC 3.0)**
A study of Hamilton's principle and energy theorems, fundamentals of plane wave theory, waves in stratified fluids, elastic waves in solids, electromagnetic and hydromagnetic radiation, and Allen's functions and point sources. Prerequisites: Geophys 281, 3221.
- **GEOPHYS 5231 Seismic Data Processing (LAB 1.0 and LEC 2.0)**
Introduction to seismic data processing. Topics to be covered include statics corrections, filtering, velocity analysis, deconvolution, stacking and migration. The course has a field component to record seismic data. If this is offered in the summer, an off-campus trip may be needed. Extra fee may be charged to cover the field expenses. Prerequisites: Geophys 3210 or Geophys 5202.
- **GEOPHYS 5241 Advanced Electrical And Electromagnetic Methods In Geophysical Exp (LAB 1.0 and LEC 2.0)**

Theory of the electrical geophysical methods as applied to subsurface investigations addressing geologic, engineering, groundwater and contaminant transport problems. Course content includes both passive and active methods and recent advances in the application of these methods. Course will include a field component illustrating application of techniques to local problems.

Prerequisites: Geophys 3251, Math 2222.

- GEOPHYS 5261 Computational Geophysics (LEC 1.0 and LAB 2.0)
Scientific programming in a UNIX/Linux environment, with emphasis on solving geophysical problems such as linear and nonlinear inversion, spectral analysis, seismicity, seismic wave attenuation, shear-wave splitting, and seismic tomography. Prerequisite: Geophys 3210.
- GEOPHYS 5736 Geophysical Field Methods (LAB 1.0 and LEC 2.0)
Imaging of selected subsurface features and engineering structures using various geophysical tools. Special emphasis is placed on ground penetrating radar and surface wave techniques. One field trip at student expense required. Prerequisite: Junior level standing or higher. (Co-listed with Geo Eng 5736).
- GEOPHYS 5761 Transportation Applications of Geophysics (LAB 1.0 and LEC 2.0)
Overview of geophysical and non-destructive test methods that are commonly used to investigate transportation structures and their foundations. Emphasis is placed on bridge system substructure, bridge system superstructure, pavement, roadway subsidence, subsurface characterization and vibration measurements. Prerequisite: Junior level standing or higher. (Co-listed with Geo Eng 5761 and Civ Eng 5750).
- GEOPHYS 5782 Environmental and Engineering Geophysics (LEC 2.0 and LAB 1.0)
An introduction to the theory and application of the gravity, magnetic, resistivity, self-potential, induced polarization and electromagnetic methods as applied to the solution of engineering and environmental problems. Prerequisite: Math 2222. (Co-listed with Geo Eng 5782).
- GEOPHYS 6211 Advanced Seismic Interpretation (LAB 1.0 and LEC 2.0)
The integration of geologic information, well log data and seismic information for interpreting the earth's subsurface using advanced 3-D seismic interpretation software packages. Reservoir identification and evaluation as well as horizon and formation attributes are included. Prerequisites: Geophys 3210 or Geophys 5202.
- GEOPHYS 6231 Advanced Seismic Data Processing (LAB 1.0 and LEC 2.0)
Theory and application of seismic data processing. Topics to be covered include convolution, correlation, deconvolution, 2-D filtering, migration and inversion. Prerequisites: Geophys 4251, 5231, Stat 3115.
- GEOPHYS 6241 The Theory of Elastic Waves (LEC 2.0 and LAB 1.0)
A mathematical study of elastic waves in the layered earth. Prerequisites: Geophys 3210.
- GEOPHYS 6251 Geophysical Inverse Theory (LEC 3.0)
A study of inverse theory applied to geophysical data, focusing on the relationship between data and model spaces and ways to estimate model parameters via global and local optimization techniques. Prerequisites: Geophys 286 or 384, Math 325, Stat 215.
- GEO ENG 6782 Surface Waves (MASW) and Ground Penetrating Radar (GPR) (LAB 1.0 and LEC 2.0) Geological engineering applications of surface wave and ground penetrating radar methods are emphasized. Field data will be acquired, processed and interpreted. Prerequisites: Geo Eng 1150 or Civ Eng 3715 or equivalent, and graduate standing.



March 1, 2019

Dr. Mun Y. Choi, President
University of Missouri System
321 University Hall
Columbia, MO 65211

Dear President Choi

I am pleased to inform you that the Missouri Department of Higher Education has approved the attached program changes submitted on behalf of the Missouri University of Science and Technology. These changes will be reported to the Coordinating Board for Higher Education at its meeting on June 5, 2019.

Sincerely,

A handwritten signature in cursive script that reads "Zora Mulligan".

Zora Mulligan
Commissioner of Higher Education

- c: Dr. Steven Graham, Senior Associate Vice President for Academic Affairs, University of Missouri System
Dr. Christopher Maples, Interim Chancellor, Missouri University of Science and Technology
Dr. Robert Marley, Provost and Executive Vice Chancellor for Academic Affairs, Missouri University of Science and Technology
Ms. Jana Moore, Sr. Program/Project Support Coordinator, University of Missouri System

Program Changes
Missouri University of Science and Technology

- 1) Current Program:
MS, Geology and Geophysics, CIP 400699

Proposed Change:
Add certificate from approved existing parent degree

Program as Changed:
GRCT, Petroleum Systems, CIP 142501

- 2) Current Program:
MS, Geology and Geophysics, CIP 400699

Proposed Change:
Add certificate from approved existing parent degree

Program as Changed:
GRCT, Geoenvironmental Science and Engineering, CIP 140802

- 3) Current Program:
MS, Geology and Geophysics, CIP 400699

Proposed Change:
Add certificate program from approved existing parent degree

Program as Changed:
GRCT, Geophysics, CIP 400603

Program Change Request

New Program Proposal

Date Submitted: 12/05/19 3:42 pm

Viewing: **PROPOSED : Petroleum Systems CT**

File: 348

Last edit: 12/11/19 1:35 pm

Changes proposed by: sbrower

In Workflow

1. **RGEOENG Chair**
2. **CCC Secretary**
3. **Sciences DSCC Chair**
4. **Engineering DSCC Chair**
5. **Pending CCC Agenda post**
6. **CCC Meeting Agenda**
7. **Campus Curricula Committee Chair**
8. **FS Meeting Agenda**
9. **Faculty Senate Chair**
10. **Registrar**
11. **Kristy Giacomelli-Feys**

Start Term
 Fall 2020
 Program Code
 PROPOSED
 Department
 Geosciences and Geological and Petroleum Engineering
 Title
 Petroleum Systems CT

Program Requirements and Description

Approval Path

1. 12/05/19 4:43 pm
 David Borrok (borrokd): Approved for RGEOENG Chair
2. 12/11/19 11:51 am
 Brittany Parnell (ershenb): Approved for CCC Secretary
3. 12/17/19 3:01 pm
 Katie Shannon (shannonk): Approved for Sciences DSCC Chair
4. 01/16/20 2:13 pm
 Stephen Raper (srafer): Approved for Engineering DSCC Chair
5. 01/16/20 4:14 pm
 Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

Petroleum Systems

The graduate certificate in Petroleum Systems is designed to provide graduate students in the geosciences, geological engineering, and petroleum engineering with the key interdisciplinary backgrounds they will need to be successful in the oil and gas industry.

The Petroleum Systems Certificate Program is open to all persons holding a B.S., M.S., or Ph.D. degree in Geology, Geophysics, Geological Engineering, or Petroleum Engineering or are currently accepted into a graduate degree program in one of these fields at Missouri S&T. Once admitted to the program, the student must take the four designated courses (provided in the curriculum section). In order to receive a Graduate Certificate, the student must have an average cumulative grade point of 3.0 or better in the certificate courses. Once admitted to the program, a student will be given three years to complete the program.

Students admitted to the Petroleum Systems Certificate Program will have non-degree graduate status, however, they will earn graduate credit for the courses they complete. If the student completes the four-course sequence with a grade of B or better in each of the courses taken, they, upon application, will be admitted to the non-thesis M.S. degree program in Geology and Geophysics. The certificate credits taken by the students admitted to the M.S. degree program will count towards their master's degree. Students who do not have all of the prerequisite courses necessary to begin the courses in the Petroleum Systems Certificate Program will be allowed to take "bridge" courses at either the graduate or undergraduate level to prepare for the formal certificate courses.

Required Courses:		
GEOLOGY 5513	Petroleum Geology	3
One of the following Geophysics courses:		
GEOPHYS 4231	Seismic Interpretation	3
GEOPHYS 5202	Exploration and Development Seismology	3
GEOPHYS 5211	Seismic Stratigraphy	3
GEOPHYS 5231	Seismic Data Processing	3
GEOPHYS 5261	Computational Geophysics	3
One of the following Geology courses:		
GEOLOGY 5311	Depositional Systems	3
GEOLOGY 5511	Applied Petroleum Geology	3
GEOLOGY 5631	Carbonate Petrology	3
GEOLOGY 5661	Advanced Stratigraphy and Basin Evolution	3
GEOLOGY 5671	Clay Mineralogy	3
GEOLOGY 5741	Micropaleontology	3
GEOLOGY 6311	Advanced Structural Geology	3
GEOLOGY 6321	Analytical Structural Geology	3
GEOLOGY 6511	Advanced Petroleum Geology	3
GEOLOGY 6621	Clastic Sedimentary Petrology	3
GEOLOGY 6811	Sedimentary Basin Analysis	3
One of the following Petroleum Engineering courses:		
PET ENG 4111	Fundamental Digital Applications In Petroleum Engineering	3
PET ENG 4210	Drilling and Well Design	3
PET ENG 4311	Reservoir Characterization	3
PET ENG 4590	Petroleum Economics and Asset Valuation	3
PET ENG 4720	Mechanical Earth Modeling	3
PET ENG 6711	Geodynamics	3

Justification for request

CIP Code: 142501

The graduate certificate in Petroleum Systems is designed to provide graduate students in the geosciences, geological engineering, and petroleum engineering with the key interdisciplinary backgrounds they will need to be successful in the oil and gas industry. The certificate requires our core Petroleum Geology course and allows students to choose an additional course from each of the three groups of Geophysics, Geology, and Petroleum Engineering offerings. Additionally, the Geosciences and Geological and Petroleum Engineering department can market the certificate and use it for branding to recruit more graduate students.

Supporting Documents

[Grad Certificate in Petroleum Systems 11 7 2018.pdf](#)

[MDHE approval.pdf](#)

Course Reviewer Comments

ershenb (12/11/19 11:50 am): attached MDHE approval and corrected CIP code in the justifications section per email from Sharon Lauck.

ershenb (12/11/19 1:35 pm): formatting

Key: 348



October 30, 2018

MEMORANDUM TO: Robert J. Marley
Provost and Executive Vice Chancellor

FROM: Costas Tsatsoulis *C.T.*
Vice Chancellor of Research and Dean of Graduate Studies

RE: Graduate Certificate in Petroleum Systems

With the recommendation of the Department of Geosciences and Geological and Petroleum Engineering and the Office of the Vice Provost and Dean of College of Engineering and Computing, I agree and request that the Petroleum Systems Graduate Certificate in its form be accepted as a graduate certificate by the Missouri University of Science & Technology.

Please contact me if you have any questions or need additional information.

Approved by:

Robert J. Marley,
Provost and Executive Vice Chancellor
for Academic Affairs

Attachment

**Geosciences and Geological and
Petroleum Engineering Department**

An equal opportunity institution

129 McNutt Hall | 1400 N. Bishop | Rolla, MO 65409
573-341-4616 | rocks@mst.edu | ggpe.mst.edu



Received
OCT 02 2018
GRAD STUDIES

September 20, 2018

To: Richard Wlezien, Vice-Provost and Dean, College of Engineering and Computing
Costas Tsatsoulis, Vice-Chancellor of Research and Dean of Graduate Studies C.T.

From: David Borrok, Chair, Department of Geosciences and Geological and
Petroleum Engineering

Two handwritten signatures in blue ink are present. The top signature is a stylized, cursive signature that appears to be "R. Wlezien". The bottom signature is a more legible signature that appears to be "David Borrok".

Subject: Proposal for a Graduate Certificate in Petroleum Systems

We are submitting the attached proposal for a Graduate Certificate in Petroleum Systems. The Department of Geosciences and Geological and Petroleum Engineering will be the home department and primary overseer of the proposed program.

GRADUATE CERTIFICATE IN PETROLEUM SYSTEMS

OFFERED BY:

*Department of Geosciences and Geological and Petroleum Engineering (GGPE)
Program of Geology and Geophysics*

PARENT DEPARTMENT AND DEGREE:

Geosciences and Geological and Petroleum Engineering, Geology and Geophysics, MS

INTENDED AUDIENCE: Main Campus Students Distance Students Both

PROGRAM DESCRIPTION:

The graduate certificate in Petroleum Systems is designed to provide graduate students in the geosciences, geological engineering, and petroleum engineering with the key interdisciplinary backgrounds they will need to be successful in the oil and gas industry. The certificate requires our core Petroleum Geology course and allows students to choose an additional course from each of the three groups of Geophysics, Geology, and Petroleum Engineering offerings.

PURPOSE:

The students targeted for this certificate are primarily on-campus graduate students already admitted to one of the degree programs within GGPE. The purpose of the certificate is to provide the students in GGPE who are interested in careers in the oil and gas industry with a collection of key interdisciplinary coursework that will be recognized by prospective employers.

ADMISSION:

The Petroleum Systems Certificate Program is open to all persons holding a B.S., M.S., or Ph.D. degree in Geology, Geophysics, Geological Engineering, or Petroleum Engineering or are currently accepted into a graduate degree program in one of these fields at Missouri S&T. Once admitted to the program, the student must take the four designated courses (provided in the curriculum section). In order to receive a Graduate Certificate, the student must have an average cumulative grade point of 3.0 or better in the certificate courses. Once admitted to the program, a student will be given three years to complete the program.

Students admitted to the Petroleum Systems Certificate Program will have non-degree graduate status, however, they will earn graduate credit for the courses they complete. If the student completes the four-course sequence with a grade of B or better in each of the courses taken, they, upon application, will be admitted to the non-thesis M.S. degree program in Geology and Geophysics. The certificate credits taken by the students admitted to the M.S. degree program will count towards their master's degree. Students who do not have all of the prerequisite courses necessary to begin the courses in the Petroleum Systems Certificate Program will be allowed to take "bridge" courses at either the graduate or undergraduate level to prepare for the formal certificate courses.

CONTRIBUTING FACULTY:

Existing faculty within the Geology and Geophysics and Petroleum Engineering programs.

CURRICULUM:

REQUIRED COURSES:

1) **GEOLOGY 5513 Petroleum Geology**

ONE OF THE FOLLOWING GEOPHYSICS COURSES:

1. **GEOPHYS 4231 Seismic Interpretation**
2. **GEOPHYS 5202 Exploration and Development Seismology**
3. **GEOPHYS 5211 Seismic Stratigraphy**
4. **GEOPHYS 5231 Seismic Data Processing**
5. **GEOPHYS 5261 Computational Geophysics**

ONE OF THE FOLLOWING GEOLOGY COURSES:

1. **GEOLOGY 5311 Depositional Systems**
2. **GEOLOGY 5511 Applied Petroleum Geology**
3. **GEOLOGY 5631 Carbonate Petrology**
4. **GEOLOGY 5661 Advanced Stratigraphy and Basin Evolution**
5. **GEOLOGY 5671 Clay Mineralogy**
6. **GEOLOGY 5741 Micropaleontology**
7. **GEOLOGY 6311 Advanced Structural Geology**
8. **GEOLOGY 6321 Analytical Structural Geology**
9. **GEOLOGY 6511 Advanced Petroleum Geology**
10. **GEOLOGY 6621 Clastic Sediment Petrology**
11. **GEOLOGY 6811 Sedimentary Basin Analysis**

ONE OF THE FOLLOWING PETROLEUM ENGINEERING COURSES:

1. **PET ENG 4720 Mechanical Earth Modeling**
2. **PET ENG 4590 Petroleum Economics and Asset Valuation**
3. **PET ENG 4311 Reservoir Characterization**
4. **PET ENG 4111 Fundamental Digital Applications In Petroleum Engineering**
5. **PET ENG 6711 Geodynamics**
6. **PET ENG 4210 Drilling and Well Design**

COURSE DESCRIPTIONS:

Please include the delivery method (online/campus/both) for each course.

*THE DELIVERY MODE FOR ALL COURSES WILL BE TRADITIONAL LECTURE ON CAMPUS

- **GEOLOGY 5513 Petroleum Geology (LEC 2.0 and LAB 1.0)**
Principles of origin, migration, and accumulation of oil and gas. The laboratory introduces the procedures used for exploration, and development of hydrocarbon resources. Prerequisites: Geology 1110 or Geo Eng 1150; accompanied or preceded by both Geology 3310 and Geology 3620.
- **GEOPHYS 4231 Seismic Interpretation (LEC 3.0)**
An introduction to 2-D/3-D seismic structural interpretation, stratigraphic interpretation, reservoir identification and evaluation, and horizon and formation attributes. The students are expected to

master interactive 2-D/3-D seismic interpretation software packages that are routinely used in the petroleum industry. Prerequisites: Math 1208 or Math 1214; Geology 1110 or Geo Eng 1150.

- GEOPHYS 5202 Exploration and Development Seismology (LAB 1.0 and LEC 2.0)
Principles of reflection seismology as applied to the delineation of geologic structures and the determination of stratigraphy and lithology. Emphasis on both the capabilities and limitations of the seismic method. The laboratory utilizes both modeled and actual seismic data. Prerequisites: Math 1208 or Math 1214; Geology 1110 or Geo Eng 1150.
- GEOPHYS 5211 Seismic Stratigraphy (LEC 2.0 and LAB 1.0)
A study of the seismic expression of depositional models. Reflection patterns and reflection amplitudes are interpreted to determine bed thicknesses, fluid content, depositional environment, and lithology. Special data acquisition and processing techniques are examined. Prerequisites: Geophys 4521, Geology 3310, 3620.
- GEOPHYS 5231 Seismic Data Processing (LAB 1.0 and LEC 2.0)
Introduction to seismic data processing. Topics to be covered include statics corrections, filtering, velocity analysis, deconvolution, stacking and migration. The course has a field component to record seismic data. If this is offered in the summer, an off-campus trip may be needed. Extra fee may be charged to cover the field expenses. Prerequisites: Geophys 3210 or Geophys 5202.
- GEOPHYS 5261 Computational Geophysics (LEC 1.0 and LAB 2.0)
Scientific programming in a UNIX/Linux environment, with emphasis on solving geophysical problems such as linear and nonlinear inversion, spectral analysis, seismicity, seismic wave attenuation, shear-wave splitting, and seismic tomography. Prerequisite: Geophys 3210.
- GEOLOGY 5311 Depositional Systems (LEC 3.0)
Development of three dimensional depositional models using Walther's Law, Walther's Warning and seismic stratigraphy. Emphasis on overall geometries and internal porosity and permeability characteristics of aquifers and hydrocarbon reservoirs. Includes 3-D models for clastic, carbonate and evaporate sequences. Prerequisites: Geology 1110 or Geo Eng 1150; accompanied or preceded by both Geology 3310 and Geology 3620.
- GEOLOGY 5511 Applied Petroleum Geology (LEC 1.0 and LAB 2.0)
The principles of petroleum geology are applied in solving hydrocarbon exploration and developmental problems. Geological and economical techniques for evaluating hydrocarbonbearing reservoirs are presented, with methods for decisionmaking under conditions of extreme uncertainty. Prerequisite: Geology 5411.
- GEOLOGY 5631 Carbonate Petrology (LEC 2.0 and LAB 1.0)
Petrology, chemistry and sedimentology of carbonates and other associated chemical sedimentary rocks. Prerequisites: GEOLOGY 2620, 3620 and CHEM 1320 or equivalent; GEOLOGY 3410 recommended.
- GEOLOGY 5661 Advanced Stratigraphy and Basin Evolution (LEC 3.0)
Advanced topics in sedimentary geology including: tectonic controls on sedimentary basin development, global sequence stratigraphy, regional facies and diagenetic patterns, basin hydrogeology, thermal evolution of basins and distribution of economic resources. This course should be preceded or accompanied by Geology 3410. Prerequisites: Geology 3620 and Geology 3310.
- GEOLOGY 5671 Clay Mineralogy (LAB 1.0 and LEC 2.0)
Mineral structure, geochemical properties, occurrence, environment, and uses of clays. Determination of physical properties, optics, x-ray diffraction, and thermal features of clays. Field trip fee required. Prerequisites: Geology 2610 and 3410, or Chem 2310, or Civ Eng 5715, or Geo Eng 5172.
- GEOLOGY 5741 Micropaleontology (LEC 2.0 and LAB 1.0)
This course studies the fossil and soft-body characteristics of bacteria, protists, microinvertebrates and organic-walled microfossils (palynomorphs). Focused discussions on systematics, evolutionary

histories, paleoecology, and geologic applications of the microfossil groups. Extraction of foraminifera and palynomorphs from rocks in lab. Prerequisite: Geology 3631.

- GEOLOGY 6311 Advanced Structural Geology (LAB 1.0 and LEC 2.0)
The course provides theoretical background, analytical techniques, and hands-on experience for analyzing geologic structures at a variety of scales hand sample to global. Prerequisites: Geology 3310, Geophysics 4096.
- GEOLOGY 6321 Analytical Structural Geology (LAB 1.0 and LEC 2.0)
The course provides theoretical background, analytical techniques, and hands-on experience, for quantifying processes that lead to the formation and evolution of rocks and structures produced as a result of deformation at a variety of scales - hand sample to global. Poster - and oral - presentations, and a research paper required. Prerequisites: Geology 3310, Geophys 4096.
- GEOLOGY 6511 Advanced Petroleum Geology (LAB 2.0 and LEC 1.0)
The principles of petroleum geology are applied in solving hydrocarbon exploration and developmental problems. Various types of oil and gas accumulations are reviewed in detail. Study of criteria useful in evaluating the petroleum potential of undrilled areas. Special investigation assignment is required. Prerequisite: Geology 3310, Geology 5513, Geology 5661, or Geology 6811.
- GEOLOGY 6621 Clastic Sedimentary Petrology (LAB 1.0 and LEC 2.0)
Petrology and petrography of clastic sedimentary rocks. Emphasis on origin, diagenesis and description of clastic, sedimentary rocks. Prerequisite: Geology 3620.
- GEOLOGY 6811 Sedimentary Basin Analysis (LEC 3.0)
An advanced study of stratigraphic, diagenetic and tectonic processes in sedimentary basins. Prerequisites: Geology 3310, 3620, 3410 or 4441 or 4451.
- PET ENG 4720 Mechanical Earth Modeling (LEC 3.0)
This course introduces the work process necessary to create the Mechanical Earth Model's principle components, formation in-situ stress and strength. 1-D modelign methods are reviewed and extended to 3-D; and the integration of MEM with well design is shown. An MEM model will be created and compared to actual field results. Prerequisites: Pet Eng 3310 and Geology 3310.
- PET ENG 4590 Petroleum Economics and Asset Valuation (LEC 3.0)
Uncertainty in the estimation of oil and gas reserves; tangible and intangible investment costs; depreciation; evaluation of producing properties; federal income tax considerations; chance factor and risk determination. Petroleum economic evaluation software is introduced. Prerequisites: Pet Eng 3520, Econ 1100 or Econ 1200.
- PET ENG 4311 Reservoir Characterization (LEC 3.0)
The integration and extrapolation of Geologic, Geophysical, and Petroleum Engineering data for flow model construction. Prerequisites: Pet Eng 3520 and Pet Eng 3310.
- PET ENG 4111 Fundamental Digital Applications In Petroleum Engineering (LEC 3.0)
Applications of Windows-based Visual Basic solutions to engineering problems including selected topics in fluid flow, PVT behavior, matrices in engineering solutions, translating curves to computer solutions, predictor-corrector material balance solutions, and graphical display of results. Prerequisite: Junior Standing.
- PET ENG 6711 Geodynamics (LEC 3.0)
The applications of continuum physics to geological and petroleum engineering problems. Topics include plate tectonics, stress and strain in solids, elasticity and flexure, heat transfer, gravity, fluid mechanics, rock rheology, faulting, and flow in porous media. Prerequisites: Math 2222 and Geology 3310. (Co-listed with Geology 6211).
- PET ENG 4210 Drilling and Well Design (LEC 2.0 and LAB 1.0)
This course covers drilling fluids, including mixing and analysis of rheological properties; pressure loss calculations; casing design; well cementing; pore pressure and geomechanical considerations

in drilling; completion equipment; and completion design. Prerequisite: Preceded or accompanied by Civ Eng 3330.



March 1, 2019

Dr. Mun Y. Choi, President
University of Missouri System
321 University Hall
Columbia, MO 65211

Dear President Choi

I am pleased to inform you that the Missouri Department of Higher Education has approved the attached program changes submitted on behalf of the Missouri University of Science and Technology. These changes will be reported to the Coordinating Board for Higher Education at its meeting on June 5, 2019.

Sincerely,

A handwritten signature in cursive script that reads "Zora Mulligan".

Zora Mulligan
Commissioner of Higher Education

- c: Dr. Steven Graham, Senior Associate Vice President for Academic Affairs, University of Missouri System
Dr. Christopher Maples, Interim Chancellor, Missouri University of Science and Technology
Dr. Robert Marley, Provost and Executive Vice Chancellor for Academic Affairs, Missouri University of Science and Technology
Ms. Jana Moore, Sr. Program/Project Support Coordinator, University of Missouri System

Program Changes
Missouri University of Science and Technology

- 1) Current Program:
MS, Geology and Geophysics, CIP 400699

Proposed Change:
Add certificate from approved existing parent degree

Program as Changed:
GRCT, Petroleum Systems, CIP 142501
- 2) Current Program:
MS, Geology and Geophysics, CIP 400699

Proposed Change:
Add certificate from approved existing parent degree

Program as Changed:
GRCT, Geoenvironmental Science and Engineering, CIP 140802
- 3) Current Program:
MS, Geology and Geophysics, CIP 400699

Proposed Change:
Add certificate program from approved existing parent degree

Program as Changed:
GRCT, Geophysics, CIP 400603

Program Change Request

Date Submitted: 01/15/20 10:16 am

Viewing: **AE ENG-BS : Aerospace Engineering BS**

File: 141.31

Last approved: 06/14/19 8:19 am

Last edit: 01/15/20 10:16 am

Changes proposed by: ershenb

Catalog Pages Using this Program

[Aerospace Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

AE ENG-BS

Department

Mechanical & Aerospace Engineering

Title

Aerospace Engineering BS

Program Requirements and Description**In Workflow**

1. RMECHENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/15/20 4:49 pm
J. Keith Nisbett (nisbett): Approved for RMECHENG Chair
2. 01/16/20 8:12 am
Brittany Parnell (ershenb): Approved for CCC Secretary
3. 01/17/20 9:57 am
Stephen Raper (sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:52 pm
Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

History

1. Apr 28, 2014 by J. Keith Nisbett (nisbett)
2. Aug 1, 2014 by pantaleoa
3. Jul 14, 2015 by pantaleoa
4. Mar 27, 2017 by Shauntae Ellis (smetg6)
5. Nov 2, 2018 by Kakkattukuzhy Isaac (isaac)
6. Jun 14, 2019 by Brittany Parnell (ershenb)

Bachelor of Science Aerospace Engineering

Entering freshmen desiring to study aerospace engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will, however, be permitted, if they wish, to state an aerospace engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the **Foundational Freshman-Engineering and Computing** 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.

A cumulative GPA of 2.5, and math science GPA of 2.25 are the minimum requirements for admission to the aerospace engineering program.

Students must comply with the requirements specified in the current online catalog published by the registrar. For the bachelor of science degree in aerospace engineering a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. At least two grade points per credit hour must also be attained in all courses taken in aerospace engineering. Each student's program of study must contain a minimum of 24 credit hours of course work in general education and must be chosen to satisfy the following requirements:

1. [ENGLISH 1120](#).
2. [HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#)
3. [ECON 1100](#) or [ECON 1200](#)
4. [ENGLISH 1160](#) or [ENGLISH 3560](#) or [SP&M S 1185](#)
5. A literature elective*
6. An ethics elective*
7. Depth elective. A humanities or social science elective that has a humanities or social science course already taken as a prerequisite*
8. A humanities or social science elective*

*Humanities and social science elective must be at least 3 credit hours of lecture designation, and also meet the requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.

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

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	MECH ENG 1720	3
CHEM 1310 & CHEM 1319 & CHEM 1100 ¹	6	MATH 1215 ⁴	4
ENGLISH 1120	3	PHYSICS 1135 ⁴	4
MATH 1214	4	H/SS Economics elective ³	3
H/SS History Elective ²	3		
	17		14
Sophomore Year			
First Semester	Credits	Second Semester	Credits
COMP SCI 1570 or 1972	2-3	AERO ENG 2780	2
COMP SCI 1580 or 1982	1	AERO ENG 2360 ⁴	3
CIV ENG 2200 ⁴	3	MECH ENG 2519 ⁴	3
MATH 2222 ⁴	4	MATH 3304 ⁴	3
PHYSICS 2135 ⁴	4	CIV ENG 2210 ⁴	3
AERO ENG 2861 ⁴	3	AERO ENG 2790	2
	17-18		16
Junior Year			
First Semester	Credits	Second Semester	Credits
AERO ENG 3613 ⁴	3	AERO ENG 3251 ⁴	3
AERO ENG 3131 ⁴	3	AERO ENG 3361	3
AERO ENG 3877	3	AERO ENG 3171	3
ELEC ENG 2800	3	AERO ENG 4882	2
Electives-Advanced Math/Cmp Sci ⁵	3	Elective/Ethics ⁹	3
		Elective/Communications ⁷	3

	15		17
Senior Year			
First Semester	Credits	Second Semester	Credits
AERO ENG 4535	3	AERO ENG 4781 or 4791	3
AERO ENG 4253	3	Electives-Technical ⁶	3
AERO ENG 4780 or 4790	2	Electives-Technical ⁶	3
AERO ENG 4883	2	AERO ENG 4885	1
Electives-Technical ⁶	3	Electives-Hum/Soc Sci	3
Depth Elective/Hum/Soc Sci ⁸	3	Elective/Literature	3
	16		16
Total Credits: 128-129			

- ¹ [CHEM 1310](#), [CHEM 1319](#) and [CHEM 1100](#) or an equivalent training program approved by Missouri S&T.
- ² Must be one of the following: [POL SCI 1200](#), [HISTORY 1200](#), [HISTORY 1300](#), or [HISTORY 1310](#).
- ³ Must be one of the following: [ECON 1100](#) or [ECON 1200](#).
- ⁴ A grade of "C" or better in [CHEM 1310](#), [MATH 1214](#), [MATH 1215](#), [MATH 2222](#), [MATH 3304](#), [PHYSICS 1135](#), [PHYSICS 2135](#), [CIV ENG 2200](#), [CIV ENG 2210](#), and computer programming elective, [AERO ENG 2360](#), [AERO ENG 2861](#), and [MECH ENG 2519](#), as prerequisite for follow-up courses in the curriculum and for graduation.
- ⁵ Must be one of the following: [AERO ENG 5830](#), [COMP SCI 3200](#), [MATH 3103](#), [MATH 3108](#), [STAT 3113](#), [STAT 3115](#), or any 5000-level math or computer science course approved by the student's advisor.
- ⁶ Electives must be approved by the student's advisor. Nine hours of technical electives must be in mechanical and aerospace engineering. Three hours of departmental technical electives must be at the 5000-level. [AERO ENG 3877](#) and the 5000-level Asteroid Mining course co-listed with geological engineering are not to be used for 5000-level technical elective.
- ⁷ This course can be selected from [ENGLISH 1160](#), [ENGLISH 3560](#), [SP&M S 1185](#), or the complete four-course sequence in advanced ROTC ([MIL ARMY 3250](#), [MIL ARMY 3500](#), [MIL ARMY 4250](#), and [MIL ARMY 4500](#); or [MIL AIR 3110](#), [MIL AIR 3120](#), [MIL AIR 4110](#) and [MIL AIR 4120](#)).
- ⁸ To satisfy the depth requirement, this course should have a humanities and social science course already taken as a prerequisite.
- ⁹ Must be a course on engineering ethics, business ethics, bio ethics, social ethics, or any ethics course approved by the student's advisor.

Justification for request
 "Freshman Engineering Program" to " Foundational Engineering and Computing Program."
 Supporting Documents
 Course Reviewer Comments

Key: 141

Program Change Request

Date Submitted: 01/15/20 10:36 am

Viewing: **ARC ENG-BS : Architectural Engineering BS**

File: 143.35

Last approved: 01/29/19 10:09 am

Last edit: 01/15/20 10:36 am

Changes proposed by: ershenb

Catalog Pages Using this Program
[Architectural Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

ARC ENG-BS

Department

Civil, Architectural, and Environmental Engineering

Title

Architectural Engineering BS

Program Requirements and Description

In Workflow

1. RCIVILEN Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/16/20 10:04 am
Joel Burken
(burken): Approved for RCIVILEN Chair
2. 01/16/20 12:42 pm
Brittany Parnell
(ershenb):
Approved for CCC Secretary
3. 01/17/20 9:57 am
Stephen Raper
(sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:52 pm
Brittany Parnell
(ershenb):
Approved for Pending CCC Agenda post

History

1. Sep 27, 2013 by
Lahne Black (lahne)
2. Sep 27, 2013 by
Lahne Black (lahne)
3. Apr 28, 2014 by
Lahne Black (lahne)
4. Aug 4, 2014 by
pantaleoa

5. Jan 30, 2015 by Stuart Baur (baur)
6. Sep 21, 2015 by Stuart Baur (baur)
7. Sep 15, 2016 by Crystal Wilson (wilsoncry)
8. Feb 27, 2018 by Stuart Baur (baur)
9. Jan 29, 2019 by Stuart Baur (baur)

Architectural Engineering Bachelor of Science

Entering freshmen desiring to study Architectural Engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will however, be permitted, if they wish, to state an Architectural Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of **the Foundational the-Freshman-Engineering and Computing Program program** is on enhanced advising **and 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 Architectural Engineering, a minimum of 129 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. An average of at least two grade points per credit hour must also be maintained in all courses taken in Architectural Engineering.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

1. All students are required to take one American history course, one economics course, one humanities course, and [ENGLISH 1120](#). The history course is to be selected from [HISTORY 1200](#) (preferred), [HISTORY 1300](#), or [HISTORY 1310](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#). [ART 3203](#) is required.
2. Depth requirement. Three credit hours must be taken in humanities or social sciences at the 2000-level or above. This will be satisfied by taking the required [HISTORY 2510](#) and [HISTORY 4550](#). All courses taken to satisfy the depth requirement must be taken after graduating from high school.
3. The Gen Ed course chosen must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog and may include one communications course in addition to [ENGLISH 1120](#).
4. Special topics and special problems and honors seminars are allowed only by petition to and approval by the student's department chair.

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

Freshman Year			
First Semester	Credits	Second Semester	Credits
CHEM 1100	1	MATH 1215	4
FR ENG 1100 ²	1	General Ed Elective ¹	3
MATH 1214	4	MECH ENG 1720	3
ENGLISH 1120	3	PHYSICS 1135	4
General Ed Elective ¹	3		
CHEM 1310	5		

& CHEM 1319			
	17		14
Sophomore Year			
First Semester	Credits	Second Semester	Credits
CIV ENG 2200 ²	3	GEOLOGY 1110	3
MATH 2222	4	CIV ENG 2210	3
PHYSICS 2135	4	CIV ENG 2211	1
CIV ENG 2401 ²	3	ARCH ENG 2103	3
ARCH ENG 2003	3	ART 3203	3
		MATH 3304	3
		MECH ENG 2350	2
	17		18
Junior Year			
First Semester	Credits	Second Semester	Credits
ARCH ENG 3201 ²	3	STAT 3113	3
CIV ENG 3330 ²	3	ARCH ENG 4800	3
MECH ENG 2527	3	CIV ENG 3116	3
ARCH ENG 3804	3	HISTORY 2510	3
ENG MGT 1210	2	ARCH ENG 3220	3
CIV ENG 3715	3		
	17		15
Senior Year			
First Semester	Credits	Second Semester	Credits
ARCH ENG 4010	1	ARCH ENG 4097	3
ARCH ENG 3210	3	ARCH ENG Technical Elective ^{3,4}	3
ARCH ENG 4448	3	CIV ENG 4729	3
ARCH ENG Technical Elective ^{3,4}	3	General Education Elective ¹	3
HISTORY 4550	3	ARCH ENG Technical Elective ^{3,4}	3
ARCH ENG 4850	3		
	16		15
Total Credits: 129			

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 A grade of 'C' or better may be required in ARCH ENG technical elective prerequisite courses. Refer to the Missouri S&T undergraduate catalog for this prerequisite information.

⁴ Choose technical electives from approved lists under Emphasis Areas for Architectural Engineering Students. A maximum of 3 credits of independent study ([ARCH ENG 5000](#) or [ARCH ENG 4099](#)) may be used as a technical elective. Additional independent study course may be taken but will not count towards the B.S. Architectural Engineering degree.

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.

Emphasis Areas and Course Listings by Area for Architectural Engineering Students

Area I, Structural Engineering

ARCH ENG 5001	Special Topics	6
ARCH ENG 5203	Applied Mechanics In Structural Engineering	3
ARCH ENG 5205	Structural Analysis II	3
ARCH ENG 5260	Analysis And Design Of Wood Structures	3
ARCH ENG 5207	Computer Methods of Structural Analysis	3
ARCH ENG 5210	Advanced Steel Structures Design	3
ARCH ENG 5220	Advanced Concrete Structures Design	3
ARCH ENG 5222	Prestressed Concrete Design	3
ARCH ENG 5729	Foundation Engineering II	3
ARCH ENG 5231	Infrastructure Strengthening with Composites	3
ARCH ENG 5206	Low-Rise Building Analysis And Design	3
ARCH ENG 5208	Structural Dynamics	3

Area II, Construction Engineering and Project Management

ARCH ENG 5442	Construction Planning and Scheduling Strategies	3
ARCH ENG 5445	Construction Methods	3
ARCH ENG 5446	Management Of Construction Costs	3
ARCH ENG 5448	Green Engineering: Analysis of Constructed Facilities	3
ARCH ENG 5449	Engineering and Construction Contract Specifications	3
ENG MGT 5110	Managerial Decision Making	3
ENG MGT 5613	Value Analysis	3
ENG MGT 5711	Total Quality Management	3

Area III, Environmental Systems for Buildings

ARCH ENG 5001	Special Topics	0-6
ARCH ENG 5642	Sustainability, Population, Energy, Water, and Materials	3
ARCH ENG 5665	Indoor Air Pollution	3
ARCH ENG 5820	Building Lighting Systems	3
ARCH ENG 5850	Residential Renewable Energy Systems	3
ENG MGT 5513	Energy and Sustainability Management Engineering	3
ENG MGT 5330	Advanced Human Factors	3
IS&T 4780	Human and Organizational Factors in Cybersecurity	3
IS&T 5885	Human-Computer Interaction	3

Mechanical Emphasis Courses

MECH ENG 5309	Engineering Acoustics I	3
MECH ENG 5566	Solar Energy Technology	3
MECH ENG 5575	Mechanical Systems For Environmental Control	3

Electrical Emphasis Courses

ELEC ENG 3340	Basic Programmable Logic Controllers	3
ELEC ENG 5150	Photovoltaic Systems Engineering	3
COMP ENG 2210 & COMP ENG 2211	Introduction to Digital Logic and Computer Engineering Laboratory	4

Area IV, Construction Materials

ARCH ENG 5203	Applied Mechanics In Structural Engineering	3
CIV ENG 5113	Composition And Properties Of Concrete	3
CIV ENG 5118	Smart Materials And Sensors	3
CIV ENG 5156	Pavement Design	3
CER ENG 5810	Principles Of Engineering Materials	3

Architectural Engineering Courses

ARCH ENG 2103	Architectural Materials And Methods Of Construction	3
ARCH ENG 3804	Architectural Design II	3
ART 3203	Architectural Design I	3
ARCH ENG 5820	Building Lighting Systems	3

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

ARCH ENG 2003	Engineering Communications and Computations	3
ARCH ENG 2001	Special Topics	0-6
ARCH ENG 3000	Special Problems	1-6
ARCH ENG 3001	Special Topics	0-6
ARCH ENG 2002	Cooperative Engineering Training	1
ARCH ENG 4010	Senior Seminar: Engineering In A Global Society	1
ARCH ENG 3201	Structural Analysis I	3
ARCH ENG 3210	Structural Design in Metals	3
ARCH ENG 3220	Reinforced Concrete Design	3
ARCH ENG 4447	Ethical, Legal and Professional Engineering Practice	2
ARCH ENG 4448	Fundamentals Of Contracts And Construction Engineering	3
ARCH ENG 4097	Senior Design Project	3
ARCH ENG 5000	Special Problems	6
ARCH ENG 5001	Special Topics	6
ARCH ENG 5205	Structural Analysis II	3
ARCH ENG 5260	Analysis And Design Of Wood Structures	3
ARCH ENG 5207	Computer Methods of Structural Analysis	3
ARCH ENG 5210	Advanced Steel Structures Design	3
ARCH ENG 5220	Advanced Concrete Structures Design	3
ARCH ENG 5222	Prestressed Concrete Design	3
ARCH ENG 5445	Construction Methods	3
ARCH ENG 5446	Management Of Construction Costs	3

ARCH ENG 5449	Engineering and Construction Contract Specifications	3
ARCH ENG 5231	Infrastructure Strengthening with Composites	3
ARCH ENG 4099	Undergraduate Research	6

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

CIV ENG 3715	Fundamentals of Geotechnical Engineering	3
CIV ENG 3116	Construction Materials, Properties And Testing	3
CIV ENG 4729	Foundation Engineering	3
CIV ENG 3330	Engineering Fluid Mechanics	3
CIV ENG 5113	Composition And Properties Of Concrete	3
CIV ENG 5117	Asphalt Pavement Design	3
CIV ENG 5729	Foundation Engineering II	3
CIV ENG 5441	Professional Aspects Of Engineering Practice	3
CIV ENG 5445	Construction Methods	3
CIV ENG 5446	Management Of Construction Costs	3
CIV ENG 5449	Engineering and Construction Contract Specifications	3

Justification for request

Updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Key: 143

Program Change Request

Date Submitted: 01/15/20 11:47 am

Viewing: **CH ENG-BS : Chemical Engineering BS**

File: 150.77

Last approved: 01/30/19 2:43 pm

Last edit: 01/15/20 11:47 am

Changes proposed by: ershenb

Catalog Pages Using this Program
[Chemical & Biochemical Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

CH ENG-BS

Department

Chemical and Biochemical Engineering

Title

Chemical Engineering BS

Program Requirements and Description

In Workflow

1. RCHEMENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/15/20 12:48 pm
Joseph Smith (smithjose): Approved for RCHEMENG Chair
2. 01/15/20 1:19 pm
Brittany Parnell (ershenb): Approved for CCC Secretary
3. 01/17/20 9:57 am
Stephen Raper (srafer): Approved for Engineering DSCC Chair
4. 01/20/20 8:52 pm
Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

History

1. Mar 18, 2014 by Lahne Black (lahne)
2. May 2, 2014 by Lahne Black (lahne)
3. Jan 30, 2015 by kleb6b

4. Jul 15, 2015 by pantaleoa
5. Jul 15, 2015 by pantaleoa
6. Nov 18, 2015 by marlene
7. Mar 7, 2016 by Daniel Forciniti (forcinit)
8. Mar 27, 2017 by Daniel Forciniti (forcinit)
9. May 3, 2018 by Daniel Forciniti (forcinit)
10. May 7, 2018 by Brittany Parnell (ershenb)
11. May 7, 2018 by Brittany Parnell (ershenb)
12. May 7, 2018 by Brittany Parnell (ershenb)
13. Jul 3, 2018 by Brittany Parnell (ershenb)
14. Nov 2, 2018 by Jee C. Wang (jcwang)
15. Jan 29, 2019 by Jee C. Wang (jcwang)
16. Jan 30, 2019 by Brittany Parnell (ershenb)
17. Jan 30, 2019 by Brittany Parnell (ershenb)

Bachelor of Science Chemical Engineering

Entering freshmen desiring to study chemical engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will be permitted, if they wish, to state a chemical engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of **the Foundational the Freshman-Engineering and Computing** Program is on enhanced advising **and 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 chemical engineering a minimum of 129 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry and basic ROTC courses. An average of at least two grade points per credit hour must be attained. At least two grade points per credit hour must also be attained in all courses taken in chemical engineering.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

- All students are required to take one American history course, one economics course, one humanities course, and [ENGLISH 1120](#). The history course is to be selected from [HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#). The humanities course must be selected and meets the requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
- Depth requirement. Three credit hours must be taken in humanities or social sciences at the 1000 level or above and must be selected from the approved list. This course must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 1180 will be considered to satisfy this requirement. Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 3000 level or above. All courses taken to satisfy the depth requirement must be taken after graduating from high school.
- The remaining two courses are to be chosen and meets the requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog and may include one communications course in addition to [ENGLISH 1120](#).
- Any specific departmental requirements in the general studies area must be satisfied and meets the requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
- Special topics and special problems and honors seminars are allowed only by petition to and approval by the student's department chairman.

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

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	MECH ENG 1720	3
CHEM 1310	4	COMP SCI 1972 , or 1971 , or 1570 ⁷	2-3
CHEM 1319	1	COMP SCI 1982 , or 1981 , or 1580 ⁷	1
ENGLISH 1120	3	CHEM 1320	3
HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3	MATH 1215	4
MATH 1214	4	PHYSICS 1135	4
CHEM 1100	1		
	17		17-18
Sophomore Year			
First Semester	Credits	Second Semester	Credits
CHEM ENG 2100 ¹	4	CHEM ENG 2110 ¹	3
CHEM ENG 2300	1	CHEM ENG 2310 ²	1
CHEM 2210	4	Science Elective ⁵	4
MATH 2222	4	MATH 3304	3
PHYSICS 2135	4	STAT 3113	3
		Humanities and Social Sciences Elective ⁴	3
		Humanities and Social Sciences Elective⁴	3
	17		17
Junior Year			
First Semester	Credits	Second Semester	Credits
CHEM ENG 3101	4	CHEM ENG 3131	3
CHEM ENG 3111	3	CHEM ENG 3141	3
CHEM ENG 3120 ¹	3	CHEM ENG 3150	3
ECON 1100 or 1200	3	STAT 3113	3

Upper level Humanities or Social Science Elective ⁴	3	ENGLISH 1160 or 3560	3
		SP&M S 1185	3
	16		15
Senior Year³			
First Semester	Credits	Second Semester	Credits
CHEM ENG 4091	3	CHEM ENG 4097²	3
CHEM ENG 4101²	3	CHEM ENG 4130²	3
CHEM ENG 4110	3	CHEM ENG 5XXX-Chem Eng Elective ⁶	3
CHEM ENG 4241	3	Chem Eng 5xxx --Chem Eng Elective ⁶	3
CHEM ENG 5XXX-Chem Eng Elective ⁶	3	Chem Eng 5xxx -Chem Eng Elective ⁶	3
	15		15
Total Credits: 129-130			

Note: The minimum number of hours required for a degree in chemical engineering is 129.

A cumulative grade point average of 2.50 or better and a "C" or better in [CHEM 1310](#), [CHEM 1319](#), [CHEM 1320](#), [MATH 1214](#), [MATH 1215](#) and [PHYSICS 1135](#) are required to be admitted into the chemical engineering major.

1	A grade of "C" or better is required in CHEM ENG 2100 & CHEM ENG 2110 in order to enroll in Chem Eng 3120 .
2	Communications emphasized course (See bachelor of science degree, general education communications requirement).
3	Chemical engineering majors are encouraged to take the fundamentals of engineering exam prior to graduation. It is the first step toward becoming a registered professional engineer.
4	Must meet the requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog. The prerequisites for the upper level course must be completed with a passing grade.
5	CHEM 2510 , or CHEM 4610 and CHEM 4619 , or BIO SCI 2213 and BIO SCI 2219 , or CHEM 2220 and CHEM 2219 , or Bio Sci 3313 and Bio Sci 3319 , or CHEM 3420 and CHEM 3459 .
6	A minimum of 12 cr. hr. from any Chem Eng 5xxx and any class from the approved list published on the Chemical Engineering web site but only 3 cr. hr. of CHEM ENG 4000 , CHEM ENG 4099 or Chem Eng 4099H. Students may have no more than three hours from approved out-of-department electives.
7	The programming elective will consist of a lecture and lab combination, and may be selected from COMP SCI 1971/COMP SCI 1981 , COMP SCI 1972/COMP SCI 1982 , or COMP SCI 1570/COMP SCI 1580 . Note that COMP SCI 1570/COMP SCI 1580 requires one more credit hour than the other option. The lecture component must be completed with a grade of "C" or better.

Chemical Engineering Biochemical Engineering Emphasis

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	MECH ENG 1720	3
CHEM 1310	4	COMP SCI 1972 , or 1971 , or 1570⁶	2-3
CHEM 1319	1	COMP SCI 1982 , or 1981 , or 1580⁶	1
ENGLISH 1120	3	CHEM 1320	3
HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3	MATH 1215	4
MATH 1214	4	PHYSICS 1135	4
CHEM 1100	1		

17

17-18

Sophomore Year			
First Semester	Credits	Second Semester	Credits
CHEM ENG 2100 ¹	4	CHEM ENG 2110 ¹	3
CHEM ENG 2300	1	CHEM ENG 2310 ²	1
CHEM 2210	4	STAT 3113	3
MATH 2222	4	Science Elective ⁵	4
PHYSICS 2135	4	MATH 3304	3
		ECON 1100 or 1200	3
	17		17
Junior Year			
First Semester	Credits	Second Semester	Credits
CHEM ENG 3101	4	CHEM ENG 3131	3
CHEM ENG 3111	3	CHEM ENG 3141	3
CHEM ENG 3120 ¹	3	CHEM ENG 3150	3
SP&M S 1185	3	ENGLISH 1160 (or English 3560)	3
Science Elective ⁵	4	Science Elective ⁵	4
Humanities or Social Sciences Elective⁴	3		
	17		16
Senior Year ³			
First Semester	Credits	Second Semester	Credits
CHEM ENG 4091	3	CHEM ENG 4097 ²	3
CHEM ENG 4110	3	CHEM ENG 4210	3
CHEM ENG 5250	3	CHEM ENG 4220	3
CHEM ENG 4201	3	CHEM ENG 4241	3
Upper Level Humanities or Social Sciences Elective ⁴	3	Humanities or Social Science Elective ⁴	3
	15		15
Total Credits: 131-132			

Note: The minimum number of hours required for a degree in chemical engineering with an emphasis in biochemical engineering is 131.

A cumulative grade point average of 2.50 or better and a "C" or better in [CHEM 1310](#), [CHEM 1319](#), [CHEM 1320](#), [MATH 1214](#), [MATH 1215](#) and [PHYSICS 1135](#) are required to be admitted into the chemical engineering major.

1	A grade of "C" or better is required in CHEM ENG 2100 & CHEM ENG 2110 in order to enroll in CHEM ENG 3120 .
2	Communications emphasized course (See bachelor of science degree, general education communications requirement).
3	Chemical engineering majors are encouraged to take the fundamentals of engineering exam prior to graduation. It is the first step toward becoming a registered professional engineer.
4	Must meet the requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog. The prerequisites for the upper level course must be completed with a passing grade.
5	A minimum of 12 credit hours in Science Electives are required. Select three courses from CHEM 2220 , CHEM 4610 , CHEM 4620 , BIO SCI 2213 , BIO SCI 3313 , and BIO SCI 4323 ; and a minimum of two laboratory courses from CHEM 2229 or CHEM 2219 , CHEM 4619 , BIO SCI 2219 , BIO SCI 3319 , and BIO SCI 4329 .
6	The programming elective consists of a lecture and lab combination, and may be selected from

[COMP SCI 1971/COMP SCI 1981](#), [COMP SCI 1972/COMP SCI 1982](#), or [COMP SCI 1570/COMP SCI 1580](#). Note that [COMP SCI 1570/COMP SCI 1580](#) requires one more credit hour than the other options. The lecture component must be completed with a grade of "C" or better.

Justification for request

Updated name: "Freshman Engineering Program" to "Foundational Engineering and Computing Program."
(change submitted by Brittany Parnell)

Giving students more time to complete Stat 3113 before it is needed in the senior year.

Specifying SP&M S 1185 to fulfill one of the Humanities/Social Science course requirements.

Supporting Documents

Course Reviewer Comments

Key: 150

Program Change Request

Date Submitted: 01/10/20 3:08 pm

Viewing: **CHEM-BA : Chemistry BA**

File: 151.12

Last approved: 12/03/19 4:24 pm

Last edit: 01/13/20 10:55 am

Changes proposed by: tschuman

Catalog Pages Using this Program

[Chemistry](#)

Start Term

Fall 2020

Program Code

CHEM-BA

Department

Chemistry

Title

Chemistry BA

Program Requirements and Description

In Workflow

1. **RCHEMIST Chair**
2. **CCC Secretary**
3. **Sciences DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. **Campus Curricula Committee Chair**
7. **FS Meeting Agenda**
8. **Faculty Senate Chair**
9. **Registrar**
10. **Kristy Giacomelli-Feys**

Approval Path

1. 12/03/19 4:46 pm
Rainer Glaser (GlaserR):
Approved for RICHEMIST Chair
2. 12/09/19 2:07 pm
Brittany Parnell (ershenb): Rollback to Initiator
3. 01/11/20 2:02 pm
Rainer Glaser (GlaserR):
Approved for RICHEMIST Chair
4. 01/13/20 10:56 am
Brittany Parnell (ershenb):
Approved for CCC Secretary
5. 01/17/20 3:43 pm
Katie Shannon (shannonk):
Approved for Sciences DSCC Chair
6. 01/20/20 8:52 pm
Brittany Parnell (ershenb):
Approved for Pending CCC Agenda post

History

1. Mar 18, 2014 by
Lahne Black (lahne)
2. Jul 15, 2015 by
pantaleoa
3. Jun 18, 2018 by
Thomas Schuman
(tschuman)
4. Dec 3, 2019 by
Thomas Schuman
(tschuman)

Bachelor of Arts Chemistry

Freshman Year			
First Semester	Credits	Second Semester	Credits
CHEM 1310	4	CHEM 1320	3
CHEM 1319	1	CHEM 1510	2
CHEM 1100	1	MATH 1215	4
MATH 1208	5	HISTORY 1100	3
ENGLISH 1120	3	MATH 1224	5
MATH 1214	4	Humanities Electives	3
	13		15
Sophomore Year			
First Semester	Credits	Second Semester	Credits
CHEM 2210	3	CHEM 2220	3
CHEM 2219	1	CHEM 2229	1
Electives	6	ENGLISH 1160	3
HISTORY 1200	3	Social Elective	3
Humanities Elective	3	Elective	6
	16		16
Junior Year			
First Semester	Credits	Second Semester	Credits
CHEM 2510	4	PHYSICS 2135	4
PHYSICS 1114	4	Chem Electives (see list below)	4
PHYSICS 1119	4	PHYSICS 2114	4
STAT 3113	3	PHYSICS 2119	4
PHYSICS 1135	4	Electives	7
Elective	4		
	15		15
Senior Year			

First Semester	Credits	Second Semester	Credits
CHEM 3410 , or 3430 , or 3420	3	CHEM 4010	1
CHEM 3419 or 3429	1	Humanities Elective	3
Humanities Elective Literature	3	Social Sciences Elective	3
Social Electives	6	Electives	7
Elective	3		
	16		14
Total Credits: 120			

Students must complete a minimum of 120 credit hours for the bachelor of arts in chemistry degree. Students may have to take more than the minimum number of coursework hours to comply with the B.A. requirements due to variations in minor degree and foreign language requirements within an individual's program of study.

Elective credits include a required minor in one of the following areas: English, economics, history, philosophy, psychology, sociology, communications, speech, media, political science, music, mathematics, statistics, foreign language, computer science, biology, or art. See Undergraduate catalog for courses required for specific minor. All chemistry majors are encouraged to do research through [CHEM 4099](#). A total of **12** ~~9~~ credits of a modern foreign language must also be taken as part of the electives above.

Chem Elective must be from one or more of the following: [CHEM 4099](#), [CHEM 4210](#), [CHEM 4297](#), [CHEM 4310](#), [CHEM 4410](#), [CHEM 4420](#), [CHEM 4510](#), [CHEM 4610](#), [CHEM 4619](#), [CHEM 4620](#), [CHEM 4630](#), ~~[CHEM 4710](#)~~, [CHEM 4810](#), [CHEM 4819](#), [CHEM 4850](#). This program of study allows students to design, in conjunction with their chemistry advisor, a program for many disciplines including pre-law, business, pre-dentistry, pre-veterinary medicine, as well as pre-medicine. An example of such a program is shown for pre-medical studies:

BIO SCI 1113	General Biology	3
BIO SCI 1219	General Biology Lab	2
BIO SCI 2213	Cell Biology	3
BIO SCI 2219	Cell Biology Laboratory	1
CHEM 4610	General Biochemistry	3
CHEM 4619	General Biochemistry Laboratory	2

A grade of "C" or better is required for each Chemistry course counted towards the degree.

Bachelor of Arts Chemistry Secondary Education Emphasis Area

Freshman Year			
First Semester	Credits	Second Semester	Credits
CHEM 1310	4	CHEM 1320	3
CHEM 1319	1	CHEM 1510	2
CHEM 1100	1	ENGLISH 1160	3
ENGLISH 1120	3	MATH 1215	4
MATH 1214	4	BIO SCI 1113	3
PSYCH 1101	3	EDUC 1104	2
EDUC 1040	2		
	18		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits

CHEM 2210	3	CHEM 2220	3
CHEM 2219	1	CHEM 2229	1
PHYSICS 1135	4	STAT 3113	3
EDUC 2102 or PSYCH 2300	3	PHYSICS 2135	4
ENGLISH 1221 or 1222	3	EDUC 3216	3
EDUC 1174	2	SP&M S 1185	3
	16		17
Junior Year			
First Semester	Credits	Second Semester	Credits
CHEM 2510	4	CHEM 3410 , or 3430 , or 3420	3
PHYSICS 1505 or GEOLOGY 1110	3	CHEM 3419 or 3429	1
ENGLISH 3170	3	HISTORY 3530	3
BIO SCI 2263	3	EDUC 4310 or PSYCH 4310	3
EDUC 1164	2	ART 1180 , or an art , or music , or theatre course	3
HISTORY 1100	3	HISTORY 1200	3
Humanities Elective	3		
	18		16
Senior Year			
First Semester	Credits	Second Semester	Credits
CHEM 4010	1	EDUC 4298	1
EDUC 3280	6	EDUC 4299	12
PSYCH 3310	3		
PHILOS 1105	3		
CHEM 4610	3		
CHEM 4619	2		
	18		13
Total Credits: 133			

Students must complete a minimum of ~~133~~ ~~136~~ credit hours for the Bachelor of Arts in Chemistry degree with a Secondary Education Emphasis Area. The degree program is intended to culminate in a Certification Recommendation for an initial Missouri teaching certification. Students should also consult the Secondary Teacher Education Program section for Teacher Certification requirements through the Education **department**. **A Bachelor of Science in Chemistry degree with a Secondary Education Emphasis Area may be obtained by taking an additional 40 credit hours of mostly upper level Chemistry courses (see your academic advisor for a schedule of classes or more information).**

~~department.~~

For this Bachelor of Arts degree program, the minor degree and foreign language requirements of the typical program of study are waived and there are other course substitutions in lieu of education coursework and requirements. A total of nine humanities credit hours are required to be selected from [ENGLISH 1221](#) or [ENGLISH 1222](#) ; [PHILOS 1105](#) ; and one of [ART 1180](#) , [MUSIC 1150](#) , ~~[ENGLISH 1222](#) , [PHILOS 1105](#) , [ART 1180](#) , [MUSIC 1150](#) ,~~ or [THEATRE 1190](#) .

Four **credit** hours of ~~a~~ Chemistry Elective must be selected from one or more of the following: [CHEM 4210](#) , [CHEM 4297](#) , [CHEM 4410](#) , [CHEM 4510](#) , [CHEM 4610](#) , [CHEM 4619](#) , [CHEM 4620](#) , [CHEM 4710](#) , [CHEM 4810](#) , [CHEM 4819](#) , [CHEM 4850](#) , and/or ~~and~~ [CHEM 4099](#) . [CHEM 4099](#) may not count for more than **3 credit hours toward** ~~3 hr credit toward~~ the degree. All chemistry majors are encouraged to do research through [CHEM 4099](#) .

A grade of "C" or better is required for each Chemistry course counted towards the degree.

Justification for request

BA: updating the degree plan to include new (different) courses offered on campus and to BA minimum standards, e.g., foreign language.

BA w/secondary ed emph: The requirements that were recently edited and approved should not have listed a junior year general humanities elective, since the 9 hours of humanity are already stipulated in text below as: Eng 1221 or 1222; Phil 1105; and one of either Art 1180, Music 1150, or Theatre 1190. Adds language stating how many additional credit hours are needed to obtain a BS with 2dary Ed Emph.

Supporting Documents

[BA vs BS hr.pdf](#)

Course Reviewer Comments

ershenb (12/09/19 2:07 pm): Rollback: Rollback per email with Dr. Schuman.

ershenb (01/13/20 10:53 am): formatting

ershenb (01/13/20 10:55 am): .

Key: 151

Program Change Request

Date Submitted: 01/15/20 2:20 pm

Viewing: **CMP SC-BS : Computer Science BS**

File: 28.64

Last approved: 06/14/19 2:14 pm

Last edit: 01/15/20 2:20 pm

Changes proposed by: ershenb

Catalog Pages Using this Program
[Computer Science](#)

Start Term

Fall **2020** ~~2019~~

Program Code

CMP SC-BS

Department

Computer Science

Title

Computer Science BS

Program Requirements and Description

In Workflow

1. RCOMPSCI Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/15/20 2:48 pm
Bruce McMillin (ff):
Approved for
RCOMPSCI Chair
2. 01/15/20 2:58 pm
Brittany Parnell
(ershenb):
Approved for CCC
Secretary
3. 01/17/20 9:57 am
Stephen Raper
(sraper): Approved
for Engineering
DSCC Chair
4. 01/20/20 8:52 pm
Brittany Parnell
(ershenb):
Approved for
Pending CCC
Agenda post

History

1. Aug 5, 2014 by
Daniel Tauritz
(tauritzd)
2. Aug 13, 2014 by
pantaleoa
3. Jun 19, 2015 by
Daniel Tauritz
(tauritzd)

4. Jul 15, 2015 by
pantaleoa
5. Jun 28, 2017 by
Daniel Tauritz
(tauritzd)
6. Jun 14, 2019 by
Daniel Tauritz
(tauritzd)

Bachelor of Science Computer Science

Entering first year students desiring to study computer science will be admitted to the **Foundational Engineering and Computing Program**. ~~First Year Experience program~~. They will, however, be permitted, if they wish, to state a computer science preference, which will be used as a consideration for available first year departmental scholarships. The focus of **the Foundational Engineering** ~~the First Year Experience program is on enhanced advising~~ and **Computing 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 Computer Science, a minimum of 128 credit hours is required. This requirement is in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. A "C" or better grade must be earned in each computer science course used to fulfill B.S. in computer science degree requirements as well as in [COMP ENG 2210](#), [COMP ENG 3150](#), and the required ethics elective.

The computer science curriculum requires twelve semester hours in humanities, exclusive of foreign language, and must include [ENGLISH 1160](#) or [ENGLISH 3560](#). A minimum of nine semester hours is required in social sciences, including either [HISTORY 1300](#), [HISTORY 1310](#), [HISTORY 1200](#), or [POL SCI 1200](#). Specific requirements for the bachelor degree are outlined in the sample program listed below.

Sample Course of Study

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	COMP SCI 1200	3
COMP SCI 1500 ¹	3	COMP SCI 1570	3
Laboratory Science Elective ²	5	COMP SCI 1580	1
MATH 1214 ³	4	MATH 1215 ⁴	4
ENGLISH 1120	3	ENGLISH 1160 or 3560	3
		Humanities / Social Science Elective ⁵	3
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
COMP SCI 1575	3	COMP SCI 2200	3
COMP SCI 1585	1	COMP SCI 2500	3
COMP ENG 2210 ⁶	3	PHYSICS 2135 ⁹	4
PHYSICS 1135 ⁷	4	COMP ENG 3150 ⁶	3
Statistics Elective ⁸	3	Literature Elective ¹⁰	3
Humanities / Social Science Elective ⁵	3		
	17		16

Junior Year			
First Semester	Credits	Second Semester	Credits
COMP SCI 2300	3	COMP SCI 3500	3
COMP SCI 3800	3	COMP SCI 3610	3
MATH 3108	3	Cmp Sc Elective ¹²	3
Humanities / Social Science Elective ⁵	3	Sci/Eng Elective ¹³	3
Ethics Elective ¹¹	3	SP&M S 1185 ¹⁴	3
	15		15
Senior Year			
First Semester	Credits	Second Semester	Credits
COMP SCI 4090	3	COMP SCI 4091	3
COMP SCI 4610	3	Cmp Sc Electives ¹²	3
Cmp Sc Electives ¹²	6	Humanities / Social Science Elective ⁵	3
Sci/Eng Elective ¹³	3	Free Elective ¹⁵	8
	15		17
Total Credits: 128			

¹ May be waived in lieu of a score of 4 or 5 on the AP Computer Science A exam.

² An approved science lecture-laboratory course pair totaling at least four credit hours. The laboratory is mandatory in all cases. The approved course pairs are: [CHEM 1310](#) and [CHEM 1319](#); [PHYSICS 1505](#) and [PHYSICS 1509](#); [PHYSICS 1605](#) and [PHYSICS 1609](#); [GEOLOGY 1110](#) and [GEOLOGY 1119](#); [GEOLOGY 1120](#) and [GEOLOGY 1129](#); [BIO SCI 1113](#) and [BIO SCI 1219](#); [BIO SCI 1223](#) and [BIO SCI 1229](#); [BIO SCI 2213](#) and [BIO SCI 2219](#); [BIO SCI 2353](#) and [BIO SCI 2359](#); [BIO SCI 2383](#) and [BIO SCI 2389](#).

³ Or [MATH 1208](#).

⁴ Or [MATH 1221](#).

⁵ Any nine credit hours of social science courses and three credit hours of humanities courses on the approved lists maintained on the computer science website. One course must satisfy the Missouri and U.S. Constitution requirement. [COMP SCI 4700](#) may be counted as a Social Science elective.

⁶ Laboratory not required.

⁷ Or both [PHYSICS 1111](#) and [PHYSICS 1119](#).

⁸ One of [STAT 3113](#), [STAT 3115](#), [STAT 3117](#), or [STAT 5643](#).

⁹ Or both [PHYSICS 2111](#) and [PHYSICS 2119](#).

¹⁰ One literature course on the approved list maintained on the computer science website.

¹¹ One of [PHILOS 3225](#), [PHILOS 3235](#), [PHILOS 4340](#), or [PHILOS 4368](#).

¹² Twelve hours of elective COMP SCI courses excluding [COMP SCI 2002](#), [COMP SCI 4700](#), COMP SCI 2001 - Domain Exploration and Innovation Methods, COMP SCI 3001 - Skill Development for Entrepreneurs and Innovators, COMP SCI 4001 - Advanced Domain Exploration and Innovation Methods, COMP SCI 4001 - Interpersonal Dynamics for Entrepreneurs and Innovators, and all COMP SCI x9xx courses. At least nine hours must be 5000-level or higher. At least nine hours must be lecture courses.

¹³ Any six hours chosen from departments that offer a degree associated with either the Discipline Specific Curricula Committee for Sciences or the Discipline Specific Curricula Committee for Engineering, excluding Computer Science. The following courses are also excluded: all 1000-level MATH courses, all STAT courses below 4000-level, all 1000-level Physics courses, [PHYSICS 2111](#), [PHYSICS 2119](#), [PHYSICS 2135](#), and [PHYSICS 2145](#).

¹⁴ [SP&M S 1185](#) or [SP&M S 3245](#) or [THEATRE 3245](#) or one of the two complete four-course sequences in Advanced ROTC

([MIL ARMY 3250](#), [MIL ARMY 3500](#), [MIL ARMY 4250](#), and [MIL ARMY 4500](#); or [MIL AIR 3110](#), [MIL AIR 3120](#), [MIL AIR 4110](#) and [MIL AIR 4120](#)).

- ¹⁵ Courses chosen from any discipline so that 128 hours are completed. These and only these courses may be taken pass/fail and only one course may be taken pass/fail each semester. The following courses are excluded: all 1000-level MATH courses, all STAT courses below 4000-level, all 1000-level Physics courses, [PHYSICS 2111](#), [PHYSICS 2119](#), [PHYSICS 2135](#), [PHYSICS 2145](#), any COMP SCI x9xx courses, and the first two years of ROTC.

Justification for request

Updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Key: 28

Program Change Request

Date Submitted: 07/22/19 1:03 pm

Viewing: **CP ENG-BS : Computer Engineering BS**

File: 153.67

Last approved: 05/14/19 11:25 am

Last edit: 01/13/20 2:05 pm

Changes proposed by: stanleyj

Catalog Pages Using this Program
[Computer Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

CP ENG-BS

Department

Electrical and Computer Engineering

Title

Computer Engineering BS

Program Requirements and Description

In Workflow

1. RELECENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 07/24/19 2:10 pm
Daryl Beetner
(daryl): Approved for RELECENG Chair
2. 07/24/19 3:13 pm
Brittany Parnell
(ershenb): Approved for CCC Secretary
3. 01/13/20 2:05 pm
Brittany Parnell
(ershenb): Rollback to RELECENG Chair for Engineering DSCC Chair
4. 01/14/20 7:34 pm
Daryl Beetner
(daryl): Approved for RELECENG Chair
5. 01/15/20 1:19 pm
Brittany Parnell
(ershenb): Approved for CCC Secretary
6. 01/17/20 9:57 am
Stephen Raper
(sraper): Approved

for Engineering
DSCC Chair
7. 01/20/20 8:52 pm
Brittany Parnell
(ershenb):
Approved for
Pending CCC
Agenda post

History

1. Aug 6, 2014 by Stanley (stanleyj)
2. Aug 13, 2014 by pantaleoa
3. Sep 21, 2015 by kleb6b
4. Apr 25, 2016 by Stanley (stanleyj)
5. Dec 1, 2016 by Stanley (stanleyj)
6. Sep 19, 2017 by Stanley (stanleyj)
7. Jun 18, 2018 by Stanley (stanleyj)
8. Nov 2, 2018 by Stanley (stanleyj)
9. May 2, 2019 by Stanley (stanleyj)
10. May 14, 2019 by Brittany Parnell (ershenb)

Bachelor of Science Computer Engineering¹

Entering freshmen desiring to study Computer Engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will be permitted to state a Computer Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the **Foundational Freshman-Engineering and Computing** program is on enhanced advising **and 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 Computer Engineering, a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. At least two grade points per credit hour must also be attained in all courses taken in Computer Engineering.

Electrical and Computer Engineering degree programs will require a minimum of 21 credit hours of humanities/social-sciences as specified below:

- [ENGLISH 1120](#)
- [HISTORY 1200](#) or [HISTORY 1300](#) or [HISTORY 1310](#) or [POL SCI 1200](#)
- [ECON 1100](#) or [ECON 1200](#)
- Technical Communication Elective: [ENGLISH 1160](#) or [ENGLISH 3560](#)
- [SP&M S 1185](#)
- The remaining minimum of 6 additional credit hours must be three-credit hour lecture courses offered in disciplines in the humanities and social sciences. Humanities courses are defined as those in: Art, English and Technical Communication, Etymology, Foreign Languages, Music, Philosophy, Speech and Media Studies, and Theatre. Social Sciences courses are defined as those in: Economics, History,

Political Science, and Psychology. Study abroad courses may count as H/SS courses. H/SS courses numbered 2001, 3001, and 4001 (experimental courses) may also be used to complete these elective requirements.

Courses in business, education, information science and technology, or any other discipline not listed above will **not** satisfy the humanities/social sciences elective requirement, although such courses may count toward general education requirements. Transfer credits from other universities in sociology and general humanities may count as humanities or social science electives.

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

Free Electives Footnote:

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.

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100 ²	1	MECH ENG 1720	3
MATH 1214 ³	4	COMP SCI 1500	3
CHEM 1310	4	MATH 1215 ³	4
CHEM 1319	1	PHYSICS 1135 ^{3,4}	4
HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3	ECON 1100 or 1200	3
ENGLISH 1120	3	Elective-Hum or Soc (any level) ⁵	3
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
ELEC ENG 2100 ^{3,6,7}	3	COMP ENG 2210 ^{3,6,8}	3
ELEC ENG 2101 ^{3,6}	1	COMP ENG 2211 ^{3,6}	1
MATH 2222 ³	4	ELEC ENG 2120 ^{3,7,9}	3
COMP SCI 1570 ³	3	MATH 3304 ³	3
COMP SCI 1580 ³	1	COMP SCI 1200 ³	3
PHYSICS 2135 ^{3,4}	4	COMP SCI 1575	3
	16		16
Junior Year			
First Semester	Credits	Second Semester	Credits
COMP ENG 3110	3	COMP ENG Elective A ^{3,14}	3
COMP ENG 3150	3	ELEC ENG 3410 ^{3,6,9}	3
COMP ENG 3151 ^{3,6,8}	1	COMP SCI 3800 or 2500 ³	3
ELEC ENG 2200 ^{3,6,7}	3	STAT 3117 ¹²	3
ELEC ENG 2201 ^{3,6,7}	1	Communication Elective ¹³	3
Mathematics Elective ¹⁰	3		
SP&M S 1185 ¹³	3		
	17		15

Senior Year			
First Semester	Credits	Second Semester	Credits
COMP ENG 5410 ³	3	COMP ENG Elective D ^{3,15,16}	3
COMP ENG Elective C ^{3,15,16}	3	COMP ENG Elective E ^{3,15,16}	3
COMP ENG 4096 ^{3,17}	1	COMP ENG 4097 ^{3,17}	3
Elective-Hum or Soc (any level) ⁵	3	Professional Development Elective ²⁰	3
Engineering Science Elective ¹¹	3	Free Elective ¹⁸	3
COMP ENG Elective B ^{3,19}	3		
	16		15
Total Credits: 128			

Notes: Student must satisfy **the common** ~~the common engineering~~-freshman year **academic** requirements and be admitted into the department.

1	The minimum number of hours required for a degree in Computer Engineering is 128.
2	Students that transfer to Missouri S&T after their freshman year are not required to enroll in Foundational Engineering and Computing Seminars.
3	A minimum grade of "C" must be attained in MATH 1214 , MATH 1215 , MATH 2222 , and MATH 3304 , PHYSICS 1135 and PHYSICS 2135 (or their equivalents), COMP SCI 1570 , COMP SCI 1580 , COMP SCI 1575 , COMP SCI 1200 , COMP SCI 2500 or COMP SCI 3800 , COMP ENG 2210 , COMP ENG 2211 , COMP ENG 3150 , COMP ENG 3151 , COMP ENG 3110 , COMP ENG 5410 , COMP ENG 4096 , and ELEC ENG 2100 , ELEC ENG 2101 , ELEC ENG 2120 , ELEC ENG 2200 , ELEC ENG 2201 , and ELEC ENG 3410 and the COMP ENG electives A, B, C, D and E. Also, students may not enroll in other courses that use these courses as prerequisites until the minimum grade of "C" is attained.
4	Students may take PHYSICS 1111 and PHYSICS 1119 in place of PHYSICS 1135 . Students may take PHYSICS 2111 and PHYSICS 2119 in place of PHYSICS 2135 .
5	All electives must be approved by the student's advisor. Students must comply with the general education requirements with respect to selection and depth of study. These requirements are specified in the current catalog.
6	Students who drop a lecture course prior to the deadline to drop a class must also drop the corequisite lab course.
7	Students must earn a passing grade on the ELEC ENG Advancement Exam I (associated with ELEC ENG 2100) before they enroll in ELEC ENG 2120 or ELEC ENG 2200 and ELEC ENG 2201 .
8	Students must earn a passing grade on the COMP ENG Advancement Exam (associated with COMP ENG 2210) before they enroll in any course with COMP ENG 2210 and COMP ENG 2211 as prerequisites.
9	Students must earn a passing grade on the ELEC ENG Advancement Exam II (associated with ELEC ENG 2120) before they enroll in ELEC ENG 3410 .
10	Students must take one of the following courses: MATH 3108 , MATH 3109 , MATH 5302 , MATH 5603 , MATH 5105 , MATH 5106 , MATH 5107 , MATH 5108 , MATH 4209 , MATH 4211 , MATH 5215 , MATH 5222 , MATH 5325 , MATH 4530 , MATH 5737 , MATH 5351 , MATH 5154 , MATH 4096 , MATH 5483 , MATH 5585 , STAT 5644 , STAT 5346 , STAT 5353 .
11	Students must take one of MECH ENG 2340 , MECH ENG 2519 , MECH ENG 2527 , PHYSICS 2311 , PHYSICS 2401 , CHEM 2210 , BIO SCI 2213 , BIO SCI 2223 , CIV ENG 2200 , MECH ENG 2350 , PHYSICS 2305 , PHYSICS 4311 , CER ENG 4240 , or NUC ENG 3205 .
12	Students may replace STAT 3117 with STAT 3115 or STAT 5643 .
13	Student must take English 3560 or English 1160. Students may replace SpMS 1185 with the ROTC sequence of Mil Army 4250 and 4500 or Mil Air 4110 and 4120
14	Comp Eng Elective A must be a 4000 or 5000-level Comp Eng, Elec Eng, or Comp Sci course with at least a 3-hour lecture component. This normally includes all Comp Eng and Elec Eng 4000 or 5000-level courses except Comp Eng or Elec Eng 4000, 4099, 4096, and 4097 or Comp Sci 5000, 4010, 5600, and 4099.

15	Comp Eng Electives C, D, and E must be 3000, 4000 or 5000-level courses from an approved list of science, mathematics, and engineering courses. In particular, this list includes all 3000, 4000 or 5000-level Comp Eng, Elec Eng and Comp Sci courses except required courses in Comp Eng, Elec Eng, and Comp Sci and except Comp Eng 4096 and 4097, Elec Eng 2800, 1002, 1003, 4096, and 4097, and Comp Sci 2002 and 4600/5600). Comp Eng Electives C, D, and E must include at least six hours of engineering or computer science courses.
16	COMP ENG Electives C, D, and E cannot include more than three hours of COMP ENG 4000 , COMP ENG 4099 , ELEC ENG 4000 , or ELEC ENG 4099 .
17	Students pursuing dual degrees in COMP ENG and ELEC ENG may take either COMP ENG 4096 or ELEC ENG 4096 and COMP ENG 4097 or ELEC ENG 4097 . Students may not receive credit for both COMP ENG 4096 and ELEC ENG 4096 or COMP ENG 4097 and ELEC ENG 4097 in the same degree program.
18	Students are required to take at least three credit hours. Elec Eng 2800 level, ELEC ENG 4096 , ELEC ENG 4097 , COMP ENG 4096 and COMP ENG 4097 may not be used for free electives. No more than one credit hour of COMP ENG 3002 or ELEC ENG 3002 may be applied to the BS degree for free electives.
19	Comp Eng Elective B must be a 4000 or 5000 level COMP ENG course with at least a 3-hour lecture component, excluding COMP ENG 4096 and COMP ENG 4097 . Students admitted to the accelerated BS/MS program must satisfy Cp Eng Electives B and C with 5xxx or 6xxx-level courses and a minimum grade of B.
20	Students must take one of the following courses: BUS 5980 , ECON 4430 , ECON 5337 , ENG MGT 2310 , ENG MGT 3320 , ENG MGT 4110 , ENG MGT 5514 , PHILOS 3225 .

An accelerated BS/MS program is optional.

Emphasis Areas for Computer Engineering

Note: The following emphasis areas identify courses from which a student may opt to develop a specific emphasis. It is not required that students obtain an emphasis specialty within computer engineering.

Computational Intelligence

Highly Recommended		
COMP ENG 5310	Computational Intelligence	3
ELEC ENG 5370	Introduction to Neural Networks and Applications	3
COMP ENG 6310	Markov Decision Processes	3
Suggested		
ELEC ENG 5330	Fuzzy Logic Control	3
COMP ENG 5450	Digital Image Processing	3
COMP ENG 5460	Machine Vision	3

Computer Architecture and Embedded Systems

Highly Recommended		
COMP ENG 5110	Principles of Computer Architecture	3
COMP ENG 5120	Digital Computer Design	3
COMP ENG 5151	Digital Systems Design Laboratory	3
COMP ENG 5160	Embedded Processor System Design	3
COMP ENG 5170	Real-Time Systems	3
Suggested		
COMP ENG 5610	Real-Time Digital Signal Processing	3
COMP ENG 5130	Advanced Microcomputer System Design	3

ELEC ENG 3100	Electronics I	3
COMP SCI 3100	Software Engineering I	3

Integrated Circuits and Logic Design

Highly Recommended		
COMP ENG 2210	Introduction to Digital Logic	3
COMP ENG 5210	Introduction To VLSI Design	3
COMP ENG 5220	Digital System Modeling	3
COMP ENG 6210	Digital Logic	3
Suggested		
ELEC ENG 3100	Electronics I	3
COMP ENG 5110	Principles of Computer Architecture	3
COMP ENG 5151	Digital Systems Design Laboratory	3
COMP ENG 5120	Digital Computer Design	3
COMP ENG 5130	Advanced Microcomputer System Design	3
COMP ENG 5510	Fault-Tolerant Digital Systems	3

Networking, Security, and Dependability

Highly Recommended		
COMP ENG 5420	Introduction to Network Security	3
COMP ENG 5430	Wireless Networks	3
COMP ENG 6440	Network Performance Analysis	3
COMP ENG 6510	Resilient Networks	3
Suggested		
COMP ENG 5510	Fault-Tolerant Digital Systems	3

Accelerated BS/MS Program Option for EE and CpE Majors

Electrical engineering or computer engineering undergraduates in ECE at Missouri S&T may opt to apply for an accelerated BS/MS ECE program where a student can achieve both degrees faster than if pursuing the degrees separately. The degrees may be BS EE and MS EE, BS CpE and MS CpE, BS EE and MS CpE, or BS CpE and MS EE. The benefits of the program for admitted students are:

- Undergraduate and graduate courses may be chosen with greater flexibility,
- Up to six hours of 5000-level or above ECE coursework may apply to both the BS and MS requirements,
- The classes taken for shared BS/MS credit may be taken at the lower undergraduate tuition rate,
- The GRE is not required for admission,
- Other graduate credit courses may be taken anytime after entering the program, and
- Work on a thesis project may begin before the BS requirements are completed.

The BS-degree requirements are modified for admitted students such that EE Electives D and E or CpE Electives B and C will be satisfied by six-credit-hours of 5000-level or above ECE coursework. To be eligible for the accelerated BS/MS ECE program, an EE or CpE undergraduate must be at or beyond the junior level with a minimum of 60 credit hours and must have completed 18 credit hours of EE and/or CpE courses at Missouri S&T with at least a 3.50 GPA in the ECE courses. To be admitted, the student must complete the program application and must have the recommendation of an ECE faculty member who agrees to serve as the graduate thesis advisor. No other MS degree requirements are changed. The MS degree must be for the thesis option. The program may be combined with existing honors research and emphasis area options. Admitted students will have both undergraduate and graduate records in the Registrar's Office.

The Accelerated program application must be completed within one semester after the shared-credit courses are completed. Courses taken for shared credit will be identified on this application form and on Graduate Form 1, which is submitted after the student enters the graduate program. The six hours of shared-credit coursework will be taken as undergraduate credit, must be approved by the academic advisor, and may not be undergraduate research, special problems, or transfer courses (a co-listed course can only apply for these undergraduate requirements if it is under an EE or CpE registration. Note that the choice of EE or CpE registration may affect how a course can apply within an MS program.) An additional six credit hours of coursework for graduate credit (beyond the shared BS/MS credits) can be taken while in the undergraduate program by applying for dual undergraduate/graduate enrollment. Taking additional courses for graduate credit will require formal application to the graduate program. Acceptance to the MS degree from the Accelerated Program is automatic so long as the student meets ECE graduate student academic performance requirements. To remain in the program, the student must maintain good standing within the undergraduate EE or CpE program and must maintain continuous enrollment at Missouri S&T. If the student exits the program before completion of the MS degree requirements or fails to maintain continuous enrollment at Missouri S&T, the shared-credit courses may not apply toward graduate requirements in the event of future readmission.

The student is responsible for checking on how dual-enrollment status and graduate coursework will affect scholarships and other financial aid. Once you become a graduate student, you **are not** eligible for Federal Pell Grants, though are still eligible for Federal Financial Aid and will be eligible for fellowships and teaching/research assistantships. International students should check with international affairs during completion of an accelerated BS/MS to ensure immigration status will be maintained throughout the program.

Justification for request

Updated name: "Freshman Engineering Program" to "Foundational Engineering and Computing Program."

Supporting Documents

[**Substituting CS 1500 for ME 1720 - Justification - 072219.docx**](#)

Course Reviewer Comments

ershenb (07/24/19 3:11 pm): updated start term to Fall 2020.

ershenb (01/13/20 11:15 am): Updated name: "Freshman Engineering Program" to "Foundational Engineering and Computing Program."

ershenb (01/13/20 11:22 am): .

ershenb (01/13/20 2:05 pm): Rollback: Per email with Dr. Raper about FEP changing to Foundational Engineering and Computing

Key: 153

Substituting CS 1500 for ME 1720 is being done to address changes in the Computer Science BS curriculum with CS 1500 becoming a prerequisite for CS 1570, which is a required, core course in the Computer Engineering BS curriculum. The vote by the Computer Engineering Faculty (May 13, 2019) to substitute CS 1500 for ME 1720 was 5-2 in favor of the substitution.

For this substitution, the Computer Engineering BS curriculum was reviewed to determine that engineering design is appropriately covered. In addressing the new ABET 2019-2020 requirements, the following is a listing of courses in the Computer Engineering curriculum which include engineering design (in the section **New ABET 2019-2020 Requirement**). Overall, there are 16 credit hours in the Computer Engineering curriculum which include design components. In addition the Computer Engineering BS curriculum was reviewed to determine that are appropriate measures related to engineering design (in the section **ABET 2019-2020 Outcome 2**). Upon inspecting the current measures related to engineering design as part of the ABET data collection process, there are several measures that are currently being used to evaluate students' engineering design proficiency. In the fall 2019 semester, the Computer Engineering faculty will review the current measures related to engineering design as part of the ABET continuous improvement process.

New ABET 2019-2020 Requirement

(b) a minimum of 45 semester credit hours (or equivalent) of engineering topics appropriate to the program, consisting of engineering and computer sciences and engineering design, and utilizing modern engineering tools.

Course	Engineering and Computer Sciences	Engineering Design	Utilizing Modern Engineering Tools	Credit Hours
Engineering				
CpE 2210/111 - Introduction to Digital Logic	x	x	x	3
CpE 2211/112 - Computer Engineering Lab I	x	x	x	1
CpE 3150/213 – Introduction to Microcontrollers and Embedded System Design	x	x	x	3
CpE 3151/214 – Computer Engineering Lab II	x	x	x	1
CpE 3110/215 – Computer Organization and Design	x	x		3
CpE 5410/319 – Introduction to Computer Communication Networks	x			3
CpE 4096/391 – Computer Engineering Senior Project I	x	x	X	1
CpE 4097/392 – Computer Engineering Senior Project II	x	x	X	3
CpE Elective A ¹	X			3
CpE Elective B ²	X			3
CpE Elective CDE ³	X			6
EE 2100/151 - Circuits I	X			3
EE 2101/152 - Circuit Analysis Lab I	X	x	x	1
EE 2120/153 - Circuits II	X			3
EE 2200/121 – Introduction to Electronic Devices	X			3
EE 2201/122 – Electronics Devices Lab	X		X	1
EE 3410/215 – Digital Signal Processing	X			3
CS 1570/53 – Introduction to Programming	X			3
CS 1580/054 – Introduction to Programming Lab	X			1
CS 1200/128 – Discrete Mathematics	X			3
CS 1575/153 – Data Structures	X			3
CS 3800/284 – Introduction to Operating Systems	X			3
Total Credit Hours	57	16	14	57

¹CpE Senior Elective A

CpE Senior Elective A must be selected from CpE/EE/CS 4xxx or 5xxx courses (CpE/EE/CS 3xx courses). This normally includes all 4xxx or 5xxx/3xx courses except CpE or EE 4000/300, 4099/390, 4096/391, and 4097/392, or CS 5000/300, 4010/310, 4600 or 5600/365, and 4099/390.

A grade of C or better is required in the Senior Elective A.

²CpE Senior Elective B

CpE Senior Elective B must be selected from CpE 4xxx or 5xxx courses (CpE 3xx courses). This normally includes all 4xxx or 5xxx/3xx courses except CpE 4096/391, and 4097/392.

A grade of C or better is required in the Senior Elective B.

³CpE Senior Electives C, D and E

CpE Senior Electives C, D and E are to be selected from an approved list. This list contains most 3xxx, 4xxx and 5xxx/2xx and 3xx level science, mathematics and engineering courses. **At least six (6) of these fifteen (15) hours must be engineering or computer science courses.** Not more than three hours of CpE or EE 3002/202, 4000/300, or 4099/390 may be applied to the CDE electives.

- Aerospace Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course except AE 4099/202
- Chemical Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Ceramic Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course except ChE 4099/202
- Chemistry – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Civil Engineering – Any 3xxx or 4xxx or 5xxx /200 or 300 level course except CE 4099/202
- Computer Engineering – Any 3xxx or 4xxx or 5xxx /200 or 300 level course except 4096/391, 4097/392 and required courses
- Computer Science – Any 3xxx or 4xxx or 5xxx /200 or 300 level course except CS 4099/202 and required courses
- Electrical Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course except EE 2800/281, 4096/391, 4097/392, and required courses
- Engineering Management – Any 3xxx or 4xxx or 5xxx/200 or 300 level course except EMgt 4099/202
- Engineering Mechanics – Any 3xxx or 4xxx or 5xxx/200 or 300 level course except EM 4099/202
- Geological Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Geology – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Geophysics – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Biological Science – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Mathematics – Any 3xxx or 4xxx or 5xxx/200 or 300 level course except Math 2002/202, Math 3304/204 and Math 3329/229

- Mechanical Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course except ME 4099/202
- Metallurgical Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Mining Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Nuclear Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Petroleum Engineering – Any 3xxx or 4xxx or 5xxx/200 or 300 level course
- Physics – Any 3xxx or 4xxx or 5xxx/200 or 300 level course

A grade of C or better is required in all ABCDE electives.

ABET 2019-2020 Outcome 2

2019-2020 Cycle ABET Student Outcome	Previous ABET Student Outcomes	Mapping of Previous Measures to Meeting Current ABET Student Outcomes
<p>2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors</p>	<p>Outcome c: an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</p>	<ul style="list-style-type: none"> • Selected assignment Digital System Design lecture (CpE 3150). <i>Goal: The median score of the selected assignments will be 80 percent or greater.</i> (Repeated use for Outcome d) <ul style="list-style-type: none"> ○ Collaborative Project Assignment in Digital Systems Design CpE 3150: Students will be asked to design an embedded computer system consisting of both hardware and software. Projects will be performed in teams. Deliverables will include a project demonstration and a short report. Grades reflect the team’s ability to design the system according to the need outlined in the project. • Project proposal report in Senior Design I (CpE 4096). <i>Goal: The median score of the selected assignment will be 80 percent or greater.</i>

		<ul style="list-style-type: none"> ○ Students will prepare a written proposal for their project. The proposal will include an overall description of the requirements for the project as well as their plan for completion. The written proposal will be graded based on the completeness of their plan, appropriateness of the budget, and the timeline details. (The written proposal grade is separate from the oral presentation grade.) ● Project final report in Senior Design II (CpE 4097). <i>Goal: The median score of the selected assignment will be 80 percent or greater.</i> <ul style="list-style-type: none"> ○ Students will prepare a written final report for their project. The proposal will include an overall summary of the project with technical performance measures. The written proposal will be graded based on the completeness of their summary, quality of the technical design, and performance of the device/program/etc. (The written report grade is separate from the oral presentation grade.)
	<p>Outcome h: the broad education necessary to understand the impact of engineering solutions in a global and societal context</p>	<ul style="list-style-type: none"> ● Assignment in Senior Design I (CpE 4096). <i>Goal: The average student assessment will be 3 on a scale of 1(needs improvement)-5(exceptional proficiency).</i> <ul style="list-style-type: none"> ○ Students are given an example of an

		<p>engineering design failure and are asked to evaluate the global and societal issues associated with the engineering decisions involved in the case. Senior design instructors are asked to evaluate each student on the basis of their ability to understand the impact of engineering solutions in a global and societal context.</p> <ul style="list-style-type: none"> • Senior design I (CpE 4096) Report. Goal: <i>The average student assessment will be 3 on a scale of 1(needs improvement)-5(exceptional proficiency).</i> <ul style="list-style-type: none"> ○ Students are asked to describe societal and business factors related to their proposed product design and how they will address them. Senior design instructors are asked to evaluate each student on the basis of their ability to understand the impact of engineering solutions in a global and societal context. • Senior Survey Question: “My education at Missouri S&T provided me with ‘An understanding of the impact of engineering upon the broader society.’ ” Goal: <i>The average response will be 3.5 on a scale of 1(not at all)-5(very well).</i>
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	<p>Outcome k: an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.</p>	<ul style="list-style-type: none"> • Selected assignments in required laboratories of Circuits I (EE 2100), and Intro. to Computer Engineering (CpE 2210). <i>Goal: The median score of the selected assignments will be 80 percent or greater.</i> <ul style="list-style-type: none"> ○ Laboratory Assignment #10 in Circuits I Laboratory EE 2101: Students will simulate the transient behavior of an RC circuit using computer tools. Students will turn in a technical memorandum that describes simulated device/circuit behavior related to theory and documents that show the simulation details. ○ Laboratory Assignment in Computer Engineering Laboratory CpE 2211: Students will design a 4-bit registered arithmetic logic unit using automated design tools. Students will determine how to build the circuit, will develop a testplan, and then will build and simulate the circuit. The students will be graded on their ability to use automated design tools in the process of designing and testing their circuit. • Senior Design II (EE/CpE 4097) Project Rubric. <i>Goal: The average student assessment will be 3 on a scale of 1(needs improvement)-5(exceptional proficiency).</i>
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		<ul style="list-style-type: none">○ Each project faculty advisor will complete a rubric assessing the project team's review of technical literature in project area; use of theory, methodology and techniques for project design, implementation and testing; usage of tools and equipment for project design, implementation and testing.● Senior Survey: "My education at Missouri S&T provided me with<ul style="list-style-type: none">'An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.'"<i>Goal: The average response will be 3.5 on a scale of 1(not at all)-5(very well).</i>
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Program Change Request

Date Submitted: 01/15/20 12:26 pm

Viewing: **CR ENG-BS : Ceramic Engineering BS**

File: 149.27

Last approved: 06/28/17 10:13 am

Last edit: 01/15/20 12:26 pm

Changes proposed by: ershenb

Catalog Pages Using this Program
[Ceramic Engineering](#)

Start Term

Fall 2020 ~~08/14/2017~~

Program Code

CR ENG-BS

Department

Materials Science & Engineering

Title

Ceramic Engineering BS

Program Requirements and Description

In Workflow

1. **RMATSENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. **Campus Curricula Committee Chair**
7. **FS Meeting Agenda**
8. **Faculty Senate Chair**
9. **Registrar**
10. **Kristy Giacomelli-Feys**

Approval Path

1. 01/15/20 12:43 pm
Greg Hilmas
(ghilmas): Approved for RMATSENG Chair
2. 01/15/20 1:19 pm
Brittany Parnell
(ershenb): Approved for CCC Secretary
3. 01/17/20 9:57 am
Stephen Raper
(sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:52 pm
Brittany Parnell
(ershenb): Approved for Pending CCC Agenda post

History

1. Oct 10, 2013 by
Lahne Black (lahne)
2. Apr 22, 2014 by
Lahne Black (lahne)
3. Aug 6, 2014 by F.
Scott Miller (smiller)

- 4. Jun 19, 2015 by F. Scott Miller (smiller)
- 5. Jul 15, 2015 by pantaleoa
- 6. Jun 28, 2017 by F. Scott Miller (smiller)

Bachelor of Science Ceramic Engineering

Entering freshmen desiring to study ceramic engineering will be admitted to the **Foundational Freshman-Engineering and Computing** 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 Foundational the-Freshman-Engineering and Computing** Program is on enhanced advising **and 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 an average of at least two grade points per credit hour in ceramic engineering.

Each student's program of study must contain a minimum 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 history course and one economics course. The history course is to be selected from [HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#).
2. Of the remaining hours, 12 credit hours must be taken in humanities or social sciences from the approved list of humanities and social science (HSS) courses posted on the undergraduate studies website (<http://ugs.mst.edu/>). Students may receive humanities credit for foreign language courses in their native tongue **only** if the course is at the 4000-level.
3. Special topics, special problems courses and honors seminars are allowed **only** by petition to and approval by the student's department chair.

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	MATH 1215	4
CHEM 1310	4	CHEM 1320	3
CHEM 1319	1	PHYSICS 1135	4
MATH 1214	4	H/SS Elective	3
ENGLISH 1120	3	MECH ENG 1720	3
H/SS Elective	3		
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
CER ENG 2110	3	CER ENG 2120	3
CER ENG 2210	2	CER ENG 2325	2
CER ENG 2315	2	CER ENG 3230	3
MATH 2222	4	MATH 3304 ¹	3
PHYSICS 2135	4	H/SS Elective	3
		CIV ENG 2200	3
	15		17

Junior Year			
First Semester	Credits	Second Semester	Credits
CER ENG 3315	2	CER ENG 3325	2
CER ENG 3220	3	CER ENG 3410	3
CIV ENG 2210	3	PHYSICS 2305	3
CER ENG 3210	3	H/SS Elective	3
H/SS Elective	3	Advanced Chemistry Elective ³	3
Technical Elective ²	2	CER ENG 4410	3
	16		17
Senior Year			
First Semester	Credits	Second Semester	Credits
CER ENG 4096	3	CER ENG 4097	3
CER ENG 4310	3	CER ENG 4220	3
CER ENG 4250	3	CER ENG 4240	3
Technical Elective ²	3	Statistics Elective ¹	3
H/SS Elective	3	Technical Elective ²	3
	15		15
Total Credits: 128			

Note 1: Students may substitute [MATH 1208](#) and [MATH 1221](#) for [MATH 1214](#) and [MATH 1215](#), respectively.

¹	All ceramic engineering students must take MATH 3304 and one statistics course (3000-level or higher).
²	Technical electives must be selected from upper level engineering and science courses with the advisor's approval.
³	All ceramic engineering students must select an advanced chemistry elective with the advisor's approval. The courses that can be considered are CHEM 2210 , CHEM 2310 , CHEM 3410 , CHEM 4310 , CHEM 4810, or CHEM 3420 .

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.

Justification for request

Updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Key: 149

Program Change Request

Date Submitted: 01/15/20 10:32 am

Viewing: **CV ENG-BS : Civil Engineering BS**

File: 152.18

Last approved: 09/21/15 10:16 am

Last edit: 01/15/20 10:32 am

Changes proposed by: ershenb

Catalog Pages Using this Program
[Civil Engineering](#)

Start Term

Fall 2020 ~~08/22/2016~~

Program Code

CV ENG-BS

Department

Civil, Architectural, and Environmental Engineering

Title

Civil Engineering BS

Program Requirements and Description

In Workflow

1. RCIVILEN Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/16/20 10:04 am
Joel Burken
(burken): Approved for RCIVILEN Chair
2. 01/16/20 12:42 pm
Brittany Parnell
(ershenb):
Approved for CCC Secretary
3. 01/17/20 9:57 am
Stephen Raper
(sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:52 pm
Brittany Parnell
(ershenb):
Approved for Pending CCC Agenda post

History

1. Sep 27, 2013 by
[Lahne Black \(lahne\)](#)
2. Aug 6, 2014 by
[Lahne Black \(lahne\)](#)
3. Sep 21, 2015 by
[Genda Chen \(gchen\)](#)

Civil Engineering Bachelor of Science

Entering freshmen desiring to study Civil Engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will, however, be permitted, if they wish, to state a Civil Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the **Foundational Freshman-Engineering and Computing Program** ~~program~~ is on enhanced advising **and** ~~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 Civil Engineering a minimum of 129 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. An average of at least two grade points per credit hour must also be attained in all courses taken in Civil Engineering.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

1. All students are required to take one American history course, one economics course, one humanities course, and [ENGLISH 1120](#) . The history course is to be selected from [HISTORY 1200](#) , [HISTORY 1300](#) , [HISTORY 1310](#) , or [POL SCI 1200](#) . The economics course may be either [ECON 1100](#) or [ECON 1200](#) . The humanities course must be selected from the approved lists for art, English, foreign languages, music, philosophy, speech and media studies, or theater.
2. Depth requirement. Three credit hours must be taken in humanities or social sciences at the 2000-level or above and must be selected from the approved list. This course must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 1180 will be considered to satisfy this requirement. Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 4000-level. All courses taken to satisfy the depth requirement must be taken after graduating from high school.
3. The remaining two courses are to be chosen from the list of approved humanities/social sciences courses and may include one communications course in addition to [ENGLISH 1120](#) .
4. Any specific departmental requirements in the general studies area must be satisfied.
5. Special topics and special problems and honors seminars are allowed only by petition to and approval by the student's department chair.

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

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100 ²	1	MECH ENG 1720	3
CHEM 1310 & CHEM 1319	5	MATH 1215	4
MATH 1214	4	PHYSICS 1135	4
ENGLISH 1120	3	General Ed Elective ¹	3
General Ed Elective ¹	3	General Ed Elective ¹	3
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
CIV ENG 2401 ²	3	MECH ENG 2350	2
CIV ENG 2003 ²	3	STAT 3113	3
CIV ENG 2200 ²	3	GEO ENG 1150	3

MATH 2222	4	CIV ENG 2210 ²	3
PHYSICS 2135	4	CIV ENG 2211 ²	1
		MATH 3304	3
	17		15
Junior Year			
First Semester	Credits	Second Semester	Credits
ENG MGT 1210 ²	2	CIV ENG 3116 ²	3
CIV ENG 3201 ²	3	CIV ENG 3842 ²	3
CIV ENG 3715 ²	3	CIV ENG 3500 ²	3
CIV ENG 3330 ²	3	CIV ENG 3334 ²	4
CIV ENG 2601 ²	3	CIV ENG 3220 ²	3
General Ed Elective ¹	3	CIV ENG 4448	3
	17		16
Senior Year			
First Semester	Credits	Second Semester	Credits
CIV ENG 4010 ²	1	CIV ENG 4097 ²	3
(2) CIV ENG Depth Electives ^{3,4}	6	CIV ENG Tech Elective ^{3,5}	3
CIV ENG 4448 ²	3	CIV ENG Depth Elective ^{3,4}	3
CIV ENG 3210 ²	3	General Ed Elective ¹	3
General Ed Elective ¹	3	CIV ENG Tech Elective ^{3,5}	3
CIV ENG 3220	3		
	16		15
Total Credits: 129			

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 [ENGLISH 1160](#), [ENGLISH 3560](#), or [SP&M S 1185](#).

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. A maximum total of 6 credit hours of independent study ([CIV ENG 5000](#) or [CIV ENG 4099](#)) can be used as depth or technical electives in the B.S. Civil Engineering curriculum.

Course Listings by Area

Construction Engineering

CIV ENG 5441	Professional Aspects Of Engineering Practice	3
CIV ENG 5442	Construction Planning and Scheduling Strategies	3
CIV ENG 5445	Construction Methods	3
CIV ENG 5446	Management Of Construction Costs	3
CIV ENG 5448	Green Engineering: Analysis of Constructed Facilities	3
CIV ENG 5449	Engineering and Construction Contract Specifications	3

Materials Engineering

CIV ENG 5112	Bituminous Materials	3
CIV ENG 5113	Composition And Properties Of Concrete	3
CIV ENG 5117	Asphalt Pavement Design	3
CIV ENG 5118	Smart Materials And Sensors	3
CIV ENG 5156	Pavement Design	3

Environmental Engineering

CIV ENG 3615	Water And Wastewater Engineering	3
CIV ENG 5605	Environmental Systems Modeling	3
CIV ENG 5619	Environmental Engineering Design	3
CIV ENG 5630	Remediation of Contaminated Groundwater and Soil	3
CIV ENG 5635	Phytoremediation and Natural Treatment Systems: Science and Design	3
CIV ENG 5640	Environmental Law And Regulations	3
CIV ENG 5642	Sustainability, Population, Energy, Water, and Materials	3
CIV ENG 5650	Public Health Engineering	3
CIV ENG 5660	Introduction To Air Pollution	3
CIV ENG 5662	Air Pollution Control Methods	3
CIV ENG 5665	Indoor Air Pollution	3
CIV ENG 5670	Solid Waste Management	3

Geotechnical Engineering

CIV ENG 4729	Foundation Engineering	3
CIV ENG 5715	Intermediate Soil Mechanics	3
CIV ENG 5716	Geotechnical Earthquake Engineering	3
CIV ENG 5729	Foundation Engineering II	3
CIV ENG 5744	Geosynthetics in Engineering	3
CIV ENG 5750	Transportation Applications of Geophysics	3

Water Resources Engineering

CIV ENG 5330	Unsteady Flow Hydraulics	3
CIV ENG 5331	Hydraulics Of Open Channels	3
CIV ENG 5332	Transport Processes in Environmental Flows	3
CIV ENG 5333	Intermediate Hydraulic Engineering	3

CIV ENG 5335	Water Infrastructure Engineering	3
CIV ENG 5337	River Mechanics And Sediment Transport	3
CIV ENG 5338	Hydrologic Engineering	3
CIV ENG 5360	Water Resources And Wastewater Engineering	3

Structural Engineering

CIV ENG 5004	Special Topics (Structural Masonry Design)	0-6
CIV ENG 5118	Smart Materials And Sensors	3
CIV ENG 5203	Applied Mechanics In Structural Engineering	3
CIV ENG 5205	Structural Analysis II	3
CIV ENG 5206	Low-Rise Building Analysis and Design	3
CIV ENG 5207	Computer Methods of Structural Analysis	3
CIV ENG 5208	Structural Dynamics	3
CIV ENG 5210	Advanced Steel Structures Design	3
CIV ENG 5220	Advanced Concrete Structures Design	3
CIV ENG 5222	Prestressed Concrete Design	3
CIV ENG 5231	Infrastructure Strengthening with Composites	3
CIV ENG 5260	Analysis And Design Of Wood Structures	3
CIV ENG 5270	Structural Masonry Design	3

Transportation Engineering

CIV ENG 5250	Air Transportation	3
CIV ENG 5510	Geometric Design Of Highways	3
CIV ENG 5513	Traffic Engineering	3
CIV ENG 5515	Advanced Traffic Operations and Capacity Analysis	3

Justification for request

Updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."
(changes submitted by Brittany Parnell)

Swapping 4448 from Senior level prerequisite to Junior level prerequisite. Moving 3220 to senior level to accommodate 4448 switch.

Adding in all classes from the course catalog to help alleviate sub/waiver forms and to allow more flexibility for class scheduling for new faculty.(changes submitted by Jody Seely)

Supporting Documents

[Civil course offerings.xlsx](#)

Course Reviewer Comments

Civil Engineering Depth/Tech Electives

Course	Co-Listed	Title
CIV ENG 3615	#	Water and Wastewater Engineering
CIV ENG 4729		Foundation Engineering
CIV ENG 5112		Bituminous Materials
CIV ENG 5113		Composition and Properties of Concrete
CIV ENG 5117		Asphalt Pavement Design
CIV ENG 5118		Smart Materials and Sensors
CIV ENG 5156		Concrete Pavement Design
CIV ENG 5203	*	Applied Mechanics in Structural Engineering
CIV ENG 5205	*	Structural Analysis II
CIV ENG 5206	*	Low-Rise Building Analysis and Design
CIV ENG 5207	*	Computer Methods of Structural Analysis
CIV ENG 5208	*	Structural Dynamics
CIV ENG 5210	*	Advanced Steel Structures Design
CIV ENG 5220	*	Advanced Concrete Structures Design
CIV ENG 5222	*	Prestressed Concrete Design
CIV ENG 5231	*	Infrastructure Strengthening with Composites
CIV ENG 5250		Air Transportation
CIV ENG 5260	*	Analysis and Design of Wood Structures
CIV ENG 5270	*	Structural Masonry Design
CIV ENG 5330		Unsteady Flow Hydraulics
CIV ENG 5331		Hydraulics of Open Channels
CIV ENG 5332		Transport Processes in Environmental Flows
CIV ENG 5333		Intermediate Hydraulic Engineering
CIV ENG 5335		Water Infrastructure Engineering
CIV ENG 5337		River Mechanics and Sediment Transport
CIV ENG 5338		Hydrologic Engineering
CIV ENG 5360	#	Water Resources and Wastewater Engineering
CIV ENG 5404		Legal Aspects of Boundary Surveying
CIV ENG 5406		Surveying Systems
CIV ENG 5441		Profession Aspects of Engineering Practice
CIV ENG 5442	*	Construction Planning and Scheduling Strategies
CIV ENG 5445	*	Construction Methods
CIV ENG 5446	*	Management of Construction Costs
CIV ENG 5448	*	Green Engineering: Analysis of Constructed Facilities
CIV ENG 5449	*	Engineering and Construction Contract Specifications
CIV ENG 5510		Geometric Design of Highways

CIV ENG 5513		Traffic Engineering
CIV ENG 5515		Advanced Traffic Operations and Capacity Analysis
CIV ENG 5605	#	Environmental Systems Modeling
CIV ENG 5619	#	Environmental Engineering Design
CIV ENG 5630	#	Remediation of Contaminated Groundwater and Soil
CIV ENG 5635	#	Phytoremediation and Natural Treatment Systems: Science and Design
CIV ENG 5640	#	Environmental Law and Regulations
CIV ENG 5642	* #	Sustainability, Population Energy, Water and Materials
CIV ENG 5650	#	Public Health Engineering
CIV ENG 5660	#	Introduction to Air Pollution
CIV ENG 5662	#	Air Pollution Control Methods
CIV ENG 5665	* #	Indoor Air Pollution
CIV ENG 5670	#	Solid Waste Management
CIV ENG 5702		Geomatics
CIV ENG 5715		Intermediate Soil Mechanics
CIV ENG 5716		Geotechnical Earthquake Engineering
CIV ENG 5729	*	Foundation Engineering II
CIV ENG 5744		Geosynthetics in Engineering
CIV ENG 5750		Transportation Applications of Geophysics
		* = co-listed with Arch Eng
		# = co-listed with Env Eng

Program Change Request

Date Submitted: 01/15/20 11:10 am

Viewing: **EL ENG-BS : Electrical Engineering BS**

File: 155.54

Last approved: 05/15/19 9:18 am

Last edit: 01/15/20 11:10 am

Changes proposed by: ershenb

Catalog Pages Using this Program

[Electrical Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

EL ENG-BS

Department

Electrical and Computer Engineering

Title

Electrical Engineering BS

Program Requirements and Description

In Workflow

1. RELECENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/16/20 1:44 pm
Daryl Beetner
(daryl): Approved for RELECENG Chair
2. 01/16/20 1:46 pm
Brittany Parnell
(ershenb): Approved for CCC Secretary
3. 01/17/20 9:57 am
Stephen Raper
(sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm
Brittany Parnell
(ershenb): Approved for Pending CCC Agenda post

History

1. Aug 6, 2014 by
[Watkins \(watkins\)](#)
2. Aug 13, 2014 by
[pantaleoa](#)
3. Apr 25, 2016 by
[Watkins \(watkins\)](#)

4. Jun 18, 2018 by
Watkins (watkins)
5. May 15, 2019 by
Mehdi Ferdowsi
(ferdowsi)

Bachelor of Science Electrical Engineering¹

Entering freshmen desiring to study Electrical Engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will be permitted to state a Electrical Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of **the Foundational the-Freshman-Engineering and Computing** Program is on enhanced advising **and 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 Electrical Engineering a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. At least two grade points per credit hour must also be attained in all courses taken in Electrical Engineering.

Electrical and Computer Engineering degree programs will require a minimum of 21 credit hours of humanities/social-sciences as specified below:

- [ENGLISH 1120](#)
- [HISTORY 1200](#) or [HISTORY 1300](#) or [HISTORY 1310](#) or [POL SCI 1200](#)
- [ECON 1100](#) or [ECON 1200](#)
- Technical Communication Elective: [ENGLISH 1160](#) or [ENGLISH 3560](#)
- [SP&M S 1185](#)
- The remaining minimum of 6 additional credit hours must be three-credit hour lecture courses offered in disciplines in the humanities and social sciences. Humanities courses are defined as those in: Art, English and Technical Communication, Etymology, Foreign Languages, Music, Philosophy, Speech and Media Studies, and Theatre. Social Sciences courses are defined as those in: Economics, History, Political Science, and Psychology. Study abroad courses may count as H/SS courses. H/SS courses numbered 2001, 3001, and 4001 (experimental courses) may also be used to complete these elective requirements.

Courses in business, education, information science and technology, or any other discipline not listed above will **not** satisfy the humanities/social sciences elective requirement, although such courses may count toward general education requirements. Transfer credits from other universities in sociology and general humanities may count as humanities or social science electives.

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

Free Electives Footnote:

Students are required to take five hours of free electives in consultation with their academic advisor. Credits which do not count towards this requirement are deficiency courses (such as algebra and trigonometry), and extra credits in required courses. Any courses outside of engineering and science must be at least three credit hours.

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100 ²	1	MECH ENG 1720	3
CHEM 1310	4	MATH 1215 ³	4
CHEM 1319	1	PHYSICS 1135 ^{3,4}	4

MATH 1214 ³	4	ECON 1100 or 1200	3
HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3	Elective-Hum or Soc Sci (any level) ⁵	3
ENGLISH 1120	3		
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
ELEC ENG 2100 ^{3,6,7}	3	ELEC ENG 2200 ^{3,6,7,10}	3
ELEC ENG 2101 ^{3,6}	1	ELEC ENG 2201 ^{3,6,7}	1
MATH 2222 ³	4	ELEC ENG 2120 ^{3,7,9}	3
COMP ENG 2210 ^{3,6,8}	3	MATH 3304 ³	3
COMP ENG 2211 ^{3,6}	1	Engineering Science Elective ¹¹	3
PHYSICS 2135 ^{3,4}	4	COMP SCI 1570	3
		COMP SCI 1580 ¹²	1
	16		17
Junior Year			
First Semester	Credits	Second Semester	Credits
ELEC ENG 3100 ^{3,6,9,10}	3	ELEC ENG 3600 ^{3,9}	4
ELEC ENG 3101 ^{3,6,9,10}	1	El Eng Elective A ^{10,14,19}	3
ELEC ENG 3320	3	ELEC ENG 3430	3
ELEC ENG 3321	1	ELEC ENG 3431	1
SP&M S 1185 ¹³	3	STAT 3117 ¹²	3
MATH 3108	3	Communication Elective ¹³	3
	14		17
Senior Year			
First Semester	Credits	Second Semester	Credits
El Eng Power Elective ^{3,6,9,15}	3	El Eng Elective C ^{10,14}	3
El Eng Power Elective Lab ^{3,6,9,15}	1	El Eng Elective E ^{17,19}	3
El Eng Elective B ^{10,14}	3	ELEC ENG 4097	3
El Eng Elective D ^{10,16,19}	3	Professional Development Elective ²⁰	3
ELEC ENG 4096 ³	1	Free Elective ¹⁸	3
Free Elective ¹⁸	2		
Elective-Hum or Soc Sci (any level) ⁵	3		
	16		15
Total Credits: 128			

Note: Student must satisfy **the common** ~~the common engineering~~ freshman year **academic requirements and** ~~requirements and~~ be admitted into the department. **See Foundational Engineering and Computing Program.**

¹ The minimum number of hours required for a degree in Electrical Engineering is 128.

² Students that transfer after their freshman year are not required to enroll in [FR ENG 1100](#).

³ A minimum grade of "C" must be attained in [MATH 1214](#), [MATH 1215](#), [MATH 2222](#), and [MATH 3304](#), [PHYSICS 1135](#) and [PHYSICS 2135](#) (or their equivalents), [ELEC ENG 2100](#), [ELEC ENG 2101](#), [ELEC ENG 2120](#), [ELEC ENG 2200](#), [ELEC ENG 2201](#), [ELEC ENG 3320](#), [ELEC ENG 3321](#), [ELEC ENG 3430](#), [ELEC ENG 3431](#), [ELEC ENG 3100](#), [ELEC ENG 3101](#), and [ELEC ENG 3600](#), the ELEC ENG power

	elective (ELEC ENG 3500 and ELEC ENG 3501 or ELEC ENG 3540 and ELEC ENG 3541), ELEC ENG 4096 and COMP ENG 2210 and COMP ENG 2211 . Also, students may not enroll in other courses that use these courses as prerequisites until the minimum grade of "C" is attained.
4	Students may take PHYSICS 1111 and PHYSICS 1119 in place of PHYSICS 1135 . Students may take PHYSICS 2111 and PHYSICS 2119 in place of PHYSICS 2135 .
5	All electives must be approved by the student's advisor. Students must comply with the general education requirements with respect to selection and depth of study. These requirements are specified in the current catalog.
6	Students who drop a lecture course prior to the last week to drop a class must also drop the corequisite lab.
7	Students must earn a passing grade on the ELEC ENG Advancement Exam I (associated with ELEC ENG 2100) before they enroll in ELEC ENG 2120 or ELEC ENG 2200 and ELEC ENG 2201 .
8	Students must earn a passing grade on the COMP ENG Advancement Exam (associated with COMP ENG 2210) before they enroll in any course with COMP ENG 2210 and/or COMP ENG 2211 as prerequisites.
9	Students must earn a passing grade on the ELEC ENG Advancement Exam II (associated with ELEC ENG 2120) before they enroll in ELEC ENG 3500 , ELEC ENG 3540 , ELEC ENG 3501 , ELEC ENG 3541 , ELEC ENG 3320 , ELEC ENG 3321 , ELEC ENG 3430 , ELEC ENG 3431 , ELEC ENG 3100 , ELEC ENG 3101 , or ELEC ENG 3600 , or other courses with ELEC ENG 2120 as a prerequisite.
10	Students must earn a passing grade on the ELEC ENG Advancement Exam III (associated with ELEC ENG 2200) before they enroll in ELEC ENG 3100 and ELEC ENG 3101 or other courses with ELEC ENG 2200 as a prerequisite.
11	Students must take MECH ENG 2340 , MECH ENG 2519 , MECH ENG 2527 , PHYSICS 2305 , PHYSICS 2311 , PHYSICS 2401 , NUC ENG 3103 , CHEM 2210 , BIO SCI 2213 , or BIO SCI 2223 . The following pairs of course are substitutions: CIV ENG 2200 and MECH ENG 2350 or ENG MGT 2110 and ENG MGT 3310 .
12	Students may replace STAT 3117 with STAT 3115 or STAT 5643 . Students may replace COMP SCI 1580 with ELEC ENG 3001 Circuits and Systems Laboratory.
13	Students must take ENGLISH 3560 or ENGLISH 1160 . Students may replace SP&M S 1185 with the ROTC sequence of MIL ARMY 4250 and MIL ARMY 4500 or MIL AIR 4110 and MIL AIR 4120 .
14	ELEC ENG Electives A, B, and C must be chosen from ELEC ENG 56XX, ELEC ENG 3500 , ELEC ENG 3540 , ELEC ENG 3410 , ELEC ENG 3250 , ELEC ENG 3340 , ELEC ENG 3440 , ELEC ENG 3120 , and COMP ENG 3150 . Only one ELEC ENG 56XX course may be used.
15	The ELEC ENG Power Elective may be satisfied with ELEC ENG 3500 and ELEC ENG 3501 or ELEC ENG 3540 and ELEC ENG 3541 .
16	ELEC ENG Elective D must be a 4XXX-level or above ELEC ENG or COMP ENG course with at least a 3-hour lecture component. ELEC ENG 4000 , ELEC ENG 5000 , COMP ENG 4000 , COMP ENG 5000 , ELEC ENG 4099 , COMP ENG 4099 , ELEC ENG 4096 , COMP ENG 4096 , ELEC ENG 4097 , COMP ENG 4097 , ELEC ENG 5070 , COMP ENG 5070 , ELEC ENG 58XX, and COMP ENG 58XX may not be used for Elective D.
17	ELEC ENG Elective E may be any 3XXX-level or above ELEC ENG or COMP ENG course except ELEC ENG 3002 , ELEC ENG 38XX, ELEC ENG 4096 , ELEC ENG 4097 , and ELEC ENG 5070 and COMP ENG 3002 , COMP ENG 38XX, COMP ENG 4000 , COMP ENG 4096 , COMP ENG 4097 , and COMP ENG 5070.
18	Students are required to take five hours of free elective in consultation with their academic advisors. Credits that do not count toward this requirement are deficiency courses (such as algebra and trigonometry) and extra credits from courses meeting other requirements. Any courses outside of engineering and science must be at least three credit hours. ELEC ENG 28XX, ELEC ENG 38XX, ELEC ENG 4096 , ELEC ENG 4097 , COMP ENG 28XX, COMP ENG 38XX, COMP ENG 4096 and COMP ENG 4097 may not be used for free electives. No more than one credit hour of ELEC ENG 3002 or COMP ENG 3002 may be applied to the BS degree for free electives.
19	Students that pursue an optional degree emphasis area have restricted options for EI Eng Electives A, D, and E. Students admitted to the accelerated BS/MS program must satisfy EI Eng Electives D and E with 5xxx or 6xxx-level courses and a minimum grade of B.
20	Students must take one of the following courses: BUS 5980 , ECON 4430 , ECON 5337 , ENG MGT 2310 , ENG MGT 3320 , ENG MGT 4110 , ENG MGT 5514 , or PHILOS 3225 .

~~See Freshman Engineering.~~ All Electrical Engineering students are encouraged to take the fundamentals of Engineering Examination prior to graduation. It is the first step toward becoming a registered professional engineer.

An accelerated BS/MS program and a formal emphasis in circuits and electronics, optics and devices, controls and systems, communications and signal processing, power and energy, electromagnetics, or computer engineering are optional.

Emphasis Areas for Electrical Engineering

Circuits and Electronics, Communications and Signal Processing, Computer Engineering, Controls and Systems, Electromagnetics, Optics and Devices, Power and Energy

A declared emphasis area is not required. A student may choose to obtain an Electrical Engineering degree without a formal emphasis or may choose to obtain an Electrical Engineering degree with a declared emphasis in one or more of the emphasis areas of electrical engineering. A major change request is required to add the emphasis area option to the degree program.

For students who seek an Electrical Engineering degree without a formal emphasis, these emphasis areas may guide the choice of their ELEC ENG Electives A, B, C, D, and E as well as their free electives. Students should consult with their advisors on such course selections.

For students who seek an Electrical Engineering degree with a declared emphasis, courses in the declared emphasis area will be applied to ELEC ENG Electives A, D, and E in the degree requirements. For students who choose to have multiple emphasis areas, the additional courses will apply to ELEC ENG Elective B or C and free elective requirements. Students should seek guidance from their advisors on emphasis areas and on courses that are relevant to more than one emphasis area. Students may have an emphasis area or emphasis areas listed on their transcript by completing three three-credit-hour courses in electrical and computer engineering from the designated lists with at least one of the courses being at the 4XXX-level or above. This requirement will be satisfied by completing the relevant ABC Elective course, a 4XXX-level or above course for Elective D, and another 3XXX-level or above course for Elective E from the designated listing. The required ELEC ENG courses [ELEC ENG 3320](#), [ELEC ENG 3430](#), [ELEC ENG 3100](#), and [ELEC ENG 3600](#) and the course used to satisfy the power requirement ([ELEC ENG 3500](#) or [ELEC ENG 3540](#)) may not be used to meet the three course requirement. Transfer courses do not apply to emphasis areas. A co-listed course may count toward both areas. Experimental courses [ELEC ENG 3001](#), [ELEC ENG 4001](#), [ELEC ENG 5001](#), [COMP ENG 3001](#), [COMP ENG 4001](#), or [COMP ENG 5001](#) require departmental approval to apply toward an emphasis area.

Circuits and Electronics		
ELEC ENG 3120	Electronics II	3
ELEC ENG 41XX and ELEC ENG 51XX Courses		
Communications and Signal Processing		
ELEC ENG 3410	Digital Signal Processing	3
ELEC ENG 3440	Digital Communications II	3
ELEC ENG 44XX and ELEC ENG 54XX Courses		
Computer Engineering		
ELEC ENG 3410, COMP ENG 3XXX-level or above Courses (Excluding COMP ENG 3000, COMP ENG 4000, COMP ENG 5000, COMP ENG 3002, COMP ENG 4096, COMP ENG 4097, and COMP ENG 5070) See the COMP ENG degree program for details on COMP ENG areas.		
Controls and Systems		
ELEC ENG 3340	Basic Programmable Logic Controllers	3
ELEC ENG 43XX and ELEC ENG 53XX Courses		
Electromagnetics		
ELEC ENG 46XX and ELEC ENG 56XX Courses		
Optics and Devices		
ELEC ENG 3250	Electronic And Photonic Devices	3
ELEC ENG 42XX and ELEC ENG 52XX Courses		

Power and Energy		
ELEC ENG 3500	Electromechanics	3
ELEC ENG 3540	Power System Design And Analysis	3
ELEC ENG 5150	Photovoltaic Systems Engineering	3
ELEC ENG 5520	Power Electronics	3
ELEC ENG 5521	Power Electronics Laboratory	2
ELEC ENG 45XX and ELEC ENG 55XX Courses		

Accelerated BS/MS Program Option for EE and CpE Majors

Electrical engineering or computer engineering undergraduates in ECE at Missouri S&T may opt to apply for an accelerated BS/MS ECE program where a student can achieve both degrees faster than if pursuing the degrees separately. The degrees may be BS EE and MS EE, BS CpE and MS CpE, BS EE and MS CpE, or BS CpE and MS EE. The benefits of the program for admitted students are:

- Undergraduate and graduate courses may be chosen with greater flexibility,
- Up to six hours of 5000-level or above ECE coursework may apply to both the BS and MS requirements,
- The classes taken for shared BS/MS credit may be taken at the lower undergraduate tuition rate,
- The GRE is not required for admission,
- Other graduate credit courses may be taken anytime after entering the program, and
- Work on a thesis project may begin before the BS requirements are completed.

The BS-degree requirements are modified for admitted students such that EE Electives D and E or CpE Electives B and C will be satisfied by six-credit-hours of 5000-level or above ECE coursework. To be eligible for the accelerated BS/MS ECE program, an EE or CpE undergraduate must be at or beyond the junior level with a minimum of 60 credit hours and must have completed 18 credit hours of EE and/or CpE courses at Missouri S&T with at least a 3.50 GPA in the ECE courses. To be admitted, the student must complete the program application and must have the recommendation of an ECE faculty member who agrees to serve as the graduate thesis advisor. No other MS degree requirements are changed. The MS degree must be for the thesis option. The program may be combined with existing honors research and emphasis area options. Admitted students will have both undergraduate and graduate records in the Registrar's Office.

The Accelerated program application must be completed within one semester after the shared-credit courses are completed. Courses taken for shared credit will be identified on the application form and on Graduate Form 1, which is submitted after the student enters the graduate program. The six hours of shared-credit coursework will be taken as undergraduate credit, must be approved by the academic advisor, and may not be undergraduate research, special problems, or transfer courses (a co-listed course can only apply for these undergraduate requirements if it is under an EE or CpE registration. Note that the choice of EE or CpE registration may affect how a course can apply within an MS program.) An additional six credit hours of coursework for graduate credit (beyond the shared BS/MS credits) can be taken while in the undergraduate program by applying for dual undergraduate/graduate enrollment. Taking additional courses for graduate credit will require formal application to the graduate program. Acceptance to the MS degree program from the Accelerated program is automatic so long as the student meets ECE graduate student academic performance requirements. To remain in the Accelerated program, the student must maintain good standing within the undergraduate EE or CpE program and must maintain continuous enrollment at Missouri S&T. If the student exits the program before completion of the MS degree requirements or fails to maintain continuous enrollment at Missouri S&T, the shared-credit courses may not apply toward graduate requirements in the event of future readmission.

The student is responsible for checking on how dual-enrollment status and graduate coursework will affect scholarships and other financial aid. Once you become a graduate student, you **are not** eligible for Federal Pell Grants, though are still eligible for Federal Financial Aid and will be eligible for fellowships and teaching/research assistantships. International students should check with international affairs during completion of an accelerated BS/MS to ensure immigration status will be maintained throughout the program.

Justification for request

Updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Program Change Request

Date Submitted: 01/15/20 2:31 pm

Viewing: **ENG MG-BS : Engineering Management BS**

File: 44.33

Last approved: 06/18/18 12:29 pm

Last edit: 01/15/20 2:31 pm

Changes proposed by: ershenb

Catalog Pages Using this Program
[Engineering Management](#)

Start Term

Fall 2020 ~~08/13/2018~~

Program Code

ENG MG-BS

Department

Engineering Management and Systems Engineering

Title

Engineering Management BS

Program Requirements and Description

In Workflow

1. **RENGMNGT Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. **Campus Curricula Committee Chair**
7. **FS Meeting Agenda**
8. **Faculty Senate Chair**
9. **Registrar**
10. **Kristy Giacomelli-Feys**

Approval Path

1. 01/15/20 2:38 pm
Suzanna Long
(longsuz): Approved for RENG MNGT Chair
2. 01/15/20 2:58 pm
Brittany Parnell
(ershenb): Approved for CCC Secretary
3. 01/17/20 9:57 am
Stephen Raper
(sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm
Brittany Parnell
(ershenb): Approved for Pending CCC Agenda post

History

1. Sep 24, 2013 by Lahne Black (lahne)
2. Apr 28, 2014 by Stephen Raper (sraper)
3. Jun 12, 2014 by pantaleoa

4. Nov 18, 2014 by kleb6b
5. Jan 30, 2015 by Stephen Raper (sraper)
6. Jul 20, 2015 by pantaleoa
7. Jun 27, 2016 by Stephen Raper (sraper)
8. Jun 18, 2018 by Stephen Raper (sraper)

Bachelor of Science Engineering Management

Entering freshmen intending to study engineering management are admitted to the **Foundational Freshman-Engineering and Computing** Program. They may, however, state an engineering management preference, which will be used as a consideration for available freshman departmental scholarships. The focus of **the Foundational the Freshman-Engineering and Computing Program program** is on enhanced advising **and 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.

The bachelor of science degree in engineering management requires a minimum of 128 credit hours. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. At least two grade points per credit hour must also be attained in all courses taken in engineering management.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

1. All students are required to take one American history course, one economics course, and [ENGLISH 1120](#). The history course is to be selected from [HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#). All students must choose one additional humanities or social science course that meets requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
2. Depth requirement. Three credit hours must be taken in humanities or social sciences at the 2000-level or above and meets requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog. This course must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 1180 will be considered to satisfy this requirement. Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 4000-level or above. All courses taken to satisfy the depth requirement must be taken after graduating from high school.
3. The remaining two courses are to be chosen and meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog and may include one communications course in addition to [ENGLISH 1120](#).
4. Any specific departmental requirements in the general studies area must be satisfied.
5. Special topics, special problems and honors seminars are allowed only by petition to and approval by the student's department chair.

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

Free Electives Footnote:

Free electives. Each student is required to take 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.

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	MECH ENG 1720	3
CHEM 1310 ¹	4	MATH 1215 ¹	4
CHEM 1319	1	PHYSICS 1135 ¹	4
CHEM 1100	1	ECON 1100 or 1200	3
MATH 1214 ¹	4	COMP SCI 1972 , or 1570 , or 1971 ^{1, 6}	2
ENGLISH 1120	3	COMP SCI 1982 or 1981 ⁶	1
HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3		
	17		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
MATH 2222 ¹	4	MATH 3304 ¹	3
PHYSICS 2135 ¹	4	STAT 3115 or 3117 ¹	3
CIV ENG 2200 ¹	3	ENG MGT 2110 ¹	3
ENG MGT 1210 ¹	2	ENG MGT 2211 ¹	3
ENG MGT 2310 ¹	3	MECH ENG 2350	2
		PSYCH 1101	3
	16		17
Junior Year			
First Semester	Credits	Second Semester	Credits
ENG MGT 3310 ¹	3	ENG MGT 4710 ¹	3
CIV ENG 2210	3	MECH ENG 2527	3
CIV ENG 2211	1	ELEC ENG 2800	3
ENG MGT 3510 ¹	3	ENGLISH 3560 or 1160	3
SP&M S 1185	3	ENG MGT 3320 ¹	3
Humanities and Social Sciences ²	3		
	16		15
Senior Year			
First Semester	Credits	Second Semester	Credits
Emphasis Area Required Course	3	ENG MGT Technical Elective	3
Emphasis Area Required Course	3	ENG MGT Technical Elective	3
Emphasis Area Required Course	3	ENG MGT 4907 ¹	3
ENG MGT 4110 ¹	3	Upper Level Hum/SS ²	3
ENG MGT Technical Elective	3	Free Elective ³	3
	15		15
Total Credits: 128			

Example Emphasis Area Programs for Engineering Management Students

One unique aspect of the engineering management degree is the student's ability to select an established emphasis area or create a specialized emphasis. Two examples of established emphasis areas are shown below.

Management of Technology

ENG MGT 5511	Technical Entrepreneurship	3
ENG MGT 5512	Legal Environment	3
ENG MGT 5410	Industrial System Simulation	3
ENG MGT 5614	Supply Chain Management Systems	3
ENG MGT Technical Electives (in consultation with your advisor)		6

Industrial Engineering

ENG MGT 4310	Materials Handling and Plant Layout	3
ENG MGT 4330	Human Factors	3
ENG MGT 5410	Industrial System Simulation	3
ENG MGT 5414	Introduction To Operations Research	3
ENG MGT Technical Electives (in consultation with your advisor)		6

General

Engineering Area Courses (Engineering Discipline)	15
ENG MGT-Technical Elective (in consultation with your advisor)	3

Note: All electives must be chosen in consultation with the student's advisor. Students must satisfy **the common freshman year academic requirements in** ~~the common engineering freshman year course requirements in~~ addition to the sophomore, junior, and senior year requirements listed above with a minimum of 128 hours.

1	Must have a grade of "C" or better in these courses for graduation. MATH 1208 and MATH 1221 may be substituted for MATH 1214 and MATH 1215 , respectively.
2	Humanities and social science 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.
3	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.
4	Students are required to select an emphasis area and maintain a minimum 2.0 GPA for these courses.
5	All engineering management students must take the fundamentals of engineering (FE) exam prior to graduation. A passing grade on this examination is not required to earn a B.S. degree. This requirement is part of the Missouri S&T assessment process as described in assessment requirements found elsewhere in this catalog.
6	The programming elective consists of a lecture and lab combination, and may be selected from COMP SCI 1970/COMP SCI 1980 , COMP SCI 1971/COMP SCI 1981 , COMP SCI 1972/COMP SCI 1982 , or COMP SCI 1570/COMP SCI 1580 . Note that COMP SCI 1570/COMP SCI 1580 requires one more credit hour than the other options. The lecture component must be completed with a grade of "C" or better.

Justification for request

Updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Key: 44

Program Change Request

Date Submitted: 11/01/19 10:12 am

Viewing: **EV ENG-BS : Environmental Engineering
BS**

File: 51.15

Last approved: 04/19/19 8:32 am

Last edit: 01/13/20 2:12 pm

Changes proposed by: mfitch

Catalog Pages Using this Program
[Environmental Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

EV ENG-BS

Department

Civil, Architectural, and Environmental Engineering

Title

Environmental Engineering BS

Program Requirements and Description

In Workflow

1. RCIVILEN Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 10/30/19 9:40 am
Joel Burken
(burken): Rollback to Initiator
2. 11/04/19 12:18 pm
Joel Burken
(burken): Approved for RCIVILEN Chair
3. 11/05/19 8:28 am
Brittany Parnell
(ershenb): Approved for CCC Secretary
4. 01/13/20 2:12 pm
Brittany Parnell
(ershenb): Rollback to RCIVILEN Chair for Engineering DSCC Chair
5. 01/16/20 10:04 am
Joel Burken
(burken): Approved for RCIVILEN Chair
6. 01/16/20 12:42 pm
Brittany Parnell
(ershenb): Approved for CCC Secretary
7. 01/17/20 9:57 am
Stephen Raper
(sraper): Approved

for Engineering
DSCC Chair
8. 01/20/20 8:53 pm
Brittany Parnell
(ershenb):
Approved for
Pending CCC
Agenda post

History

1. Aug 30, 2013 by pantaleoa
2. Sep 3, 2013 by pantaleoa
3. Sep 27, 2013 by Lahne Black (lahne)
4. Mar 18, 2014 by Lahne Black (lahne)
5. Jul 20, 2015 by pantaleoa
6. Sep 15, 2016 by Crystal Wilson (wilsoncry)
7. Sep 22, 2017 by Crystal Wilson (wilsoncry)
8. Apr 19, 2019 by Brittany Parnell (ershenb)

Environmental Engineering Bachelor of Science

Entering freshmen desiring to study environmental engineering will be admitted to **the Foundational ~~the Freshman~~ Engineering and Computing Program. Program.** They will, however, be permitted, if they wish, to state a environmental engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the **Foundational ~~Freshman~~ Engineering and Computing Program program** is on enhanced advising **and 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 environmental engineering a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. At least two grade points per credit hour must also be attained in all courses taken in environmental engineering.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

1. All students are required to take one American history course, one economics course, one humanities course, and [ENGLISH 1120](#). The history course is to be selected from [HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#). The humanities course must be selected from the approved lists for art, English, foreign languages, music, philosophy, speech and media studies, or theater.
2. [HISTORY 2510](#) or [HISTORY 3530](#) is required.
3. The remaining two courses are to be chosen from the list of approved humanities/social sciences courses and may include one communications course in addition to [ENGLISH 1120](#).

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

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

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100 ²	1	MECH ENG 1720	3
CHEM 1310 & CHEM 1319	5	MATH 1215	4
MATH 1214	4	PHYSICS 1135	4
ENGLISH 1120	3	General Education Elective ¹	6
General Education Elective ¹	3		
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
CIV ENG 2200	3	CIV ENG 2210	3
MATH 2222	4	CIV ENG 2211	1
ENV ENG 2601 ³	3	MECH ENG 2350	2
CHEM 1320 or GEOLOGY 3410	3	CHEM ENG 2100	4
BIO SCI 1113	3	ENV ENG 2602	3
		PHYSICS 2135	4
		ENV ENG 3603	3
	16		16
Junior Year			
First Semester	Credits	Second Semester	Credits
ENV ENG 3615 ³	3	ENV ENG 5619	3
ENV ENG 3603	3	STAT 3113	3
CIV ENG 3330 ²	3	CHEM ENG 2110	3
MATH 3304	3	ENV ENG Technical Elective ^{5,6}	3
GEO ENG 1150	3	Communications Elective ⁷	3
PHYSICS 2135	4		
	16		15
Senior Year			
First Semester	Credits	Second Semester	Credits
CIV ENG 4448	3	ENV ENG 4097 ³	3
ENV ENG 4010 ³	1	ENV ENG Depth Elective ^{5,6}	3
CIV ENG 3334	4	ENV ENG Depth Elective ^{5,6}	3
ENV ENG Air Pollution Elective ^{4,5}	3	ENV ENG Technical Elective ^{5,6}	3
HISTORY 2510 or 3530	3	ENV ENG 4609	1
ENV ENG Depth Elective ^{5,6}	3	General Education Elective ¹	3

Total Credits: 129

- 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 CIV ENG course that is cross-listed as ENV ENG course.
- 4 Air Pollution Elective: Choose [ENV ENG 5660](#), [ENV ENG 5662](#) or [ENV ENG 5665](#). 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 depth and technical electives from approved lists. A maximum total of 6 credit hours of independent study ([ENV ENG 5000](#) or [ENV ENG 4099](#)) can be used as depth or technical electives in the B.S. environmental engineering curriculum.
- 7 Choose 1 of the following: [CIV ENG 2003](#), [ENGLISH 1160](#), [ENGLISH 3560](#), or [SP&M S 1185](#)

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 Depth Electives

The following classes may be used to fulfill the three depth elective courses required for the B.S. in environmental engineering:

ENV ENG 5640	Environmental Law And Regulations	3
ENV ENG 5630	Remediation of Contaminated Groundwater And Soil	3
ENV ENG 5650	Public Health Engineering	3
ENV ENG 5670	Solid Waste Management	3
ENV ENG 5605	Environmental Systems Modeling	3
ENV ENG 5642	Sustainability, Population, Energy, Water, and Materials	3
ENV ENG 5665	Indoor Air Pollution	3
ENV ENG 5660	Introduction To Air Pollution	3
ENV ENG 5662	Air Pollution Control Methods	3
GEO ENG 5331	Subsurface Hydrology	3
ENV ENG 5360	Water Resources And Wastewater Engineering	3
ENV ENG 5635	Phytoremediation and Natural Treatment Systems: Science and Design	3

One class may not be used to fulfill both the air pollution requirement and depth elective.

Environmental Engineering Technical Electives

The following classes may be used to fulfill the two technical elective courses required for the B.S. in environmental engineering:

CIV ENG 5331	Hydraulics Of Open Channels	3
CIV ENG 5335	Water Infrastructure Engineering	3
CIV ENG 5446	Management Of Construction Costs	3
CIV ENG 5360	Water Resources And Wastewater Engineering	3

<u>CIV ENG 5448</u>	Green Engineering: Analysis of Constructed Facilities	3
<u>CHEM ENG 3101</u>	Fundamentals of Transport in Chemical and Biochemical Engineering	4
<u>CIV ENG 5744</u>	Geosynthetics in Engineering	3
<u>CIV ENG 386</u>	Course CIV ENG 386 Not Found	
<u>CHEM ENG 5340</u>	Principles Of Environmental Monitoring	3
<u>GEO ENG 3148</u>	Fundamentals Of Geographic Information Systems	3
<u>GEO ENG 3175</u>	Geomorphology And Terrain Analysis	3
<u>GEO ENG 5233</u>	Risk Assessment In Environmental Studies	3
<u>GEO ENG 5235</u>	Environmental Geological Engineering	3
<u>GEO ENG 5239</u>	Groundwater Remediation	3
<u>GEO ENG 4276</u>	Environmental Aspects Of Mining	3
<u>PET ENG 3210</u>	Course PET ENG 3210 Not Found	3
<u>GEOLOGY 3410</u>	Introduction To Geochemistry	3
<u>PET ENG 4210</u>	Drilling and Well Design	3
<u>GEOLOGY 4451</u>	Aqueous Geochemistry	3
<u>GEOLOGY 382</u>	Course GEOLOGY 382 Not Found	
<u>CIV ENG 5662/ENV ENG 5662</u>	Air Pollution Control Methods	3
<u>GEOLOGY 3811</u>	Fundamentals Of Geographic Information Systems	3
<u>GEOLOGY 4421</u>	Radioactive Waste Management And Remediation	3
<u>CHEM 3410</u>	Chemical Thermodynamics I	3
<u>CHEM 373</u>	Course CHEM 373 Not Found	
<u>PHYSICS 337</u>	Course PHYSICS 337 Not Found	
<u>CHEM 5510</u>	Introduction to Chemical Analysis	4
<u>CHEM 4510</u>	Instrumental Methods Of Chemical Analysis	4
<u>CHEM ENG 3120</u>	Chemical Engineering Thermodynamics II	3
<u>CHEM ENG 3100</u>	Chemical Engineering Fluid Flow	3
<u>CHEM ENG 3110</u>	Chemical Engineering Heat Transfer	2
<u>CHEM ENG 374</u>	Course CHEM ENG 374 Not Found	
<u>CHEM 1550</u>	Elementary Quantitative Chemical Analysis	2
<u>CHEM ENG 5130</u>	Risk Assessment and Reduction	3
<u>CHEM 2210</u>	Organic Chemistry I	4
<u>BIO SCI 2223</u>	General Genetics	3
<u>BIO SCI 2263</u>	Ecology	3
<u>BIO SCI 5313</u>	Pathogenic Microbiology	3
<u>BIO SCI 322</u>	Course BIO SCI 322 Not Found	
<u>BIO SCI 325</u>	Course BIO SCI 325 Not Found	3
<u>BIO SCI 4323</u>	Molecular Genetics	3
<u>GEO ENG 5237</u>	Geological Aspects Of Hazardous Waste Management	3
<u>GEO ENG 5276</u>	Advanced Environmental Aspects Of Mining	3
<u>GEO ENG 5320</u>	Groundwater Modeling	3
<u>GEO ENG 5331</u>	Subsurface Hydrology	3
<u>GEO ENG 5332</u>	Fundamentals of Groundwater Hydrology	3

GEO ENG 5381	Intermediate Subsurface Hydrology And Contaminant Transport Mechs	3
MIN ENG 5742	Environmental Aspects of Mining	3
BIO SCI 3313	Microbiology	3
BIO SCI 4313	Introduction to Environmental Microbiology	3
BIO SCI 4343	Introduction to Geomicrobiology	3
BIO SCI 4363	Freshwater Ecology	3
BIO SCI 4563	Global Ecology	3
BIO SCI 4329	Molecular Genetics Laboratory	2
BIO SCI 4383	Toxicology	3
CIV ENG 5330	Unsteady Flow Hydraulics	3
CIV ENG 5332	Transport Processes in Environmental Flows	3
CIV ENG 5333	Intermediate Hydraulic Engineering	3
CIV ENG 5337	River Mechanics And Sediment Transport	3
CIV ENG 5338	Hydrologic Engineering	3

Justification for request

- 1) Updating Electives to reflect current classes and expanding offerings as a result input from Senior Survey.
- 2) Revised elective footnotes (numbers in the Junior and Senior year listing) to be accurate to footnote text.
- 3) Swapped EnvE 3603 and Phys 2135 because EnvE 3603 is offered only in Spring.

Supporting Documents

Course Reviewer Comments

burken (10/30/19 9:40 am): Rollback: Needing to complete the updates for course listings.

ershenb (11/05/19 8:28 am): formatting

ershenb (01/13/20 2:11 pm): Updated name: "Freshman Engineering Program" to "Foundational Engineering and Computing Program."

ershenb (01/13/20 2:12 pm): Rollback: Per email with Dr. Raper about FEP changing to Foundational Engineering and Computing

Key: 51

Program Change Request

Date Submitted: 01/15/20 9:59 am

Viewing: **FR ENG-UN : Foundational Engineering and Computing**
Freshman Engineering Program

File: 261.4

Last approved: 06/18/18 12:29 pm

Last edit: 01/16/20 10:01 am

Changes proposed by: ershenb

Catalog Pages Using this Program

[Freshman Engineering Program](#)

Start Term

Fall 2020 ~~08/13/2018~~

Program Code

FR ENG-UN

Department

Freshman Engineering

Title

Foundational Engineering and Computing ~~Freshman Engineering Program~~

Program Requirements and Description

In Workflow

1. **FR ENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. **Campus Curricula Committee Chair**
7. **FS Meeting Agenda Chair**
8. **Faculty Senate Chair**
9. **Registrar**
10. **Kristy Giacomelli-Feys**

Approval Path

1. 01/15/20 1:13 pm Douglas Ludlow (dludlow): Approved for FR ENG Chair
2. 01/15/20 1:18 pm Brittany Parnell (ershenb): Approved for CCC Secretary
3. 01/17/20 9:57 am Stephen Raper (sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

History

1. Jun 18, 2018 by Douglas Ludlow (dludlow)

Entering freshmen desiring to study engineering are admitted to the **Foundational Freshman-Engineering and Computing** Program. They may state a preference for a major in a particular **engineering or computer science engineering** field if they wish. In the event a preference is stated, it will be used in the consideration for freshmen scholarships, if available, in the preferred department.

The goals of the **Foundational the Freshman-Engineering and Computing** Program are:

1. to provide high quality advising in order to enhance the likelihood of student academic success, and
2. to provide information about careers in the various engineering fields so that students can make an informed decision regarding **a an engineering** major.

Students will complete a set of required courses common to all **engineering fields engineering fields** and then may apply for admission as degree candidates to the program of their choice.

Typical Courses for Freshman ~~Common Engineering Freshman~~ Year

The following courses **are typical freshman year academic requirements to are common to** all the engineering programs offered at Missouri S&T and are normally taken while the student is in the **Foundational Engineering and Computing Freshman Engineering** Program:

[MATH 1214](#)
& [MATH 1215](#)

Calculus For Engineers I
and Calculus For Engineers II

8

CHEM 1310 & CHEM 1319 & CHEM 1100	General Chemistry I and General Chemistry Laboratory and Introduction To Laboratory Safety & Hazardous Materials	6
ENGLISH 1120	Exposition And Argumentation	3
Humanities/Social Sciences courses ¹		
FR ENG 1100	Study And Careers In Engineering	1
MECH ENG 1720	Introduction to Engineering Design	3
or a department specific course		
PHYSICS 1135	Engineering Physics I	4

Courses required in the remainder of each specific engineering program are listed under that program's description in the catalog.

¹ Students must receive credit prior to graduation for a course that fulfills the Williams law requirement ([HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#) or [POL SCI 1200](#)). Students planning to major in architectural engineering should take [HISTORY 1200](#).

Students planning to major in ceramic engineering, chemical engineering, environmental engineering, geological engineering, metallurgical engineering or petroleum engineering will require additional chemistry or chemistry/geochemistry electives. It is recommended that, during the freshman year, these students should plan on taking [CHEM 1320](#), [GEOLOGY 3410](#), or other suggested courses as outlined in the curriculum of those specific majors.

Students planning to major in mining engineering should take [GEO ENG 1150](#), [MIN ENG 1912](#), and [MIN ENG 2126](#) during their freshman year. Students planning to major in nuclear engineering should take [NUC ENG 1105](#) during their freshman year.

Students may transfer from the **Foundational Freshman-Engineering and Computing Program to Program to** their selected degree program after having satisfied all of the above requirements, provided the degree programs will accept them. Students are advised to check special program requirements as listed with the program curricula in the catalog.

Justification for request

updated language to reflect "Freshman Engineering Program" to "Foundational Engineering and Computing."

Supporting Documents

Course Reviewer Comments

ershenb (01/16/20 10:01 am): update title

Key: 261

Program Change Request

Date Submitted: 01/15/20 2:00 pm

Viewing: **GE ENG-BS : Geological Engineering BS**

File: 156.32

Last approved: 06/14/19 2:14 pm

Last edit: 01/15/20 2:00 pm

Changes proposed by: ershenb

Catalog Pages Using this Program
[Geological Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

GE ENG-BS

Department

Geosciences and Geological and Petroleum Engineering

Title

Geological Engineering BS

Program Requirements and Description

In Workflow

1. **RGEOENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. **Campus Curricula Committee Chair**
7. **FS Meeting Agenda**
8. **Faculty Senate Chair**
9. **Registrar**
10. **Kristy Giacomelli-Feys**

Approval Path

1. 01/15/20 9:16 pm
David Borrok (borrokd): Approved for RGEOENG Chair
2. 01/16/20 8:14 am
Brittany Parnell (ershenb): Approved for CCC Secretary
3. 01/17/20 9:57 am
Stephen Raper (sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm
Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

History

1. Mar 18, 2014 by [Lahne Black \(lahne\)](#)
2. Nov 18, 2014 by [pantaleoa](#)
3. Nov 18, 2014 by [pantaleoa](#)

4. Jul 20, 2015 by pantaleoa
5. Feb 27, 2018 by Katherine Grote (grotekr)
6. Jun 18, 2018 by Katherine Grote (grotekr)
7. Jun 14, 2019 by Katherine Grote (grotekr)

Bachelor of Science Geological Engineering

Entering freshmen desiring to study geological engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will, however, be permitted, if they wish, to state a geological engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of **the Foundational the Freshman-Engineering and Computing Program program** is on enhanced advising **and 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 geological 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 geological engineering.

The geological engineering curriculum contains a required number of hours in humanities and social sciences. Each student's program of study must contain a minimum 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 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#). Some disciplines require one humanities course to be selected 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 2000 level or above and must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog. Each of these courses must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 1180 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 3000 level.)
3. Some departments list specific requirements; e.g. a psychology course, a literature course, and /or a second semester of economics. Selections should be made to ensure that these requirements are met.
4. Special topics, special problems courses and honors seminars are allowed only by petition to and approval by the student's program head.

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

Freshman Year			
First Semester	Credits	Second Semester	Credits
MATH 1214	4	MATH 1215	4
CHEM 1310	4	MECH ENG 1720	3

CHEM 1100	1	PHYSICS 1135	4
CHEM 1319	1	GEO ENG 1150	3
ENGLISH 1120	3	Humanities/Soc Sci Elective ^a	3
FR ENG 1100	1		
Humanities/Soc Sci Elective ^a	3		
	17		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
MATH 2222	4	MATH 3304	3
PHYSICS 2135	4	CIV ENG 2200	3
GEO ENG 3148	3	GEO ENG 2110	1
GEO ENG 3249	3	GEOLOGY 2611	3
		GEO ENG 3175	3
		Humanities/Soc Sci Elective ^a	3
	14		16
Junior Year			
First Semester	Credits	Second Semester	Credits
MECH ENG 2350	2	CIV ENG 3330	3
CIV ENG 2210	3	GEO ENG 5443	3
GEO ENG 5331	3	ENGLISH 3560	3
Economics Elective ^b	3	Humanities/Soc Sci Elective ^a	3
GEOLOGY 3310	3	Chemistry/Geochemistry Elective ^c	3
Humanities/Soc Sci Elective ^a	3		
GEOLOGY 3319	1		
	18		15
Senior Year			
First Semester	Credits	Second Semester	Credits
Geophysics Elective ^d	3	GEO ENG 5174	3
GEO ENG 4010	0.5	GEO ENG 4010	0.5
GEO ENG 5441	3	Earth Mechanics Elective ^f	3
GEO ENG 5090 or 5092 ^e	3	Technical Electives ^g	6
CIV ENG 3715 or MIN ENG 5823	3	Eng Econ Elective ^h	3
GEO ENG 4115	3		
	15.5		15.5
Total Credits: 128			

a The sequence of course selection must provide both breadth and depth of content and must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog. A total of 18 hours of humanities and social science credit is required.

b The Economics Elective must be selected from [ECON 1100](#) or [ECON 1200](#).

c The chemistry/geochemistry elective must be selected from chemistry, geochemistry or biology courses as approved by your advisor.

d The Geophysics elective can be selected from [GEO ENG 5736](#), [GEO ENG 5761](#), or [GEO ENG 5782](#).

e	Students may take GEO ENG 5090 or GEO ENG 5092 for senior design credit.
f	To be selected from GEO ENG 5471 , GEO ENG 5381 , GEO ENG 5556 , MIN ENG 5823 , PET ENG 2510 , PET ENG 3520 , CIV ENG 3715 , CIV ENG 4729 , or CIV ENG 5715 .
g	To be selected from advanced courses in geological, mining, petroleum or civil engineering, geology or other courses with approval of your advisor. Must contain design content and must be approved by your advisor.
h	To be selected from ENG MGT 5210 , MIN ENG 3512 , or PET ENG 4590 or both ENG MGT 1100 and ENG MGT 1210 .

All GE students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade is not required; however, it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process.

Geological engineering students must earn the grade of "C" or better in all geological engineering courses to receive credit toward graduation. The total number of credit hours required for a degree in Geological Engineering is 128. The assumption is made that a student admitted to the Department has completed 34 hours toward graduation to fulfill the requirements of the Freshman Engineering program.

Geological Engineering Emphasis Areas

Electives are selected by the student with advisor approval. Some appropriate electives are listed for each emphasis area.

Engineering Geology and Geotechnics

GEO ENG 5471	Rock Engineering	3
CIV ENG 3715	Fundamentals of Geotechnical Engineering	3
CIV ENG 4729	Foundation Engineering	3
MIN ENG 5823	Rock Mechanics	3
GEO ENG 5146	Applications Of Geographic Information Systems	3
GEO ENG 5441	Engineering Geology And Geotechnics	3

Groundwater Hydrology and Environmental Protection

GEO ENG 5381	Intermediate Subsurface Hydrology And Contaminant Transport Mechs	3
GEO ENG 5233	Risk Assessment In Environmental Studies	3
GEO ENG 5235	Environmental Geological Engineering	3
GEO ENG 5320	Groundwater Modeling	3
GEO ENG 5237	Geological Aspects Of Hazardous Waste Management	3
CIV ENG 5640	Environmental Law And Regulations	3
GEO ENG 4276	Environmental Aspects Of Mining	3
PET ENG 3330	Well Logging	3

Dual Professional Registration as a Geologist

GEOLOGY 2096	Field Geology	3
GEOLOGY 3620	Stratigraphy And Sedimentation	3
GEOLOGY 4097	Advanced Field Geology	3
GEOLOGY 4841	Geological Field Studies	3
GEOLOGY 3410	Introduction To Geochemistry	3
GEOLOGY 4310	Remote Sensing Technology	3
GEOLOGY 4431	Methods Of Karst Hydrogeology	3

Environmental and Engineering Geophysics

GEO ENG 5736	Geophysical Field Methods	3
GEO ENG 5761	Transportation Applications of Geophysics	3
GEO ENG 5782	Environmental and Engineering Geophysics	3
GEO ENG 5144	Remote Sensing Technology	3
GEOPHYS 4241	Electrical Methods In Geophysics	3
GEOPHYS 4261	Geophysical Instrumentation	1
GEOPHYS 5231	Seismic Data Processing	3

Renewable and Conventional Energy Resources

GEO ENG 5556	Renewable Energy Systems	3
PET ENG 3520	Petroleum Reservoir Engineering	3
GEO ENG 5146	Applications Of Geographic Information Systems	3
MIN ENG 5823	Rock Mechanics	3
GEO ENG 5381	Intermediate Subsurface Hydrology And Contaminant Transport Mechs	3
GEOLOGY 5511	Applied Petroleum Geology	3
PET ENG 2510	Properties Of Hydrocarbon Fluids	3
PET ENG 1110	Introduction to Petroleum Engineering	1
PET ENG 3330	Well Logging	3
PET ENG 4520	Well Test Analysis	3

Quarry and Mining Engineering

GEO ENG 5575	Aggregates And Quarrying	3
MIN ENG 5823	Rock Mechanics	3
CIV ENG 3116	Construction Materials, Properties And Testing	3
GEO ENG 5471	Rock Engineering	3
GEO ENG 4276	Environmental Aspects Of Mining	3
MIN ENG 3913	Mineral Identification and Exploration	3
MIN ENG 5612	Principles of Explosives Engineering	3
MIN ENG 5822	Strata Control	3

Accelerated BS/MS Geological Engineering Program Option for Geological Engineering Majors

Geological Engineering undergraduates at Missouri S&T may opt to apply for an accelerated BS/MS program where a student can achieve both the BS and MS degrees in Geological Engineering faster than if pursuing the degrees separately. The degrees awarded will be a BS & MS in Geological Engineering.

The benefits for undergraduate students admitted to the program are:

- Undergraduate and graduate courses may be chosen with greater flexibility,
- Up to six hours of 5000-level or above Geo Eng coursework may apply to both the BS and MS requirements,
- The classes taken for shared BS/MS credit may be taken at the lower undergraduate tuition rate,
- The GRE is not required for admission,
- Other graduate courses can be taken any time after entering the program as a dual enrolled student,
- Work on a thesis project may begin before the BS requirements are completed.

To be eligible for the accelerated BS/MS Geo Eng program, a Geo Eng undergraduate must be at or beyond the junior level standing with a minimum of 48 credit hours, have successfully completed the Chemistry and Math requirements, and have completed 18 credit hours of Geo Eng courses at Missouri S&T with at least a 3.2 GPA in the Geo Eng courses. To be admitted, the student must complete the program application and must have the recommendation of a Geo Eng faculty member. All other MS degree requirements remain the same. The program may be combined with existing honors research, emphasis areas, and certificate options. Admitted students will have both undergraduate and graduate records in the Registrar's Office.

The Accelerated Program application must be completed within one semester after all shared-credit courses are completed. Courses taken for shared credit will be identified on the application form. These courses will also be listed on the student's Graduate Form 1 to be submitted after the student enters the graduate program. The six hours of shared-credit coursework, to be taken as undergraduate credit, must be approved by the academic advisor and may not be undergraduate research, special problems, or transfer courses. An additional six credit hours of coursework for graduate credit (beyond the shared BS/MS credits) can be taken while in the undergraduate program by applying for dual undergraduate/graduate enrollment. Taking additional courses for graduate credit as a dual enrolled student will require formal application to the graduate program.

Acceptance to the Geo Eng MS degree program from the Accelerated Program is automatic so long as the student remains in good standing (GPA above 3.0 and B's or better in all graduate courses) within the program. To remain in the Accelerated Program, the student must meet Geological Engineering graduate student academic performance requirements and must maintain continuous enrollment at Missouri S&T. If the student exits the program before completion of the MS degree requirements, or fails to maintain continuous enrollment at Missouri S&T, the shared-credit courses may not apply toward graduate requirements in the event of future readmission.

It is the student's responsibility to check how dual-enrollment status and graduate coursework would affect scholarships and other financial aid. Graduate students **are not** eligible for Federal Pell Grants, though they are eligible for Federal Financial Aid, as well as fellowships and teaching/research assistantships. It is international student's responsibility to check with the International Affairs Office during completion of an accelerated BS/MS to ensure immigration status is properly maintained throughout the program.

Justification for request

Updated name: "Freshman Engineering Program " to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Key: 156

Program Change Request

Date Submitted: 01/15/20 10:19 am

Viewing: **MC ENG-BS : Mechanical Engineering BS**

File: 86.43

Last approved: 06/14/19 2:11 pm

Last edit: 01/16/20 8:14 am

Changes proposed by: ershenb

Catalog Pages Using this Program

[Mechanical Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

MC ENG-BS

Department

Mechanical & Aerospace Engineering

Title

Mechanical Engineering BS

Program Requirements and Description

In Workflow

1. RMECHENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/15/20 4:51 pm
J. Keith Nisbett (nisbett): Approved for RMECHENG Chair
2. 01/16/20 8:14 am
Brittany Parnell (ershenb): Approved for CCC Secretary
3. 01/17/20 9:58 am
Stephen Raper (sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm
Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

History

1. Feb 24, 2014 by J. Keith Nisbett (nisbett)
2. Aug 6, 2014 by J. Keith Nisbett (nisbett)

3. Jul 21, 2015 by pantaleoa
4. May 3, 2018 by J. Keith Nisbett (nisbett)
5. Jun 14, 2019 by J. Keith Nisbett (nisbett)

Bachelor of Science Mechanical Engineering

Entering freshmen desiring to study mechanical engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will, however, be permitted, if they wish, to state a mechanical engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of **the Foundational the Freshman-Engineering and Computing Program program** is on enhanced advising **and end**-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 mechanical engineering a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. An average of at least two grade points per credit hour must also be attained in all courses taken in mechanical engineering.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education as follows:

1. ENGLISH 1120
2. HISTORY 1200 or HISTORY 1300 or HISTORY 1310 or POL SC 1200
3. ECON 1100 or ECON 1200
4. ENGL 1160 or ENGL 3560 or SP&MS 1185
5. A literature elective
6. A humanity or social science elective*
7. A humanity or social science elective* that has, as a prerequisite, a humanity or social science course already taken.

* Humanity and social science electives must be at least 3 credit hours of lecture designation, and also meet the requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.

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

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	ECON 1100 or 1200	3
CHEM 1310^a	4	MECH ENG 1720	3
ENGLISH 1120	3	PHYSICS 1135^a	4
HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3	MATH 1215^{a, b}	4

CHEM 1319	1	Elective-Hum or Soc Sci ^f	3
MATH 1214 ^{a, b}	4		
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
MATH 2222 ^a	4	MECH ENG 2761	3
Programming Elective ^{a, c}	3	MECH ENG 2519 ^a	3
CIV ENG 2200 ^a	3	MECH ENG 2360 ^a	3
PHYSICS 2135 ^a	4	MATH 3304 ^a	3
MECH ENG 2653	3	MET ENG 2110 ^a	3
	17		15
Junior Year			
First Semester	Credits	Second Semester	Credits
MECH ENG 3313	3	MECH ENG 3411 ^a	3
MECH ENG 3521	3	MECH ENG 3131	3
ELEC ENG 2800	3	MECH ENG 4840	2
CIV ENG 2210 ^a	3	Elective-Communications ^d	3
CIV ENG 2211	1	MECH ENG 3708	3
Elective-Advanced Math/Stat or Comp Sci ^e	3	MECH ENG 3525	3
	16		17
Senior Year			
First Semester	Credits	Second Semester	Credits
MECH ENG 4842	2	ENG MGT 1100	1
MECH ENG 4479	3	ENG MGT 1210	2
MECH ENG technical elective ^g	3	MECH ENG 4761	3
Literature elective ^f	3	MECH ENG 4480	1
Technical elective ^h	3	MECH ENG 5000-level technical elective ^g	3
Elective-Advanced Hum or Soc Sci ^f	3	Breadth elective ⁱ	3
	17		13
Total Credits: 128			

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

- a A grade of "C" or better is required in [CHEM 1310](#), [MATH 1214](#), [MATH 1215](#), [MATH 2222](#), [MATH 3304](#), [PHYSICS 1135](#), [PHYSICS 2135](#), programming elective, [MET ENG 2110](#), [CIV ENG 2200](#), [CIV ENG 2210](#), [MECH ENG 2519](#), [MECH ENG 2360](#), and [MECH ENG 3411](#), both as prerequisite for follow-up courses in the curriculum and for graduation.
- b [MATH 1208](#) and [MATH 1221](#) may be substituted for [MATH 1214](#) and [MATH 1215](#), respectively.
- c The programming elective consists of a lecture and lab combination, and may be selected from [COMP SCI 1970/COMP SCI 1980](#), [COMP SCI 1971/COMP SCI 1981](#), or [COMP SCI 1972/COMP SCI 1982](#), or [COMP SCI 1570/COMP SCI 1580](#). Note that [COMP SCI 1570/COMP SCI 1580](#) requires one more credit hour than the other options.
- d This course must be selected from the following: [ENGLISH 1160](#), [ENGLISH 3560](#) or [SP&M S 1185](#), or the complete four course sequence in Advanced ROTC ([MIL ARMY 3250](#), [MIL ARMY 3500](#), [MIL ARMY 4250](#), and [MIL ARMY 4500](#); or [MIL AIR 3110](#), [MIL AIR 3120](#), [MIL AIR 4110](#) and [MIL AIR 4120](#)).

- e This course must be selected from the following: [COMP SCI 3200](#), [MATH 3108](#), [STAT 3113](#), [STAT 3115](#) or any 5000-level math or computer science course approved by the student's advisor.
- f All electives must be approved by the student's advisor. Humanity and social science electives must be at least 3 credit hours of lecture designation, and also meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
- g Six hours of technical electives, subject to approval by the student's advisor, must be in the department of mechanical and aerospace engineering. At least three of these technical elective hours must be at the 5000 level. This elective may not include co-op, special problems, or research credits, such as 3002, 4000, or 4099. Honors students have special requirements for technical electives.
- h This elective must be a three credit hour course, subject to approval by the student's advisor, from any of the following areas: math, statistics, science, engineering, or computer science. The course must be at the 3000 or higher level, or have a prerequisite that is part of the required mechanical engineering curriculum. Exceptions to the course level may be approved by the student's advisor. The elective may not include co-op, special problems, or research credits, such as 3002, 4000, or 4099.
- i This elective consists of three credit hours, subject to approval by the student's advisor, and may be satisfied by any of the following: (1) A three credit hour course from any of the following areas: math, statistics, science, engineering, computer science, business, or IST. The course must be at the 3000 or higher level, or have a prerequisite that is part of the required mechanical engineering curriculum. Exceptions to the course level may be approved by the student's advisor; (2) Any three credit hour course in the list of approved courses for the global studies minor; or (3) Any combination of three credit hours from co-op (3002), special problems (3000, 4000, or 5000), research (4099), or design team credit (ENG MGT 2011, 2012, or 2013).
- j All mechanical engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade on this examination is not required to earn a B.S. degree. However, it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process as described in assessment requirements found elsewhere in this catalog.

Energy Conversion Emphasis Area for Mechanical Engineering

Students desiring to obtain a bachelor of science degree in mechanical engineering with an emphasis area in energy conversion must satisfy all the requirements of the bachelor of science degree in mechanical engineering, with the additional stipulation that four courses must be taken as follows:

a. Two courses from the following list:		6
MECH ENG 5527	Combustion Processes	3
or AERO ENG 5527	Combustion Processes	
MECH ENG 5533	Internal Combustion Engines	3
MECH ENG 5566	Solar Energy Technology	3
MECH ENG 5567	Heat Pump And Refrigeration Systems	3
MECH ENG 5571	Environmental Controls	3
MECH ENG 5575	Mechanical Systems For Environmental Control	3
AERO ENG 5169	Introduction to Hypersonic Flow	3
AERO ENG 5535	Aerospace Propulsion Systems	3
b. One course from the following list:		3
MECH ENG 5519	Advanced Thermodynamics	3
or AERO ENG 5519	Advanced Thermodynamics	
MECH ENG 5525	Intermediate Heat Transfer	3
or AERO ENG 5525	Intermediate Heat Transfer	
MECH ENG 5131	Intermediate Thermofluid Mechanics	3
or AERO ENG 5131	Intermediate Thermofluid Mechanics	
MECH ENG 5139	Computational Fluid Dynamics	3
or AERO ENG 5139	Computational Fluid Dynamics	

c. One additional course from either list "a" or list "b", or from the following list:		3
ECON 4540	Energy Economics	3
ELEC ENG 5150	Photovoltaic Systems Engineering	3
ENV ENG 5660	Introduction To Air Pollution	3
NUC ENG 4257	Two-phase Flow in Energy Systems - I	3

Note: By using the breadth elective and technical electives to satisfy the above requirements, this emphasis area requires the same total number of credit hours as the BSME degree. A change of major form should be submitted to designate the energy conversion emphasis area.

Manufacturing Processes Emphasis Area for Mechanical Engineering

Students desiring to obtain a bachelor of science in mechanical engineering with an emphasis area in manufacturing processes must satisfy all requirements of the bachelor of science in mechanical engineering with the additional stipulation that four courses must be taken as follows:

a. The following course:		3
MECH ENG 3653	Manufacturing	3
b. One course from the following Manufacturing/Automation courses:		3
MECH ENG 5653	Computer Numerical Control of Manufacturing Processes	3
MECH ENG 5655	Manufacturing Equipment Automation	3
MECH ENG 5449	Robotic Manipulators and Mechanisms	3
MECH ENG 5606	Material Processing By High-Pressure Water Jet	3
c. One course from the following Design courses:		3
MECH ENG 5763	Computer Aided Design: Theory and Practice	3
MECH ENG 5656	Design For Manufacture	3
MECH ENG 5702	Synthesis Of Mechanisms	3
d. One course from the following list:		3
MECH ENG 5708	Rapid Product Design And Optimization	3
MECH ENG 5758	Integrated Product Development	3
e. The Math/Stat elective must be one of the following:		3
STAT 3113	Applied Engineering Statistics	3
STAT 3115	Engineering Statistics	3

A suggested sequence for the junior and senior years is given below. Note that by using the breadth elective and technical electives to satisfy the above requirements, this emphasis area requires the same total number of credit hours as the BSME degree. A change of major form should be submitted to designate the manufacturing processes emphasis area.

Junior Year			
First Semester	Credits	Second Semester	Credits
MECH ENG 3313	3	MECH ENG 3411 ^a	3
ELEC ENG 2800	3	MECH ENG 3131	3
MECH ENG 3521	3	MECH ENG 3525	3
CIV ENG 2210 ^a	3	MECH ENG 4840	2
CIV ENG 2211	1	MECH ENG 3653	3
STAT 3113 or 3115	3	Elective-Communications ^d	3
	16		17
Senior Year			

First Semester	Credits	Second Semester	Credits
MECH ENG 4842	2	ENG MGT 1100	1
MECH ENG 4479	3	ENG MGT 1210	2
MECH ENG 3708	3	MECH ENG 4761	3
Manufacturing Technical Elective ^f	3	MECH ENG 4480	1
Manufacturing Technical Elective ^f	3	Manufacturing Technical Elective ^f	3
Elective Literature ^e	3	Electives-Hum or Soc Sci ^e	3
	17		13
Total Credits: 63			

a	A grade of "C" or better is required in CHEM 1310 , MATH 1214 , MATH 1215 , MATH 2222 , MATH 3304 , PHYSICS 1135 , PHYSICS 2135 , programming elective, MET ENG 2110 , CIV ENG 2200 , CIV ENG 2210 , MECH ENG 2519 , MECH ENG 2360 and MECH ENG 3411 , both as prerequisite for follow-up courses in the curriculum and for graduation.
b	MATH 1208 and MATH 1221 may be substituted for MATH 1214 and MATH 1215 , respectively.
c	The programming elective consists of a lecture and lab combination, and may be selected from COMP SCI 1970/COMP SCI 1980 , COMP SCI 1971/COMP SCI 1981 , COMP SCI 1972/COMP SCI 1982 , or COMP SCI 1570/COMP SCI 1580 . Note that COMP SCI 1570/COMP SCI 1580 requires one more credit hour than the other options.
d	This course must be selected from the following: ENGLISH 1160 , ENGLISH 3560 or SP&M S 1185 , or the complete four course sequence in Advanced ROTC (MIL ARMY 3250 , MIL ARMY 3500 , MIL ARMY 4250 , and MIL ARMY 4500 ; or MIL AIR 3110 , MIL AIR 3120 , MIL AIR 4110 and MIL AIR 4120).
e	All electives must be approved by the student's advisor. Humanity and social science electives must be at least 3 credit hours of lecture designation, and also meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
f	The nine hours of manufacturing technical elective must be selected as follows: One course from the following manufacturing/automation courses: MECH ENG 5653 , MECH ENG 5655 , MECH ENG 5449 , MECH ENG 5606 . One of the following design courses: MECH ENG 5763 , MECH ENG 5656 , MECH ENG 5702 . One course from the following list: MECH ENG 5708 , MECH ENG 5758 .
g	All mechanical engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade on this examination is not required to earn a B.S. degree, however, it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process as described in Assessment Requirements found elsewhere in this catalog.

Mechanical Design and Analysis Emphasis Area

Students desiring to obtain a bachelor of science in mechanical engineering with an emphasis area in mechanical design and analysis must satisfy all requirements of the bachelor of science in mechanical engineering, with the additional stipulation that four courses must be taken as follows:

a. One design course from the following list:		3
MECH ENG 5709	Machine Design II	3
MECH ENG 5702	Synthesis Of Mechanisms	3
MECH ENG 5704	Compliant Mechanism Design	3
MECH ENG 5708	Rapid Product Design And Optimization	3
MECH ENG 5715	Concurrent Engineering	3
MECH ENG 5656	Design For Manufacture	3
MECH ENG 5757	Integrated Product And Process Design	3
MECH ENG 5760	Probabilistic Engineering Design	3

MECH ENG 5763	Computer Aided Design: Theory and Practice	3
MECH ENG 5761	Engineering Design Methodology	3
b. One analysis course from the following list:		3
MECH ENG 5307	Vibrations I	3
MECH ENG 5211	Introduction To Continuum Mechanics	3
MECH ENG 5212	Introduction to Finite Element Analysis	3
MECH ENG 5234	Stability of Engineering Structures	3
MECH ENG 5236	Fracture Mechanics	3
MECH ENG 5313	Intermediate Dynamics Of Mechanical And Aerospace Systems	3
MECH ENG 5222	Introduction To Solid Mechanics	3
MECH ENG 5238	Fatigue Analysis	3
MECH ENG 5449	Robotic Manipulators and Mechanisms	3
MECH ENG 5478	Mechatronics	3
c. Two additional courses from either of the previous lists.		6

Note that by using the breadth elective and technical electives to satisfy the above requirements, this emphasis area requires the same total number of credit hours as the BSME degree. A change of major form should be submitted to designate the mechanical design and analysis emphasis area.

Systems Integration Emphasis Area

The Systems Integration emphasis area is required and available only for students pursuing a bachelor of science in mechanical engineering in the cooperative program delivered at Missouri State University. This emphasis area includes all requirements of the bachelor of science in mechanical engineering, except for the substitutions stipulated below.

The following requirements in the mechanical engineering curriculum are removed (16 credit hours):		
ELEC ENG 2800	Electrical Circuits	3
ENG MGT 1100	Practical Concepts for Technical Managers	1
Elective-Advanced Math/Stat or Comp Sci		3
MECH ENG 5000-level technical elective		3
Technical elective		3
Breadth elective		3
The following requirements are added (16 credit hours):		
ELEC ENG 2100	Circuits I	3
ELEC ENG 2101	Circuit Analysis Laboratory I	1
ELEC ENG 2120	Circuits II	3
ENG MGT 3320	Introduction to Project Management	3
Systems Integration technical elective. One of the following:		3
MECH ENG 5307	Vibrations I	3
MECH ENG 5478	Mechatronics	3
MECH ENG 5481	Mechanical And Aerospace Control Systems	3
MECH ENG 5533	Internal Combustion Engines	3
MECH ENG 5571	Environmental Controls	3
MECH ENG 5575	Mechanical Systems For Environmental Control	3
MECH ENG 5656	Design For Manufacture	3

MECH ENG 5704	Compliant Mechanism Design	3
MECH ENG 5708	Rapid Product Design And Optimization	3
MECH ENG 5709	Machine Design II	3
MECH ENG 5715	Concurrent Engineering	3
MECH ENG 5757	Integrated Product And Process Design	3
MECH ENG 5763	Computer Aided Design: Theory and Practice	3
One of the following:		
STAT 3113	Applied Engineering Statistics	3
STAT 3115	Engineering Statistics	3
STAT 3117	Introduction To Probability And Statistics	3
COMP SCI 3200	Introduction To Numerical Methods	3

All of the substitutions for this emphasis area appear in the junior and senior years. A suggested sequence for the junior and senior years is given below.

Junior Year			
First Semester	Credits	Second Semester	Credits
MECH ENG 3313	3	MECH ENG 3411 ^a	3
MECH ENG 3521	3	MECH ENG 3131	3
ELEC ENG 2100	3	MECH ENG 3525	3
ELEC ENG 2101	1	MECH ENG 3708	3
CIV ENG 2210 ^a	3	MECH ENG 4840	2
CIV ENG 2211	1	ELEC ENG 2120	3
STAT 3113 , or 3115 , or 3117 , or COMP SCI 3200	3		
	17		17
Senior Year			
First Semester	Credits	Second Semester	Credits
MECH ENG 4842	2	MECH ENG 4761	3
MECH ENG 4479	3	Systems Integration technical elective ^g	3
MECH ENG 4480	1	Literature elective ^e	3
MECH ENG technical elective ^f	3	Elective - Advanced Hum or Soc Sci ^e	3
Elective - Communications ^d	3	ENG MGT 3320	3
ENG MGT 1210	2		
	14		15
Total Credits: 63			

a A grade of "C" or better is required in [CHEM 1310](#), [MATH 1214](#), [MATH 1215](#), [MATH 2222](#), [MATH 3304](#), [PHYSICS 1135](#), [PHYSICS 2135](#), programming elective, [MET ENG 2110](#), [CIV ENG 2200](#), [CIV ENG 2210](#), [MECH ENG 2519](#), [MECH ENG 2360](#) and [MECH ENG 3411](#), both as prerequisite for follow-up courses in the curriculum and for graduation.

b [MATH 1208](#) and [MATH 1221](#) may be substituted for [MATH 1214](#) and [MATH 1215](#), respectively.

c The programming elective consists of a lecture and lab combination, and may be selected from [COMP SCI 1970/COMP SCI 1980](#), [COMP SCI 1971/COMP SCI 1981](#), or [COMP SCI 1972/COMP SCI 1982](#), or [COMP SCI 1570/COMP SCI 1580](#). Note that [COMP SCI 1570/COMP SCI 1580](#) requires one more credit hour than the other options.

d This course must be selected from the following: [ENGLISH 1160](#), [ENGLISH 3560](#) or [SP&M S 1185](#), or the complete four course sequence in

Advanced ROTC ([MIL ARMY 3250](#), [MIL ARMY 3500](#), [MIL ARMY 4250](#), and [MIL ARMY 4500](#); or [MIL AIR 3110](#), [MIL AIR 3120](#), [MIL AIR 4110](#) and [MIL AIR 4120](#)).

- e All electives must be approved by the student's advisor. Humanity and Social Science electives must be at least 3 credit hours of lecture designation, and also meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
- f The mechanical engineering technical elective is subject to approval by the student's advisor, and must be in the department of mechanical and aerospace engineering. This elective may not include co-op, special problems, or research credits, such as 3002, 4000, or 4099. Honors students have special requirements for technical electives.
- g The systems integration technical elective must be selected from the following list: MECH ENG 5307, 5478, 5481, 5533, 5571, 5575, 5656, 5704, 5708, 5709, 5715, 5757, 5763.
- h All mechanical engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade on this examination is not required to earn a B.S. degree. However, it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process as described in assessment requirements found elsewhere in this catalog.

Justification for request

updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

[PCRequestforStaffReviewSept17_000-Systems-Integration-Emphasis.pdf](#)

Course Reviewer Comments

ershenb (01/16/20 8:14 am): .

Key: 86

Program Change Request

Date Submitted: 01/15/20 2:25 pm

Viewing: **MI ENG-BS : Mining Engineering BS**

File: 95.28

Last approved: 03/21/18 10:55 am

Last edit: 01/15/20 2:25 pm

Changes proposed by: ershenb

Catalog Pages Using this Program

[Mining Engineering](#)

Start Term

Fall 2020 ~~08/13/2018~~

Program Code

MI ENG-BS

Department

Mining & Nuclear Engineering

Title

Mining Engineering BS

Program Requirements and Description

In Workflow

1. MINEXP ENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 01/16/20 8:18 am
Kwame Awuah-Offei (kwamea):
Approved for
MINEXP ENG Chair
2. 01/16/20 12:43 pm
Brittany Parnell
(ershenb):
Approved for CCC
Secretary
3. 01/17/20 9:58 am
Stephen Raper
(sraper): Approved
for Engineering
DSCC Chair
4. 01/20/20 8:53 pm
Brittany Parnell
(ershenb):
Approved for
Pending CCC
Agenda post

History

1. Apr 28, 2014 by
Kwame Awuah-Offei (kwamea)
2. Jan 30, 2015 by
Tina Alobaidan
(cifarellit)

3. Jun 28, 2017 by
Tina Alobaidan
(cifarellit)
4. Mar 21, 2018 by
Tina Alobaidan
(cifarellit)

Bachelor of Science Mining Engineering

Entering freshmen desiring to study Mining Engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will, however, be permitted, if they wish, to state a Mining Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of **the Foundational the Freshman-Engineering and Computing Program program** is on fundamental sciences **and and** mathematics, enhanced advising **and 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. In major. In** addition, students who state the Mining Engineering preference are required to **complete MIN ENG 2126 during the complete Mining Engineering 2126 during the** first or second semester on campus.

For the Bachelor of Science degree in Mining Engineering a minimum of 128 credit hours is required, although completion of an emphasis area may require up to 132 credits. 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 Mining Engineering.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

1. All students are required to take one American History course, two economics courses, one humanities course, [ENGLISH 1120](#) and either [ENGLISH 1160](#), [ENGLISH 3560](#) or [TCH COM 1600](#). The history course is to be selected from [HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics courses must be either [ECON 1100](#) or [ECON 1200](#), and [ECON 3512](#). The humanities course must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
2. The remaining three credit hours must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog. Foreign language courses 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 4000 or 5000 level.)
3. Special topics, special problems courses and honors seminars are allowed only by petition to and approval by the student's department chairman.

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

Freshman Year			
First Semester	Credits	Second Semester	Credits
MATH 1214	4	MATH 1215	4
CHEM 1310	4	PHYSICS 1135	4
CHEM 1319	1	MECH ENG 1720	3
CHEM 1100	1	MIN ENG 1912	2
MIN ENG 2126	1	GEO ENG 1150	3
FR ENG 1100	1		
HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3		
ENGLISH 1120	3		

18

16

Sophomore Year			
First Semester	Credits	Second Semester	Credits
MIN ENG 2925	2	MIN ENG 2412	3
MIN ENG 3912	3	MATH 3304	3
MATH 2222	4	MECH ENG 2527	3
MIN ENG 3913	3	MECH ENG 2350	2
CIV ENG 2200	3	PHYSICS 2135	4
ECON 1100 or 1200	3		
	18		15
Junior Year			
First Semester	Credits	Second Semester	Credits
STAT 3113 or 3115	3	MIN ENG 4512	3
NUC ENG 3221 or CIV ENG 3330	3	MIN ENG 5522	3
MIN ENG 5932	3	MIN ENG 5823	3
CIV ENG 2210	3	MIN ENG 5933	3
ECON 3512	3	ENGLISH 1600 , or 1160 , or 3560	3
GEOLOGY 3310	3		
	18		15
Senior Year			
First Semester	Credits	Second Semester	Credits
MIN ENG 5612	3	MIN ENG 5742	3
MIN ENG 5912	3	MIN ENG 4097	4
MIN ENG 4096	3	Technical Elective ^{1,2,3,4,5,6}	3
H/SS Elective	3	H/SS Elective	3
MIN ENG 5113	3		
	15		13
Total Credits: 128			

- ¹ **Explosives Engineering Emphasis:** [MIN ENG 5622](#) (Blasting Tech) and [MIN ENG 5823](#) (Rock Mechanics) or [MIN ENG 5922](#) (Tunneling/Construction) have to be taken as Technical Electives.
- ² **Quarrying Emphasis:** Two of [CIV ENG 3116](#) (Construction Materials); [MIN ENG 5212](#) (Aggregate and Quarrying); and [MIN ENG 5412](#) (Aggregate Materials) have to be taken as Technical Electives.
- ³ **Coal Emphasis:** Two of [MIN ENG 5322](#) (Coal Mine Development and Production), [MIN ENG 4414](#) (Mine Plant Management) or an approved substitute course must be taken as Technical Electives.
- ⁴ **Mining and the Environment Emphasis:** [GEO ENG 5235](#) (Environmental Geological Engineering) and [GEO ENG 5233](#) (Risk Assessment in Environmental Studies), or approved substitute courses have to be taken as Technical Electives.
- ⁵ **Mining Health and Safety Emphasis:** [MIN ENG 3002](#) (Mine Rescue), [ENG MGT 4330](#) (Human Factors), or other approved substitute courses must be taken as Technical Electives.
- ⁶ **Sustainable Development Emphasis:** [POL SCI 3310](#) (Public Policy Analysis), [ECON 4440](#) (Environmental and Natural Resource Economics), or other approved substitute courses must be taken as Technical Electives.

Graduating Mining Engineers Examination

Mining engineering students must complete the Fundamentals of Engineering Examination prior to graduation as a senior assessment requirement. A passing grade is not required to earn a B.S. degree in mining engineering; however it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process.

Mining Health and Safety Emphasis

Junior and Senior Years		
MIN ENG 3002	Mine Rescue (or approved substitute course in lieu of Technical Elective.)	3
ENG MGT 4330	Human Factors (or approved substitute course in lieu of Technical Elective.)	3

Sustainable Development Emphasis

Junior and Senior Years		
POL SCI 3300	Principles Of Public Policy (or approved substitute course in lieu of Technical Elective.)	3
ECON 4440	Environmental And Natural Resource Economics (or approved substitute course in lieu of Technical Elective.)	3

Quarrying Engineering Emphasis

Senior Year		
CIV ENG 3116	Construction Materials, Properties And Testing (in lieu of Technical Elective.)	3
MIN ENG 5212	Aggregates and Quarrying	3

Explosives Engineering Emphasis

Junior and Senior Years		
Choose one of the following courses in lieu of Technical Elective in Junior Year:		
A three-credit hour explosives engineering (EXP ENG) course		
EXP ENG 5922	Tunneling & Underground Construction Techniques	3
GEO ENG 5471	Rock Engineering	
In lieu of Technical Elective in Senior Year:		
EXP ENG 5622	Blasting Design And Technology	

Coal Emphasis

Junior and Senior Years		
MIN ENG 5322	Coal Mining Methods	3
MIN ENG 4414	Mine Plant Management (or approved substitute course in lieu of Technical Elective.)	2

Mining and the Environment Emphasis

Junior and Senior Years		
ENV ENG 5640	Environmental Law And Regulations	3
GEO ENG 5233	Risk Assessment In Environmental Studies (or approved substitute course in lieu of Technical Elective.)	3

Justification for request

"Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Program Change Request

Date Submitted: 01/15/20 2:22 pm

Viewing: **MT ENG-BS : Metallurgical Engineering BS**

File: 90.30

Last approved: 06/28/17 10:13 am

Last edit: 01/15/20 2:22 pm

Changes proposed by: ershenb

Catalog Pages Using this Program

[Metallurgical Engineering](#)

Start Term

Fall 2020 ~~08/14/2017~~

Program Code

MT ENG-BS

Department

Materials Science & Engineering

Title

Metallurgical Engineering BS

Program Requirements and Description

In Workflow

1. **RMATSENG Chair**
2. **CCC Secretary**
3. **Engineering DSCC Chair**
4. **Pending CCC Agenda post**
5. **CCC Meeting Agenda**
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/15/20 2:28 pm
Greg Hilmas
(ghilmas): Approved for RMATSENG Chair
2. 01/15/20 2:58 pm
Brittany Parnell
(ershenb): Approved for CCC Secretary
3. 01/17/20 9:58 am
Stephen Raper
(sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm
Brittany Parnell
(ershenb): Approved for Pending CCC Agenda post

History

1. Oct 8, 2013 by
[Lahne Black \(lahne\)](#)
2. Apr 28, 2014 by
[Lahne Black \(lahne\)](#)
3. Aug 14, 2014 by
[Lahne Black \(lahne\)](#)
4. Aug 20, 2014 by
[pantaleoa](#)

5. Aug 20, 2014 by pantaleoa
6. Aug 20, 2014 by pantaleoa
7. Jul 21, 2015 by pantaleoa
8. Mar 7, 2016 by F. Scott Miller (smiller)
9. Mar 27, 2017 by F. Scott Miller (smiller)
10. Jun 28, 2017 by F. Scott Miller (smiller)

Bachelor of Science Metallurgical Engineering

Entering freshmen desiring to study metallurgical engineering will be admitted to the **Foundational Freshman-Engineering and Computing** 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 **Foundational Freshman-Engineering and Computing Program** program is on enhanced advising **and** ~~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 an average of at least two grade points per credit hour 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 ABET. Each student's program of study must contain a minimum 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 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#).
2. Of the remaining hours, six credit hours must be taken in humanities or social sciences from the approved list of humanities and social science (HSS) courses posted on the undergraduate studies website (<http://ugs.mst.edu/>). Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 4000 level.)
3. Special topics, special problems courses and honors seminars are allowed only by petition to and approval by the student's department chair.

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	CHEM 1320	3
CHEM 1310	4	MATH 1215	4
CHEM 1319	1	PHYSICS 1135	4
MATH 1214	4	Hum/Soc Sci Elective ¹	3
ENGLISH 1120	3	MECH ENG 1720	3
Hum/Soc Sci Elective ¹	3		
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
PHYSICS 2135	4	CER ENG 3230	3
MATH 2222	4	CIV ENG 2210	3
MET ENG 2110	3	MET ENG 2125	2

CIV ENG 2200	3	MET ENG 3130	3
Hum/Soc Sci Elective ¹	3	MET ENG 3420	3
		MET ENG 3425	1
	17		15
Junior Year			
First Semester	Credits	Second Semester	Credits
MET ENG 3320	3	MET ENG 3225	1
MATH 3304 ²	3	MET ENG 3220	3
MET ENG 3120	3	CER ENG 3410	3
MET ENG 3125	2	Core Elective ⁴	3
MET ENG 4420	3	Out of Department Technical Elective ³	3
Communication Elective ¹	3	Hum/Soc Sci Elective ¹	3
	17		16
Senior Year			
First Semester	Credits	Second Semester	Credits
MET ENG 4096	3	MET ENG 4097	3
Statistics Course ²	3	Hum/Soc Sci Elective ¹	3
MET ENG 4350	3	Technical Elective ⁵	3
Core Elective ⁴	3	Free Elective ⁶	3
Technical Elective ⁵	3	Core Elective ⁴	3
	15		15
Total Credits: 128			

¹ Eighteen hours of required H/SS electives of which three hours must be history ([HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#)), three hours of economics ([ECON 1100](#) or [ECON 1200](#)) and three hours communications ([ENGLISH 1160](#), [ENGLISH 3560](#), or [SP&M S 1185](#))

² All metallurgical engineering students must take [MATH 3304](#) and one statistics course ([STAT 3113](#) or [STAT 3115](#))

³ [CHEM ENG 5320](#), [CHEM 2210](#) or [CHEM 2310](#) or [CHEM 3410](#) or CHEM 4810, [ELEC ENG 2100](#) & [ELEC ENG 2101](#) or [ELEC ENG 2800](#), [GEOLOGY 2610](#), [MATH 5603](#) or [MATH 5325](#), [MECH ENG 5212](#) or [MECH ENG 5220](#) or [MECH ENG 5229](#) or [MECH ENG 5236](#) or [MECH ENG 5238](#) or [MECH ENG 5282](#), [MIN ENG 2412](#), [PHYSICS 2305](#) or [PHYSICS 2311](#), STAT 5120 or STAT 5346 or STAT 5353.

⁴ Metallurgical Core Electives (9 hours): Core Elective I - Introduction to Metal Additive Manufacturing ([MET ENG 5150](#)) or [Course MET ENG 4230 Not Found](#) ([MET ENG 4230](#)), Core Elective II - Steelmaking ([MET ENG 4450](#)) or Steels And Their Treatment ([MET ENG 4320](#)), Core Elective III - Intro to ICME (CER ENG 4410) or Phase Equilibria (CER ENG 3220) or Refractories (CER ENG 5250) or Chemistry and Inherent Properties of Polymers (CHEM 4810).

⁵ Technical Electives (MET ENG or approved listing)

⁶ Free Electives (3 hours)-algebra, trigonometry, basic ROTC, and courses considered remedial excluded

Justification for request

Updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Program Change Request

Date Submitted: 01/15/20 2:27 pm

Viewing: **NU ENG-BS : Nuclear Engineering BS**

File: 104.16

Last approved: 03/27/17 2:47 pm

Last edit: 01/15/20 2:27 pm

Changes proposed by: ershenb

Catalog Pages Using this Program

[Nuclear Engineering](#)

Start Term

Fall 2020 ~~08/14/2017~~

Program Code

NU ENG-BS

Department

Mining & Nuclear Engineering

Title

Nuclear Engineering BS

Program Requirements and Description

In Workflow

1. NUC ENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. CAT entry
11. Peoplesoft

Approval Path

1. 01/16/20 1:20 pm
AYODEJI Alajo
(alajoa): Approved for NUC ENG Chair
2. 01/16/20 1:23 pm
Brittany Parnell
(ershenb): Approved for CCC Secretary
3. 01/17/20 9:58 am
Stephen Raper
(sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm
Brittany Parnell
(ershenb): Approved for Pending CCC Agenda post

History

1. Aug 6, 2014 by
[Lahne Black \(lahne\)](#)
2. Jul 21, 2015 by
[pantaleoa](#)
3. Mar 27, 2017 by
[Hyoung-Koo Lee \(leehk\)](#)

Bachelor of Science Nuclear Engineering

Entering freshmen desiring to study nuclear engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will, however, be permitted, to state a nuclear engineering preference, which will be used as a consideration for available departmental scholarships.

For the bachelor of science degree in nuclear engineering a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. A student must maintain an average of at least two grade points overall and for all courses taken in nuclear engineering.

Each student's program of study must contain a minimum 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 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#).
2. Students must take [ENGLISH 1120](#). ~~ENGLISH 1120~~—Students are also required to take one humanities course to be selected from "The Approved List of Humanities and Social Science Courses for Engineering Degrees" maintained by the office of undergraduate studies.
3. Of the remaining hours, six credit hours must be taken in humanities or social sciences at the 1000 level or above and must be selected from "The Approved List of Humanities and Social Science Courses for Engineering Degrees" maintained by the office of undergraduate studies. One of these courses must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 1180 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 4000 level.)
4. Skill courses are not allowed to meet humanities and social sciences requirements except in foreign languages. Students who select the foreign language option are urged to take more than one course.
5. Special topics, special problems courses and honors seminars are allowed only by petition to and approval by the student's department chair.

The nuclear engineering program at Missouri S&T is characterized by its focus on the scientific basics of engineering and its innovative application. The necessary interrelations among the various topics, the engineering disciplines, and the other professions as they naturally come together in the solution of real world problems are emphasized as research, analysis, synthesis, and design are presented and discussed through classroom and laboratory instruction.

Freshman Year			
First Semester	Credits	Second Semester	Credits
Freshman Chemistry Requirement ¹	5	Elective-Hum or Soc Sci ³	3
ENGLISH 1120	3	HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3
FR ENG 1100	1	PHYSICS 1135	4
MATH 1214	4	MECH ENG 1720	3
NUC ENG 1105 ²	1	MATH 1215	4
	14		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits
CIV ENG 2200	3	STAT 3111 , or 3113 , or 3115 , or 3117	3
Elective ⁶	3	ECON 1100 or 1200	3
MATH 2222	4	NUC ENG 2406	1
NUC ENG 2105	2	CIV ENG 2210	3
PHYSICS 2135	4	MATH 3304	3
		PHYSICS 2305	3
	16		16
Junior Year			
First Semester	Credits	Second Semester	Credits

Elective-Hum or Soc Sci ³	3	ENGLISH 1160 or 3560	3
COMP SCI 3200 (or any 3000-level MATH or 5000-level STAT)	3	NUC ENG 4312	3
MET ENG 2110	3	NUC ENG 3223	3
NUC ENG 3205	3	NUC ENG 4203	3
NUC ENG 3221	3	NUC ENG 4229	3
		Technical Electives-3000 or 4000 level ⁵	3
	15		18
Senior Year			
First Semester	Credits	Second Semester	Credits
Elective-Hum or Soc Sc ³	3	Elective-Hum or Soc Sci ³	3
NUC ENG 4428	2	Technical Elective-4000 level ⁵	3
NUC ENG 4207	3	Free Elective ⁴	6
Elective-4000 level MATH	3	NUC ENG 4438	2
NUC ENG 4496	1	NUC ENG 4497	3
NUC ENG 4241	3		
	15		17
Total Credits: 128			

Note: Minimum credit hours for graduation is 128.

1	CHEM 1310 and CHEM 1319 or CHEM 1351 and CHEM 1100 or an equivalent training program approved by Missouri S&T.
2	Nuclear Engineering students are expected to take Nuclear Technology Applications (NUC ENG 1105) during their Freshman year. However, transfer students are exempt.
3	Humanities and Social Science to be taken in accordance with the policy described above.
4	Courses which do not count towards this requirement are remedial courses such as algebra and trigonometry, physical education courses, extra credits in required courses, and basic Air Force and Army ROTC courses (courses taught in the first two years of the ROTC program).
5	Any Math, Science, or Engineering courses.
6	The programming elective consists of a lecture and lab combination, and may be selected from COMP SCI 1970 and COMP SCI 1980 , or COMP SCI 1971 and COMP SCI 1981 , or COMP SCI 1972 and COMP SCI 1982 , or COMP SCI 1570 and COMP SCI 1580 . Note that COMP SCI 1570 and COMP SCI 1580 requires one more credit hour than the other options.

Fundamentals of Engineering Exam: All nuclear engineering students must take the Fundamentals of Engineering Examination prior to graduation. A passing grade on this examination is not required to earn a B.S. degree, however, it is the first step toward becoming a registered professional engineer. This requirement is part of the Missouri S&T assessment process as described in assessment requirements found elsewhere in this catalog.

Justification for request

"Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Key: 104

Program Change Request

Date Submitted: 01/15/20 1:48 pm

Viewing: **PE ENG-BS : Petroleum Engineering BS**

File: 108.41

Last approved: 06/14/19 2:14 pm

Last edit: 01/15/20 1:48 pm

Changes proposed by: ershenb

Catalog Pages Using this Program

[Petroleum Engineering](#)

Start Term

Fall **2020** ~~2019~~

Program Code

PE ENG-BS

Department

Geosciences and Geological and Petroleum Engineering

Title

Petroleum Engineering BS

Program Requirements and Description

In Workflow

1. RGEOENG Chair
2. CCC Secretary
3. Engineering DSCC Chair
4. Pending CCC Agenda post
5. CCC Meeting Agenda
6. Campus Curricula Committee Chair
7. FS Meeting Agenda
8. Faculty Senate Chair
9. Registrar
10. Kristy Giacomelli-Feys

Approval Path

1. 01/15/20 9:16 pm
David Borrok (borrokd): Approved for RGEOENG Chair
2. 01/16/20 8:15 am
Brittany Parnell (ershenb): Approved for CCC Secretary
3. 01/17/20 9:58 am
Stephen Raper (sraper): Approved for Engineering DSCC Chair
4. 01/20/20 8:53 pm
Brittany Parnell (ershenb): Approved for Pending CCC Agenda post

History

1. Sep 21, 2015 by reflori
2. Jun 18, 2018 by Shari Dunn-Norman (caolila)
3. Jun 14, 2019 by Sharon Lauck (laucks)

Bachelor of Science Petroleum Engineering

Entering freshmen desiring to study Petroleum Engineering will be admitted to the **Foundational Freshman-Engineering and Computing** Program. They will, however, be permitted, if they wish, to state a Petroleum Engineering preference, which will be used as a consideration for available freshman departmental scholarships. The focus of **the Foundational the-Freshman-Engineering and Computing Program is Program is** on enhanced advising **and 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. A grade point average of 2.80 or higher is required to enter the Petroleum Engineering program from the **Foundational Freshman-Engineering and Computing** Program.

For the Bachelor of Science degree in Petroleum 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 Petroleum Engineering.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

1. Six credit hours of English: All students are required to take [ENGLISH 1120](#) and either ENGLISH 3560 (preferred) or ENGLISH 1160 or ENGLISH 1600.
2. Nine credit hours of basic humanities and social sciences: All students are required to take one history course, one economics course and one humanities course. The history course is to be selected from [HISTORY 1200](#), [HISTORY 1300](#), [HISTORY 1310](#), or [POL SCI 1200](#). The economics course may be either [ECON 1100](#) or [ECON 1200](#). The humanities course selected must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog.
3. Three credit hours as a depth requirement. Three credit hours must be taken in humanities or social sciences at the 2000-level or above and meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog. This course must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 1180 will be considered to satisfy this requirement. Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 4000-level. All courses taken to satisfy the depth requirement must be taken after graduating from high school.
4. Three credit hours of elective humanities and social sciences must meet requirements as specified under "Engineering Degree Requirements" published in the current undergraduate catalog..
5. Special topics and special problems and honors seminars are allowed only by petition to and approval by the student's department chair.

The Petroleum Engineering program at Missouri S&T consists of a strong foundation in math, sciences and engineering fundamentals, plus strong content in the traditional Petroleum Engineering core areas of drilling, production and reservoir engineering. Two unique features of the curriculum are a strong sequence of courses in Geology and Geophysics, plus a two course sequence in finite element analysis and mechanical earth modeling. S&T Petroleum Engineering students are prepared to solve today's problems and tomorrow's. Students learn theory, have ample hands-on experiences in laboratories, and they learn many modern software packages used by the petroleum industry.

Students planning on majoring in petroleum engineering should take the following courses.

Freshman Year			
First Semester	Credits	Second Semester	Credits
FR ENG 1100	1	MATH 1215	4
CHEM 1310	4	PHYSICS 1135	4
CHEM 1319	1	MECH ENG 1720	3
MATH 1214	4	GEO ENG 1150 or GEOLOGY 1110	3
HISTORY 1200 , or 1300 , or 1310 , or POL SCI 1200	3	PET ENG 2510	3
ENGLISH 1120	3		
	16		17
Sophomore Year			
First Semester	Credits	Second Semester	Credits

MATH 2222	4	MATH 3304	3
PHYSICS 2135	4	PET ENG 3520	3
GEOLOGY 3310 (Geol 3319 lab optional)	3	MECH ENG 2350	2
PET ENG 3320	3	CIV ENG 2210	3
CIV ENG 2200	3	GEOLOGY 3620	3
		ECON 1100 or 1200	3
	17		17
Junior Year			
First Semester	Credits	Second Semester	Credits
GEOLOGY 5513	3	PET ENG 3330	3
GEOPHYS 4231	3	PET ENG 4410	3
CIV ENG 3330	3	PET ENG 4590	3
PET ENG Elective ⁴	3	PET ENG 4710	3
PET ENG 4210	3	Humanities/Social Sci Elective ²	3
	15		15
Senior Year			
First Semester	Credits	Second Semester	Credits
PET ENG 4010 ³	1	PET ENG 4097	3
MECH ENG 2527	3	GEO ENG 4115	3
PET ENG 4520	3	Hum/Soc Sci Elective ²	3
PET ENG 4720	3	PET ENG Elective ⁴	3
PET ENG Elective ⁴	3	ENGLISH 1600 ⁵	3
Humanities/Social Sci Elective ²	3		
	16		15
Total Credits: 128			

¹ All freshmen Petroleum Engineering students must enroll in [CHEM 1100](#) (Intro to Lab Safety and Haz Mat).

² Humanities/Social Science electives are to be selected from a list of approved courses to be taken in accordance with the University policy. Petroleum Engineering students are especially encouraged to study foreign languages

³ All Petroleum 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 to becoming a registered professional engineer. This requirement is part of 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.

⁴ Select Petroleum Engineering electives in accordance with interest area. Students interested in reservoir engineering select from topics in advanced reservoir engineering, simulation, natural gas engineering, and formation characterization. Students interested in drilling/completions and production select petroleum electives such as advanced drilling, well completions, stimulation. Other general interest petroleum electives may be selected as available.

⁵ Students may also select [ENGLISH 1160](#) or [ENGLISH 3560](#).

The total number of credit hours required for a degree in Petroleum Engineering is 128.

Petroleum Engineering students must earn the grade of "C" or better in all Petroleum Engineering courses to receive credit toward graduation.

Accelerated BS/MS Program Option for Petroleum Engineering Majors

Missouri S&T Petroleum Engineering undergraduate students may opt to apply for an accelerated BS/MS program where a student can earn both the BS and MS degrees in Petroleum Engineering faster than if pursuing the degrees separately. The degrees awarded will be a BS & MS in Petroleum Engineering.

The benefits for undergraduate students admitted to the program are:

- Undergraduate and graduate courses may be chosen with greater flexibility,
- Up to six hours of 5000-level or above Petroleum Engineering coursework may apply to both the BS and MS requirements,
- The classes taken for shared BS/MS credit may be taken at the lower undergraduate tuition rate,
- The GRE is not required for admission,
- Other graduate courses can be taken any time after entering the program as a dual enrolled student,
- Work on a thesis project may begin before the BS requirements are completed.

To be eligible for the accelerated BS/MS Petroleum Engineering program, a Petroleum Engineering undergraduate must be at or beyond the junior level standing with a minimum of 48 credit hours. They must have successfully completed the Chemistry and Math requirements and have completed 21 credit hours of Petroleum Engineering courses at Missouri S&T with at least a 3.2 GPA in the Petroleum Engineering courses. To be admitted, the student must complete the program application and must have the recommendation of a Petroleum Engineering faculty member who agrees to serve as the graduate thesis advisor. All other MS degree requirements remain the same. The program may be combined with existing honors research, emphasis areas, and certificate options. Admitted students will have both undergraduate and graduate records in the Registrar's Office.

The Accelerated Program application must be completed within one semester after shared-credit courses are completed. Courses taken for shared credit will be identified on the application form. These courses will also be listed on the student's Graduate Form 1 to be submitted after the student enters the graduate program. The six hours of shared-credit coursework, to be taken as undergraduate credit, must be approved by the academic advisor, and may not be undergraduate research, special problems, or transfer courses. An additional six credit hours of coursework for graduate credit (beyond the shared BS/MS credits) can be taken while in the undergraduate program by applying for dual undergraduate/graduate enrollment. Taking additional courses for graduate credit as a dual enrolled student will require formal application to the graduate program. Acceptance to the Petroleum Engineering MS degree from the Accelerated Program is automatic so long as the student remains in good standing (GPA above 3.0 and B's or better in all graduate courses) within the program. To remain in the Accelerated Program, the student must meet Petroleum Engineering graduate student academic performance requirements and must maintain continuous enrollment at Missouri S&T. If the student exits the program before completion of the MS degree requirements, or fails to maintain continuous enrollment at Missouri S&T, the shared-credit courses may not apply toward graduate requirements in the event of future readmission.

It is the student's responsibility to check on how dual-enrollment status and graduate coursework affects scholarships and other financial aid. As a graduate student, you **are not** eligible for Federal Pell Grants. You are still eligible for Federal Financial Aid. You may be eligible for fellowships and teaching/research assistantships. It is the International student's responsibility to check with international affairs during completion of an accelerated BS/MS to ensure immigration status will be maintained throughout the program.

Justification for request

Updated name: "Freshman Engineering Program" to " Foundational Engineering and Computing Program."

Supporting Documents

Course Reviewer Comments

Key: 108