CLEMSON UNIVERSITY

Curriculum and Course Change System - Print Change/Delete Course Form

X **Change a Course - Abbrev & Number: BIOE- 4010**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Bio E Design Theory

Brief Statement of Change:
Change pre-req from BIOE 3020, which is taken very late in bioelectrical concentration, to BIOE 3020 or 3070 or 3200 3070

Last Term taught: 201208	.. **Change Abbrev to:**
Effective Term: 01/2014	.. **Change Number to:**
.. **Change Catalog Title:**	.. **Change Transcript Title:**
from:	from: Bio E Design Theory
to:	to:

.. **Change of Credit**	From: Fixed Credit: 3 (3,0) Variable Credit: - (-), (-)	To: Fixed Credit: (,) Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
X A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
.. N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

X **Change Prerequisite(s):**
from: BIOE 3020 or consent of instructor
to: BIOE 3020 or BIOE 3070 or BIOE 3200 3070

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator: KWEBB, Webb,Charles K **Date Form Created:** 11/8/2013
Form Last Updated by: KWEBB, Webb,Charles K **Date Form Last Updated:** 11/8/2013
Form Number: 6832

Approval

Ken Webb	11/7/13	Jessica W. Morrison	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
[signature]	11/8/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
[signature]	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
[signature]	11/15/13	[signature]	1/20/14
College Dean	Date	President	Date

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000131

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

X **Change a Course - Abbrev & Number: BIOE- 4120**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: BIOE--6120
.. **Add Graduate course:** --
Course Title: Orthopaedic Engr and Pathology

Brief Statement of Change:
Modify pre-req such that BIOL 3150 is allowed for concurrent enrollment rather than pre-req

Last Term taught: 201208	.. **Change Abbrev to:**	
Effective Term: 01/2014	.. **Change Number to:**	
.. **Change Catalog Title:**	.. **Change Transcript Title:**	
from:	from: Orthopaedic Engr and Pathology	
to:	to:	
.. **Change of Credit**	From: Fixed Credit: 3 (3,0) Variable Credit: - (-), (-)	To: Fixed Credit: (,) Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
X A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
.. N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

X **Change Prerequisite(s):**
from: BIOE 3020 and 3200 and BIOL 3150
to: BIOE 3020 and 3200 andconcurrent enrollment BIOL 3150

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator: KWEBB, Webb,Charles K **Date Form Created:** 11/8/2013
Form Last Updated by: KWEBB, Webb,Charles K **Date Form Last Updated:** 11/8/2013
Form Number: 6831

Approval

Ken Webb	11/7/13	Janice W. Morrison	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
[signature]	11/8/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
[signature]	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
[signature]	11/15/13	[signature]	1/20/14
College Dean	Date	President	Date

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CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Major Form**

Change Major Name: Civil Engineering (BS - 201405)
Degree: BS
Effective Catalog Year: 2014
.. **Change Major Name to:**
.. **Change Degree to:** (CHE approval required)
X **Change Curriculum Requirements**
(Submit or upload Curriculum map in catalog format. CHE approval required for > 18 hours of changes)
.. **Change General Education Requirements**
(Must also submit a General Education Checklist)
.. **Add, Change or Delete Concentration(s)**
(Submit or upload Curriculum map in catalog format. CHE approval required)
.. **Add, Change or Delete Emphasis Area(s)**
Explanation: We are recommending two changes:

First, EX ST 3010 is no longer going to be offered. We recommend MTSC 3020 be the replacement, because: 1) MTSC 3020, a calculus-based statistics course, is intended for Science and Engineering Majors. 2) Requiring MTSC 3020 will better standardize the statistics requirement of the engineering departments within CoES. 3) Based on a review of 41 of our peer programs, this will make us consistent with what many of them require of their students.

The second change relates to our A/H/SS requirements. The College requirement for Humanities is now 4 classes—not 5. However, we still require 5 in CE. We would like the 5th Humanities class be removed from our curriculum and replaced by COMM 2500. This class is currently required by several programs within CoES, including Computer Engineering, Electrical Engineering, Industrial Engineering, and Materials Science. Additionally, recent review of ABET data has revealed that recent graduates feel less than prepared in the area of communication in the workplace. It is our hope that the addition of this class will serve to address this issue.

Form Originator: KRISTI, Baker,Kristin L **Date Form Created:** 11/6/2013
Form Last Updated by: KRISTI, Baker,Kristin L **Date Form Last Updated:** 11/6/2013
Form Number: 6811

Approval

	11/6/13		12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
for James Martin	11/6/2013		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13		1/20/14
College Dean	Date	President	Date

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Proposed Civil Engineering Curriculum Worksheet
2014-2015

Freshman Year (General Engineering)			
First Semester		**Second Semester**	
Course	**Taken**	**Course**	**Taken**
C H 1010 General Chemistry (4)		GEOL 1010 Physical Geology (3)	
ENGL 1030 Composition I (3)		GEOL 1030 Physical Geology Lab (1)	
ENGR 1020 Engineering Disciplines and Skills (2)		ENGR 2100 Intro to Engr/Computer Graphics (2)	
MTHS 1060 Calculus of One Variable I (4)		ENGR 1410 Engineering Fundamentals (3)	
Arts, Humanities or Social Science Reqmt.[1] (3)		MTHS 1080 Calculus of One Variable II (4)	
		PHYS 1220 Physics with Calculus I (3)	
		PHYS 1240 Physics Lab (1)	

Sophomore Year			
First Semester		**Second Semester**	
Course	**Taken**	**Course**	**Taken**
C E 2010 Statics (3)		C E 2080 Dynamics (2)	
MTHS 2060 Calculus of Several Variables (4)		MTHS 2080 Intro to Ordinary Diff. Equations (4)	
Arts, Humanities or Social Science Reqmt.[1] (3)		COMM 2500 Public Speaking (3)	
PHYS 2210 Physics with Calculus II (3)		C E 2060 Structural Mechanics (4)	
PHYS 2230 Physics Lab (1)		C E 3520 Economic Evaluation of Projects (2)	
CE 2550 Geomatics (3)			

Junior Year		**Second Semester**	
First Semester	**Taken**	**Course**	**Taken**
Course		C E 3530 Professional Seminar (1)	
C E 3010 Structural Analysis (3)		C E 3110 Transp Engr Planning & Design (3)	
C E 3410 Intro to Fluid Mechanics (4)		C E 3210 Geotechnical Engr (4)	
C E 3510 C E Materials (4)		Design Technical Requirement[2] (3)	
C E 3310 Construction Engr (3)		EE&S 4010 Environmental Engr (3)	
MTSC 3020 Statistics for Engineering & Sci (3)		C E 3420 Appl Hydraulics & Hydrology (3)	

Senior Year		**Second Semester**	
First Semester	**Taken**	**Course**	**Taken**
Course		C E 4590 Capstone Design Project (3)	
Technical Requirement Restricted[3] (3)		Technical Requirement[3] (3)	
Design Technical Requirement[2] (3)		Arts and Humanities (Literature) Requirement[1] (3)	
Technical Requirement[3] (3)		Arts and Humanities/Social Science Reqmt.[1] (3)	
Technical Requirement[3] (3)		Elective (3)	
ENGL 3140 Technical Writing (3)			

Arts, Humanities/Social Science Requirements

_____

_____

_____

Technical/Technical Design Requirements

_____ _____

_____ _____

_____ _____

Free Electives

_____

_____

_____

_____

Emphasis Area:_____

_____

_____

_____

_____

See notes on next page

Proposed Civil Engineering Curriculum Worksheet
2014-2015

Note: Civil Engineering students may neither enroll in nor receive credit for any CE or EM course unless they have a 2.0 engineering grade-point ratio.

Note: Civil Engineering students enrolling in any CE course (except CE 4590) must have a C grade or better in the prerequisites for that course.

[1] *See Policy on Social Sciences and Humanities for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.*
[2] *See advisor for approved list.*
[3] *See advisor for approved list. Technical Requirements and electives may be used to complete an emphasis area in one or more of the following fields: Applied Fluid Mechanics, Construction, Environmental Engineering, Geotechnical/Geoenvironmental Engineering, Structural Engineering, or Transportation Engineering*

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000185

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

X **Change a Course - Abbrev & Number: CE- 4820**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: CE--6820
.. **Add Graduate course:** --
Course Title: Groundwater & Contam Transport

Brief Statement of Change:
This course was recently changed to combine two similar courses in different departments, CE and EEES. The change in prerequisites will enable students in both departments to enroll in the course. The course material is designed so the earlier prerequisite courses are no longer needed.

Last Term taught: 201208	.. **Change Abbrev to:**
Effective Term: 01/2014	.. **Change Number to:**
.. **Change Catalog Title:**	.. **Change Transcript Title:**
from:	from: Groundwater & Contam Transport
to:	to:
.. **Change of Credit**	From: Fixed Credit: 3 (3,0) Variable Credit: - (-), (-) / To: Fixed Credit: (,) Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
X A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
.. N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:
X **Change Prerequisite(s):**
from: CE 3410. Preq or concurrent enrollment; EES 4010.
to: Junior standing in CoES, and GEOL 1010 or consent of instructor.
Learning Objectives:
Topical Outline:
Evaluation:

Form Originator: KRISTI, Baker,Kristin L **Date Form Created:** 11/1/2013
Form Last Updated by: KRISTI, Baker,Kristin L **Date Form Last Updated:** 11/6/2013
Form Number: 6755

Approval

		Patricia W. Mercer	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	11/5/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
for Tanner Mathis	11/6/2013		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13		1/20/14
College Dean	Date	President	Date
	11/15/13		

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

000186

X **Change a Course - Abbrev & Number: ECE- 3090**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Electrical Engineering Lab I

Brief Statement of Change:
We are requesting a change in course number from ECE 3090 to ECE 2080. Based on a comparison of the syllabus of ECE 3090 with syllabi of related labs at the 2000 level and the 3000 level, ECE faculty believe that the 2000 level is the more appropriate level for the material currently currently covered in ECE 3090.

Last Term taught: 201305	.. **Change Abbrev to:**
Effective Term: 08/2014	X **Change Number to:** 2080
.. **Change Catalog Title:** from: to:	.. **Change Transcript Title:** from: Electrical Engineering Lab I to:
.. **Change of Credit**	From: Fixed Credit: 1 (0,2) Variable Credit: - (-), (-) / To: Fixed Credit: (,) Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
.. A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
X B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
.. N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

.. **Change Prerequisite(s):**
from:
to:

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator: EBRAD, Gibisch,Elizabeth Bradley **Date Form Created:** 11/5/2013
Form Last Updated by: EBRAD, Gibisch,Elizabeth Bradley **Date Form Last Updated:** 11/5/2013
Form Number: 6800

Approval

Chair, Department Curriculum Committee	11/5/13 Date	Chair, Undergraduate Curriculum Committee	12/6/2013 Date
Department Chair	11/5/13 Date	Chair, Graduate Curriculum Committee	Date
Chair, College Curriculum Committee	11/15/13 Date	Provost	Date
College Dean	11/15/13 Date	President	1/20/14 Date

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

000187

X **Change a Course - Abbrev & Number: ECE- 3070**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Basic Elect Engr

Brief Statement of Change:
We are requesting a change in course number from ECE 3070 to ECE 2070. Based on a comparison of the syllabus of ECE 3070 with syllabi of related courses at the 2000 level and the 3000 level, ECE faculty believe that the 2000 level is the more appropriate level for the material currently currently covered in ECE 3070.

Last Term taught: 201305	.. **Change Abbrev to:**
Effective Term: 08/2014	X **Change Number to:** 2070
.. **Change Catalog Title:**	.. **Change Transcript Title:**
from:	from: Basic Elect Engr
to:	to:
.. **Change of Credit**	From: Fixed Credit: 2 (2,0) Variable Credit: - (-), (-) / To: Fixed Credit: (,) Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
X A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
.. N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

.. **Change Prerequisite(s):**
from:
to:

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator: EBRAD, Gibisch,Elizabeth Bradley **Date Form Created:** 11/5/2013
Form Last Updated by: EBRAD, Gibisch,Elizabeth Bradley **Date Form Last Updated:** 11/5/2013
Form Number: 6799

Approval

Chair, Department Curriculum Committee	11/5/13 Date	Chair, Undergraduate Curriculum Committee	12/6/2013 Date
Department Chair	11/5/13 Date	Chair, Graduate Curriculum Committee	Date
Chair, College Curriculum Committee	11/15/13 Date	Provost	Date
College Dean	11/15/13 Date	President	1/20/14 Date

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CLEMSON UNIVERSITY

Curriculum and Course Change System - Print Change/Delete Course Form

000183

X**Change a Course - Abbrev & Number: EES- 4010**
Corresponding Lab Course: --
Corresponding Honors course: --
..**Add Honors course:** --
Corresponding Graduate course: EES--6010
..**Add Graduate course:** --
Course Title: Environmental Engr

Brief Statement of Change:
Modification of prerequisites for BS Geology students in the Hydrogeology concentration which requires them to take the course.

Last Term taught:201305	..**Change Abbrev to:**	
Effective Term:01/2014	..**Change Number to:**	
..**Change Catalog Title:**	..**Change Transcript Title:**	
from:	from: Environmental Engr	
to:	to:	
..	From: Fixed Credit: 3 (3,0)	To: Fixed Credit: (,)
Change of Credit	Variable Credit: - (-), (-)	Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

..**Change Method of Instruction**		..**Change Course Modifier**		..**Change General Education Designation**	
from:	to:	from:	to:	from:	to:
XA-Lecture Only	..	..Pass/Fail Only	..	..Creative Inquiry	..
..B-Lab (w/fee)	..	XGraded	..	..English Composition	..
..D-Seminar	..	..Variable Title	..	..Oral Communication	..
..E-Independent Study	..	..Creative Inquiry	..	..Mathematics	..
..F-Tutorial (w/fee)	..	..Repeatable	..	..Natural Science w/Lab	..
..G-Studio	..	maximum credits		..Natural Science w/Lab	..
..H-Field course	..	from:		..Math or Science	..
..I-Study Abroad	..	to:		..A&H (Literature)	..
..L-Lab (no/fee)	..			..A&H (Non-Literature)	..
..N/B-Lecture/Lab(w/fee)	..			..Social Science	..
..N/L-Lecture/Lab(no fee)	..			..CCA	..
				..STS	..

..**Change Catalog Description:**
from:
to:

X**Change Prerequisite(s):**
from: Preq: Junior standing in engineering or consent of instructor. Preq or concurrent enrollment: CE 3410 or CHE 2300 or ME 3080.
to: Preq: Junior standing in CoES. Preq or concurrent enrollment: CE 3410 or CHE 2300 or ME 3080 or (GEOL 4820 and (GEOL 4150 or MATH 2060)). Preq for 6010: none.

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator:MSCHLAU, Schlautman,Mark A.**Date Form Created:** 11/4/2013
Form Last Updated by: MSCHLAU, Schlautman,Mark A.**Date Form Last Updated:** 11/4/2013
Form Number: 6792

Approval

Thomas J. Queeney	4 Nov 2013	Patricia W. Hudson	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
David L. Freedman / for TK	11/4/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13	M. Roy	1/20/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Major Form**

000189

Change Major Name: Geology (BS - 201401)
Degree: BS
Effective Catalog Year: 2014
..**Change Major Name to:**
..**Change Degree to:** (CHE approval required)
X**Change Curriculum Requirements**
(Submit or upload Curriculum map in catalog format. CHE approval required for > 18 hours of changes)
..**Change General Education Requirements**
(Must also submit a General Education Checklist)
..**Add, Change or Delete Concentration(s)**
(Submit or upload Curriculum map in catalog format. CHE approval required)
..**Add, Change or Delete Emphasis Area(s)**
Explanation: Curriculum revisions have been made to the B.S. degree program in Geology to reflect the removal of geology courses no longer being taught, creation of a new field course, renumbering of existing courses, and to better meet the technological and quantitative needs of students in the program. The revisions affect the existing base degree and the two existing concentrations in Hydrogeology and Environmental Science.
Form Originator: MSCHLAU, Schlautman,Mark A. **Date Form Created:** 11/4/2013
Form Last Updated by: MSCHLAU, Schlautman,Mark A. **Date Form Last Updated:** 11/4/2013
Form Number: 6788

Approval

Thomas J. Overcamp	4 Nov 2013	Patricia W. Manley	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
David J. Freedman	11/4/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13	Nelson M. Hoyt	1/20/14
College Dean	Date	President	Date

003190

Summary of Major Changes

BS Geology
2014-2015 Curriculum

Changes affecting all Pathways

- GEOL 1020 renumbered to GEOL 2020 and moved to sophomore year
- GEOL 4080 renumbered to GEOL 4820 and cross-listed with CE 4820
- New requirement of GEOL 1120 in the second semester freshman year
- Course replacements for GEOL 2110 and 2120 which no longer are being taught
- Creation of a new field course, GEOL 2750, to provide students with more practical experience and hands-on learning opportunities in geology prior to their 3000- and 4000-level courses and laboratories
- General rearrangement of courses to achieve better balance in the curriculum pathways
- Department approved lists updated

Changes Unique to the Base Degree (no declared concentration)

- Course replacements for GEOL 2080 and GEOL 3160 which are no longer being taught
- Course replacements for Biology 1030 + 1050, CSEN 2020, ENSP 2000, GEOL 3000, GEOL 3130, GEOL 4050, GEOL 4080, and GEOL 4090 with STEM requirement hours or geology requirement hours to allow students more flexibility in selecting the specific science, technology, engineering and math classes for their individual needs
- Reduction in total semester hours from 122 to 120

Changes Unique to the Environmental Science Concentration

- Environmental Science Concentration requirement hours decreased from 27 (of which 3 had to be in geology) to 14 so that required courses could be added to strengthen student skills in technology and critical thinking and to improve their foundation in geology. These needs were identified by both students and faculty in the program.
- The summer research experience has been increased from 3 to 6 hours for consistency with the base degree and hydrogeology concentration and to improve critical student skills
- Reduction in total semester hours from 122 to 121

Changes Unique to the Hydrogeology Concentration

- Technical requirement hours in the previous curriculum have been renamed Hydrogeology Concentration requirement hours for clarity
- Six hours of Geology requirement in the previous curriculum have been replaced by addition of two new required geology courses (7 hours)

000191

Course	Credits	Program Requirments				Evaluation of Programmatic Credit Differences		
		BS Geol	*Hydro*	*Con Env*	*Conc*	Base vs. Hydro	Base vs. Env	Hydro vs. Env
BIOL1030	3				1	0	3	3
BIOL1040	3				1	0	3	3
BIOL1050	1				1	0	1	1
BIOL1060	1				1	0	1	1
CH1010	4	1	1		1	0	0	0
CH1020	4	1	1		1	0	0	0
Organic Chem	3				1	0	3	3
EES4010	3		1			3	0	3
ENGL1030	3	1	1		1	0	0	0
ENSP2000	3				1	0	3	3
ENSP4000	3				1	0	3	3
GEOL1010	3	1	1		1	0	0	0
GEOL1030	1	1	1		1	0	0	0
GEOL1120	3	1	1		1	0	0	0
GEOL2020	4	1	1		1	0	0	0
GEOL2050	3	1	1		1	0	0	0
GEOL2070	1	1	1		1	0	0	0
GEOL2910	1	1	1		1	0	0	0
GEOL2920	1	1	1		1	0	0	0
GEOL3000	3		1		1	3	3	0
GEOL3020	4	1	1		1	0	0	0
GEOL3130	4		1			4	0	4
GEOL3180	3		1		1	3	3	0
GEOL3910	2	1	1		1	0	0	0
GEOL3920	2	1	1		1	0	0	0
GEOL4050	4		1			4	0	4
GEOL4090	4		1			4	0	4
GEOL4150	4		1		1	4	4	0
GEOL4210	3		1		1	3	3	0
GEOL4820	3		1		1	3	3	0
GEOL4910	3	1	1		1	0	0	0
GEOL4920	3	1	1		1	0	0	0
MATH1060	4	1	1		1	0	0	0
MATH1080	4	1	1		1	0	0	0
Statistics Reqt.	3		1		1	3	3	0
PHYS1220	3	1	1		1	0	0	0
PHYS1240	1		1			1	0	1
PHYS2210	3		1			3	0	3
		Difference in Credits for Required Courses:				**38**	**36**	**36**

Geology B.S. Degree
2014 - 2015 Curriculum

FRESHMAN YEAR			
____ CH 1010 General Chemistry	4	____ CH 1020 General Chemistry	4
____ ENGL 1030 Accelerated Composition	3	____ GEOL 1120 Earth Resources	3
____ GEOL 1010 Physical Geology	3	____ MATH 1080 Calculus of One Variable II	4
____ GEOL 1030 Physical Geology Lab	1	____ A&H/SS Reqt[1] _____	3
____ MATH 1060 Calculus of One Variable I	4	____ A&H/SS Reqt[1] _____	3
	15		17
SOPHOMORE YEAR			
____ GEOL 2050 Mineralogy and Intro. Petrology	3	____ GEOL 2020 Earth History	4
____ GEOL 2070 Mineral. And Intro. Petrology Lab	1	____ GEOL 2920 Introduction to Research II	1
____ GEOL 2910 Introduction to Research I	1	____ STEM Reqt[2] _____	4
____ PHYS 1220 Physics with Calculus I	3	____ STEM Reqt[2] _____	3
____ STEM Reqt[2] _____	3	____ Quantitative Science[3] _____	3
____ A&H/SS Reqt[1] _____	3		
____ A&H/SS Reqt[1] _____	3		
	17		15
JUNIOR YEAR			
____ GEOL 3020 Structural Geology	4	____ Geology Reqt[4] _____	3
____ GEOL 3910 Research Methods I	2	____ Geology Reqt[4] _____	4
____ Quantitative Science[3] _____	3	____ GEOL 3920 Research Methods II	2
____ STEM Reqt[2] _____	3	____ STEM Reqt[2] _____	3
	12		12
SUMMER FIELD EXPERIENCE			
____ Field Experience[5]	6		
SENIOR YEAR			
____ GEOL 4910 Research Synthesis I	3	____ GEOL 4920 Research Synthesis II	3
____ Geology Reqt[4] _____	4	____ Geology Reqt[4] _____	4
____ STEM Reqt[2] _____	3	____ STEM Reqt[2] _____	3
____ STEM Reqt[2] _____	3	____ STEM Reqt[2] _____	3
	13		13

120 Total Semester Hours

1 See General Education Requirements. Three of these credits must also satisfy the Cross Cultural Awareness Requirement.

2 Twenty-eight credit hours selected from department approved list. No more than 14 hours below the 3000-level and no more than 8 hours below the 2000-level. Courses cannot be used to satisfy any other requirement.

3 Select from department approved list. Courses cannot be used to satisfy any other requirement.

4 Fifteen credit hours. Select from GEOL 3130, 3180, 4050, 4090, 4150, 4210, or 4820. Only excess hours can be used to satisfy STEM requirement hours.

5 GEOL 4750, or other 6 cr hr summer geology field camp, or a combination of GEOL 2750 plus a three credit hour field course in geology or other approved discipline. Students desiring to become registered professional geologists should take a six-credit hour summer field camp.

STS Requirement: _____

CCA Requirement: _____

Total # of General Education Hours Completed: ____

Geology B.S. Degree
2014 - 2015 Curriculum

Environmental Science Concentration

FRESHMAN YEAR

____ CH 1010 General Chemistry	4	____ CH 1020 General Chemistry	4
____ ENGL 1030 Accelerated Composition	3	____ GEOL 1120 Earth Resources	3
____ GEOL 1010 Physical Geology	3	____ MATH 1080 Calculus of One Variable II	4
____ GEOL 1030 Physical Geology Lab	1	____ A&H/SS Reqt[1] _____	3
____ MATH 1060 Calculus of One Variable I	4	____ A&H/SS Reqt[1] _____	3
	15		17

SOPHOMORE YEAR

____ BIOL 1030 General Biology I	3	____ BIOL 1040 General Biology II	3
____ BIOL 1050 General Biology Lab I	1	____ BIOL 1060 General Biology Lab II	1
____ GEOL 2050 Mineralogy and Intro. Petrology	3	____ GEOL 2020 Earth History	4
____ GEOL 2070 Mineral. And Intro. Petrology Lab	1	____ GEOL 2920 Introduction to Research II	1
____ ENSP 2000 Intro. To Environmental Science	3	____ PHYS 1220 Physics with Calculus I	3
____ GEOL 2910 Introduction to Research I	1	____ Organic Chemistry[2]	3
____ A&H/SS Reqt[1] _____	3		
	15		15

JUNIOR YEAR

____ GEOL 3000 Environmental Geology	3	____ GEOL 3180 Introduction to Geochemistry	3
____ GEOL 3020 Structural Geology	4	____ GEOL 3920 Research Methods II	2
____ GEOL 3910 Research Methods I	2	____ GEOL 4210 GIS Applications in Geology	3
____ GEOL 4150 Analysis of Geological Processes[3]	4	____ Statistics[4] _____	3
		____ Env Sci Concentration Reqt[5] _____	4
	13		15

SUMMER FIELD EXPERIENCE

____ Field Experience[6] 6

SENIOR YEAR

____ GEOL 4820 Groundwater and Contaminant Transport	3	____ GEOL 4920 Research Synthesis II	3
____ GEOL 4910 Research Synthesis I	3	____ Env Sci Concentration Reqt[5] _____	4
____ ENSP 4000 Studies in Environmental Science	3	____ Env Sci Concentration Reqt[5] _____	3
____ A&H/SS Reqt[1] _____	3	____ Env Sci Concentration Reqt[5] _____	3
	12		13

121 Total Semester Hours

1 See General Education Requirements. Three of these credits must also satisfy the Cross Cultural Awareness Requirement

2 CH 2010 or CH 2230.

3 MATH 2060 can be substituted

4 STAT 2300 or MATH 3020.

5 Total of 14 credit hours selected from department approved list. No more than 8 hours below the 3000-level. Courses cannot be used to satisfy any other requirement.

6 GEOL 4750 or a combination of GEOL 2750 plus a three credit hour field course in geology, ecology, or other approved discipline. Students desiring to become registered professional geologists should take a six-credit summer geology field camp.

STS Requirement: _____
CCA Requirement: _____
Total # of General Education Hours Completed: ____

ENVIRONMENTAL SCIENCE REQUIREMENT OPTIONS - See Advisor for list (Pick 14 hours total)

Geology B.S. Degree
2014 - 2015 Curriculum

HYDROGEOLOGY CONCENTRATION

FRESHMAN YEAR

____ CH 1010 General Chemistry	4	____ CH 1020 General Chemistry	4
____ ENGL 1030 Accelerated Composition	3	____ GEOL 1120 Earth Resources	3
____ GEOL 1010 Physical Geology	3	____ MATH 1080 Calculus of One Variable II	4
____ GEOL 1030 Physical Geology Lab	1	____ A&H/SS Reqt[1] _____	3
____ MATH 1060 Calculus of One Variable I	4	____ A&H/SS Reqt[1] _____	3
	15		17

SOPHOMORE YEAR

____ GEOL 2050 Mineralogy and Intro Petrology	3	____ GEOL 2020 Earth History	4
____ GEOL 2070 Mineralogy and Intro Petrology Lab	1	____ GEOL 2920 Introduction to Research II	1
____ GEOL 2910 Introduction to Research I	1	____ Statistics[3] _____	3
____ PHYS 1220 Physics with Calculus I	3	____ PHYS 2210 Physics with Calculus II	3
____ PHYS 1240 Physics Lab I	1	____ Hydrogeology Concentration Reqt[2]: _____	3
____ Hydrogeology Concentration Reqt[2]: _____	3	____ A&H/SS Reqt[1] _____	3
____ A&H/SS Reqt[1] _____	3		
	15		17

JUNIOR YEAR

____ GEOL 3000 Environmental Geology	3	____ GEOL 3130 Sedimentology and Stratigraphy	4
____ GEOL 3020 Structural Geology	4	____ GEOL 3180 Introduction to Geochemistry	3
____ GEOL 3910 Research Methods I	2	____ GEOL 3920 Research Methods II	2
____ GEOL 4150 Analysis of Geological Processes[4]	4	____ GEOL 4210 GIS Applications in Geology	3
	13		12

SUMMER FIELD EXPERIENCE

____ GEOL 4750 Summer Geology Field Camp 6

SENIOR YEAR

____ GEOL 4820 Groundwater and Contaminant Transport	3	____ EES 4010 Environmental Engineering	3
____ GEOL 4910 Research Synthesis I	3	____ GEOL 4050 Surficial Processes	4
____ Hydrogeology Concentration Reqt[2]: _____	3	____ GEOL 4090 Subsurface Methods	4
____ Hydrogeology Concentration Reqt[2]: _____	3	____ GEOL 4920 Research Synthesis	3
	12		14

121 Total Semester Hours

1 See General Education Requirements. Three of these credits must also satisfy the Cross Cultural Awareness Requirement

2 Total of 12 credit hours selected from department approved list. Courses cannot be used to satisfy any other requirement.

3 STAT 2300 or MATH 3020.

4 MATH 2060 can be substituted.

____ STS Requirement: _____

____ CCA Requirement: _____

Total Number of General Education Hours Completed: _____

Hydrogeology Concentration Requirement -- See Advisor (Pick 12 hours total)

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Geology B.S. Degree
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FRESHMAN YEAR			
____ CH 1010 General Chemistry	4	____ CH 1020 General Chemistry	4
____ ENGL 1030 Accelerated Composition	3	____ GEOL 1120 Earth Resources	3
____ GEOL 1010 Physical Geology	3	____ MATH 1080 Calculus of One Variable II	4
____ GEOL 1030 Physical Geology Lab	1	____ A&H/SS Reqt[1] _____	3
____ MATH 1060 Calculus of One Variable I	4		
	15		14
SOPHOMORE YEAR			
____ GEOL 2050 Mineralogy and Intro. Petrology	3	____ GEOL 2020 Earth History	4
____ GEOL 2070 Mineral. And Intro. Petrology Lab	1	____ GEOL 2920 Introduction to Research II	1
____ GEOL 2910 Introduction to Research I	1	____ STEM Reqt[2] _____	4
____ PHYS 1220 Physics with Calculus I	3	____ STEM Reqt[2] _____	3
____ STEM Reqt[2] _____	3	____ Quantitative Science[3] _____	3
____ A&H/SS Reqt[1] _____	3		
	14		15
JUNIOR YEAR			
____ GEOL 3020 Structural Geology	4	____ Geology Reqt[4] _____	3
____ GEOL 3910 Research Methods I	2	____ Geology Reqt[4] _____	4
____ Quantitative Science[3] _____	3	____ GEOL 3920 Research Methods II	2
____ STEM Reqt[2] _____	3	____ STEM Reqt[2] _____	3
____ STEM Reqt[2] _____	3	____ A&H/SS Reqt[1] _____	3
	15		15
SUMMER FIELD EXPERIENCE			
____ Field Experience[5]	6		
SENIOR YEAR			
____ GEOL 4910 Research Synthesis I	3	____ GEOL 4920 Research Synthesis II	3
____ Geology Reqt[4] _____	4	____ Geology Reqt[4] _____	4
____ STEM Reqt[2] _____	3	____ STEM Reqt[2] _____	3
____ A&H/SS Reqt[1] _____	3	____ STEM Reqt[2] _____	3
	13		13

120 Total Semester Hours

1 See General Education Requirements. Three of these credits must also satisfy the Cross Cultural Awareness Requirement.

2 Twenty-eight credit hours selected from department approved list. No more than 14 hours below the 3000-level and no more than 8 hours below the 2000-level. Courses cannot be used to satisfy any other requirement.

3 Select from department approved list. Courses cannot be used to satisfy any other requirement.

4 Fifteen credit hours. Select from GEOL 3130, 3180, 4050, 4090, 4150, 4210, or 4820. Only excess hours can be used to satisfy STEM requirement hours.

5 GEOL 4750, or other 6 cr hr summer geology field camp, or a combination of GEOL 2750 plus a three credit hour field course in geology or other approved discipline. Students desiring to become registered professional geologists should take a six-credit hour summer field camp.

STS Requirement: _____

CCA Requirement: _____

Total # of General Education Hours Completed: ____

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Department Approved Lists for Base Geology B.S. Degree Program

2. STEM Requirement

Courses used to satisfy the STEM Requirement cannot be used to satisfy any other geology degree requirement. Pick a minimum of **28** credit hours total from the disciplines below subject to the following limitations:

(1) No more than 14 credit hours below the 3000-level and no more than 8 credit hours below the 2000-level
(2) No creative inquiry courses without prior approval from the advisor
(3) No research-based or independent study-type course outside GEOL without prior approval from the advisor, and
(4) Credit for GEOL 4110 is limited to a maximum of 3 hours.

Acceptable course prefixes are: ASTR, BCHM, BE, BIOE, BIOL, CE, CH, CHE, ECE, EES, ETOX, GEOL, IE, ME, MICR, MSE, MATH, PHYS

Other acceptable courses, subject to the limitations above, are:

CSEN 2020 Soils	4
ENSP 2000 Introduction to Environmental Science	3
ENGR 1020 Engineering Disciplines and Skills	2
ENGR 1410 Programming and Problem Solving	3
EM 2020 Engineering Mechanics: Dynamics	3
CPSC 1110 or CPSC 1150 or CPSC 1610	3

(*Note: Credit can be received for only one of these introductory programming courses*)

3. Quantitative Science

Courses selected to satisfy the Quantitative Science Requirement cannot be used to satisfy any other geology degree requirement. Pick two courses from the groupings below:

Pick one or two courses from:	GEOL 4150, MATH 2060, MATH 2080, MATH 3110
Pick up to one course from:	STAT 2300, MATH 3020, MATH 3600, ENGR 1410 CPSC 1610, CPSC 1150, CPSC 1110

4. Geology Requirement

Explanation already is contained in the footnote.

5. Field Experience

Footnote reads:

> *GEOL 4750, or other 6 cr hr summer geology field camp, or a combination of GEOL 2750 plus a three credit hour field course in geology or other approved discipline. Students desiring to become registered professional geologists should take a six-credit hour summer field camp.*

In addition to the courses specifically listed above, other currently approved three credit hour field courses at Clemson University are:

GEOL 3700 Western US Field Study
GEOL 3750 Bahamian Field Study

Other field courses at Clemson University or at other universities may be approved on a case-by-case basis. See your advisor for guidance and assistance.

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Geology B.S. Degree
2014 - 2015 Curriculum

Environmental Science Concentration

FRESHMAN YEAR

____ CH 1010 General Chemistry	4	____ CH 1020 General Chemistry	4
____ ENGL 1030 Accelerated Composition	3	____ GEOL 1120 Earth Resources	3
____ GEOL 1010 Physical Geology	3	____ MATH 1080 Calculus of One Variable II	4
____ GEOL 1030 Physical Geology Lab	1	____ A&H/SS Reqt[1] _____	3
____ MATH 1060 Calculus of One Variable I	4		
	15		14

SOPHOMORE YEAR

____ BIOL 1030 General Biology I	3	____ BIOL 1040 General Biology II	3
____ BIOL 1050 General Biology Lab I	1	____ BIOL 1060 General Biology Lab II	1
____ GEOL 2050 Mineralogy and Intro. Petrology	3	____ GEOL 2020 Earth History	4
____ GEOL 2070 Mineral. And Intro. Petrology Lab	1	____ GEOL 2920 Introduction to Research II	1
____ ENSP 2000 Intro. To Environmental Science	3	____ PHYS 1220 Physics with Calculus I	3
____ GEOL 2910 Introduction to Research I	1	____ Organic Chemistry[2]	3
____ A&H/SS Reqt[1] _____	3		
	15		15

JUNIOR YEAR

____ GEOL 3000 Environmental Geology	3	____ GEOL 3180 Introduction to Geochemistry	3
____ GEOL 3020 Structural Geology	4	____ GEOL 3920 Research Methods II	2
____ GEOL 3910 Research Methods I	2	____ GEOL 4210 GIS Applications in Geology	3
____ GEOL 4150 Analysis of Geological Processes[3]	4	____ Statistics[4] _____	3
____ A&H/SS Reqt[1] _____	3	____ Env Sci Concentration Reqt[5] _____	4
	16		15

SUMMER FIELD EXPERIENCE

____ Field Experience[6]	6

SENIOR YEAR

____ GEOL 4820 Groundwater and Contaminant Transport	3	____ GEOL 4920 Research Synthesis II	3
____ GEOL 4910 Research Synthesis I	3	____ Env Sci Concentration Reqt[5] _____	4
____ ENSP 4000 Studies in Environmental Science	3	____ Env Sci Concentration Reqt[5] _____	3
____ A&H/SS Reqt[1] _____	3	____ Env Sci Concentration Reqt[5] _____	3
	12		13

121 Total Semester Hours

1 See General Education Requirements. Three of these credits must also satisfy the Cross Cultural Awareness Requirement

2 CH 2010 or CH 2230.

3 MATH 2060 can be substituted

4 STAT 2300 or MATH 3020.

5 Total of 14 credit hours selected from department approved list. No more than 8 hours below the 3000-level. Courses cannot be used to satisfy any other requirement.

6 GEOL 4750 or a combination of GEOL 2750 plus a three credit hour field course in geology, ecology, or other approved discipline. Students desiring to become registered professional geologists should take a six-credit summer geology field camp.

STS Requirement: _____

CCA Requirement: _____

Total # of General Education Hours Completed: ____

ENVIRONMENTAL SCIENCE REQUIREMENT OPTIONS - See Advisor for list (Pick 14 hours total)

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Approved List of Courses for Environmental Science Concentration Requirement*

STUDENTS MUST PICK A MINIMUM OF 14 CREDIT HOURS FROM THIS LIST.
NO MORE THAN 8 CREDIT HOURS CAN BE SELECTED FROM COURSES BELOW THE 3000-LEVEL

AGR (ENSP) 3150 Environment and Agriculture	3
APEC 2570 Natural Resources, Environment, and Economics	3
APEC (CRD) 3570 Natural Resource Economics	3
APEC 4570 Natural Resource Use, Technology, and Policy	3
BE 3220 Small Watershed Hydrology and Sedimentology	3
BE 4220 Hydrologic Modeling of Small Watersheds	3
BIOL (WFB) 3130 Conservation Biology	3
BIOL 4100 Limnology	3
BIOL (ENR) 4130 Restoration Ecology	3
BIOL 4410 Ecology	3
BIOL 4430 Freshwater Ecology	3
CH 4130 Chemistry of Aqueous Systems	3
CSEN 2020 Soils	4
CSEN (BE) 4080 Land Treatment of Wastewater and Sludges	3
CSEN (GEOL) 4850 Environmental Soil Chemistry	3
EES 4010 Environmental Engineering	3
EES 4100 Environmental Radiation Protection I	3
EES 4800 Environmental Risk Assessment	3
EES 4840 Municipal Solid Waste Management	3
EES 4850 Hazardous Waste Management	3
FNR 2040 Soil Information Systems	4
GEOL 2700 Experiences in Sustainable Development: Water	3
GEOL 2750 Field Methods in Geology**	3
GEOL 3130 Sedimentology and Stratigraphy	4
GEOL 3700 Western US Field Study **	3
GEOL 3750 Bahamian Field Study **	3
GEOL 4050 Surficial Processes	4
GEOL 4090 Environmental and Exploration Geophysics	4
GEOL 4590 Biogeochemistry	3
GEOL 4750 Summer Geology Field Camp**	6
MATH 2060 Calculus of Severable Variables	4
MATH 2080 Introduction to Ordinary Differential Equations	4
MATH 3110 Linear Algebra	3
MATH 3600 Intermediate Mathematical Computing	3
MICR 3050 General Microbiology	4
MICR 4010 Microbial Diversity and Ecology	4
MICR 4020 Environmental Microbiology	3
MICR 4100 Soil Microbiology	3
PHYS 2210 Physics with Calculus II	3
PHYS 2400 Physics of the Weather	3
PHYS 2450 Physics of Global Climate Change	3

*Students whose goal is to become a registered professional geologist (PG) should take GEOL 3130 and 4050.
**May count toward "Field Experience" or "Environmental Science Concentration Elective" (but not both).

Geology B.S. Degree
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HYDROGEOLOGY CONCENTRATION

FRESHMAN YEAR

____ CH 1010 General Chemistry	4	____ CH 1020 General Chemistry	4
____ ENGL 1030 Accelerated Composition	3	____ GEOL 1120 Earth Resources	3
____ GEOL 1010 Physical Geology	3	____ MATH 1080 Calculus of One Variable II	4
____ GEOL 1030 Physical Geology Lab	1	____ A&H/SS Reqt[1] _____	3
____ MATH 1060 Calculus of One Variable I	4		
	15		14

SOPHOMORE YEAR

____ GEOL 2050 Mineralogy and Intro Petrology	3	____ GEOL 2020 Earth History	4
____ GEOL 2070 Mineralogy and Intro Petrology Lab	1	____ GEOL 2920 Introduction to Research II	1
____ GEOL 2910 Introduction to Research I	1	____ Statistics[3] _____	3
____ PHYS 1220 Physics with Calculus I	3	____ PHYS 2210 Physics with Calculus II	3
____ PHYS 1240 Physics Lab I	1	____ A&H/SS Reqt[1] _____	3
____ Hydrogeology Concentration Reqt[2]: _____	3		
____ A&H/SS Reqt[1] _____	3		
	15		14

JUNIOR YEAR

____ GEOL 3000 Environmental Geology	3	____ GEOL 3130 Sedimentology and Stratigraphy	4
____ GEOL 3020 Structural Geology	4	____ GEOL 3180 Introduction to Geochemistry	3
____ GEOL 3910 Research Methods I	2	____ GEOL 3920 Research Methods II	2
____ GEOL 4150 Analysis of Geological Processes[4]	4	____ GEOL 4050 Surficial Processes	4
____ A&H/SS Reqt[1] _____	3	____ GEOL 4210 GIS Applications in Geology	3
	16		16

SUMMER FIELD EXPERIENCE

____ GEOL 4750 Summer Geology Field Camp 6

SENIOR YEAR

____ GEOL 4820 Groundwater and Contaminant Transport	3	____ EES 4010 Environmental Engineering	3
____ GEOL 4910 Research Synthesis I	3	____ GEOL 4090 Subsurface Methods	4
____ Hydrogeology Concentration Reqt[2]: _____	3	____ GEOL 4920 Research Synthesis	3
____ Hydrogeology Concentration Reqt[2]: _____	3	____ Hydrogeology Concentration Reqt[2]: _____	3
	12		13

121 Total Semester Hours

1 See General Education Requirements. Three of these credits must also satisfy the Cross Cultural Awareness Requirement

2 Total of 12 credit hours selected from department approved list. Courses cannot be used to satisfy any other requirement.

3 STAT 2300 or MATH 3020.

4 MATH 2060 can be substituted.

____ STS Requirement: _____

____ CCA Requirement: _____

Total Number of General Education Hours Completed: _____

Hydrogeology Concentration Requirement -- See Advisor (Pick 12 hours total)

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Approved List of Courses for Hydrogeology Concentration Requirement

(*STUDENTS MUST PICK A MINIMUM OF 12 CREDIT HOURS FROM THIS LIST*)

CH 2230 or CH 2010 Organic Chemistry	3
CSEN 2020 Soils	4
ENSP 2000 Introduction to Environmental Science	3
GEOL 2700 Experiences in Sustainable Development: Water	3
GEOL 2750 Field Methods in Geology	3
MATH 2060 Calculus of Several Variables	4
MATH 2080 Introduction to Ordinary Differential Equations	4
ENGR 1020 Engineering Disciplines and Skills	2
ENGR 1410 Programming and Problem Solving	3
CE 2010 Statics	3
CE 2080 Dynamics	2
EM 2020 Engineering Mechanics: Dynamics	3
CPSC 1110 or CPSC 1150 or CPSC 1610	3

(*Note: Credit can be received for only one of these introductory programming courses*)

3000- and 4000-level courses in ASTR, BCHM, BE, BIOE, BIOL, CE, CH, CHE, ECE, EES, ETOX, GEOL, IE, ME, MICR, MSE, MATH, PHYS can also be used to satisfy the Hydrogeology Concentration requirement subject to the following limitations: (1) No creative inquiry courses without prior approval, (2) No research-based or independent study-type course outside GEOL without prior approval, and (3) Credit for GEOL 4110 is limited to a maximum of 3 hours.

Existing Curricula in Geology 27

GEOLOGY

Bachelor of Science

Geology and biogeochemical environmental science involve the physics and chemistry of materials that comprise the earth, as well as the development and influence of life on earth and the environmental systems and processes involved. The chemical, physical, and biological responses to environments on and in the earth must be thoroughly understood at a fundamental level so that the history of the earth can be deduced, future changes and natural disasters might be predicted, and sustainable approaches to natural resources developed. We depend on many geological resources; for example, water from ground and surface systems, metals from minerals, and power from coal, petroleum, and radioactive minerals. Geology integrates the science and engineering principles used for understanding and managing these geological and environmental systems. The Geology curriculum is built around three themes in geology and environmental science: appreciation for spatial and temporal scales, knowledge of earth materials and compositions of environmental systems, and understanding geological and environmental processes. The Bachelor of Science degree can be earned in traditional geology or with a concentration in Hydrogeology or Environmental Science. All majors participate in an interdisciplinary problem-oriented group research sequence and capstone course.

Employment opportunities for geologists and environmental scientists are numerous and varied. Included are such far-reaching fields as environmental and engineering consulting firms, mineral-producing industries, railroads, municipalities, natural resources conservation organizations, and water authorities. Many students go on to graduate study. It is important, therefore, that a geology or biogeochemical environmental science education develop a broad and rigorous base integrating a variety of descriptive and quantitative material.

The "traditional" curriculum provides the fundamentals of geology and excellent support in basic sciences. Graduates are prepared for employment or for graduate study in any field of geology. The Environmental Science Concentration provides an appropriate quantitative science base for students interested in environmental science and an introduction to environmental systems. It prepares students for careers in natural resources, the environmental consulting industry, government agencies or graduate school in environmental fields. The Hydrogeology Concentration may be taken by students interested in surface and groundwater systems and applying engineering principles to geologic problems. Graduates from the Hydrogeology Concentration work for consulting companies, government agencies and in the natural resources area or go on to graduate study.

Freshman Year

First Semester
4 - CH 1010 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - GEOL 1010 Physical Geology
1 - GEOL 1030 Physical Geology Lab.
4 - MTHS 1060 Calculus of One Variable I
15

Second Semester
4 - CH 1020 General Chemistry
4 - GEOL 1020 Earth History
4 - MTHS 1080 Calculus of One Variable II
3 - Arts and Humanities (Non-Lit.) Requirement[1]
15

Sophomore Year

First Semester
3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
3 - GEOL 2050 Mineralogy and Intro. Petrology
2 - GEOL 2080 Min. and Intro. Petrography Lab.
4 - GEOL 2110 Geoanalysis I[2]
1 - GEOL 2910 Introduction to Research I
1 - Elective
15

Second Semester
4 - CSEN 2020 Soils
4 - GEOL 2120 Geoanalysis II[2]
1 - GEOL 2920 Introduction to Research II
3 - PHYS 1220 Physics with Calculus I
3 - Social Science Requirement[1]
15

Junior Year

First Semester
3 - ENSP 2000 Intro. to Environmental Science
4 - GEOL 3020 Structural Geology
3 - GEOL 3160 Igneous and Metamorphic Petrol.
2 - GEOL 3910 Research Methods I
3 - Arts and Humanities (Literature) Requirement[1]
15

Second Semester
3 - GEOL 3000 Environmental Geology
4 - GEOL 3130 Sedimentology and Stratigraphy
2 - GEOL 3920 Research Methods II
3 - Geology Requirement[3]
3 - Social Science Requirement[1]
2 - Elective
17

Summer

6 - Summer Geology Field Course[4]

Senior Year

First Semester
4 - GEOL 4050 Surficial Geology
3 - GEOL 4080 Geohydrology
3 - GEOL 4910 Research Synthesis I
2 - Elective
12

Second Semester
4 - GEOL 4090 Subsurface Methods
3 - GEOL 4920 Research Synthesis II
3 - Geology Requirement[3]
2 - Elective
12

122 Total Semester Hours

[1]See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
[2]MTHS 2060 and 2080 or 3010 or EXST 3010 may be substituted.
[3]Select from department-approved list.
[4]See advisor.

ENVIRONMENTAL SCIENCE CONCENTRATION

Freshman Year

First Semester
4 - CH 1010 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - GEOL 1010 Physical Geology
1 - GEOL 1030 Physical Geology Lab.
4 - MTHS 1060 Calculus of One Variable I
15

GEOLOGY

Bachelor of Science

Geology and biogeochemical environmental science involve the physics and chemistry of materials that comprise the earth, as well as the development and influence of life on earth and the environmental systems and processes involved. The chemical, physical, and biological responses to environments on and in the earth must be thoroughly understood at a fundamental level so that the history of the earth can be deduced, future changes and natural disasters might be predicted, and sustainable approaches to natural resources developed. We depend on many geological resources; for example, water from ground and surface systems, metals from minerals, and power from coal, petroleum, and radioactive minerals. Geology integrates the science and engineering principles used for understanding and managing these geological and environmental systems. The Geology curriculum is built around three themes in geology and environmental science: appreciation for spatial and temporal scales, knowledge of earth materials and compositions of environmental systems, and understanding geological and environmental processes. The Bachelor of Science degree can be earned in traditional geology or with a concentration in Hydrogeology or Environmental Science. All majors participate in an interdisciplinary problem-oriented group research sequence and capstone course.

Employment opportunities for geologists and environmental scientists are numerous and varied. Included are such far-reaching fields as environmental and engineering consulting firms, mineral-producing industries, railroads, municipalities, natural resources conservation organizations, and water authorities. Many students go on to graduate study. It is important, therefore, that a geology or biogeochemical environmental science education develop a broad and rigorous base integrating a variety of descriptive and quantitative material.

The "traditional" curriculum provides the fundamentals of geology and excellent support in basic sciences. Graduates are prepared for employment or for graduate study in any field of geology. The Environmental Science Concentration provides an appropriate quantitative science base for students interested in environmental science and an introduction to environmental systems. It prepares students for careers in natural resources, the environmental consulting industry, government agencies or graduate school in environmental fields. The Hydrogeology Concentration may be taken by students interested in surface and groundwater systems and applying engineering principles to geologic problems. Graduates from the Hydrogeology Concentration work for consulting companies, government agencies and in the natural resources area or go on to graduate study.

Freshman Year

First Semester
4 - CH 1010 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - GEOL 1010 Physical Geology
1 - GEOL 1030 Physical Geology Lab.
4 - MTHS 1060 Calculus of One Variable I
15

Second Semester
4 - CH 1020 General Chemistry
4 - GEOL 1020 Earth History
4 - MTHS 1080 Calculus of One Variable II
3 - Arts and Humanities (Non-Lit.) Requirement[1]
15

Sophomore Year

First Semester
3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
3 - GEOL 2050 Mineralogy and Intro. Petrology
2 - GEOL 2080 Min. and Intro. Petrography Lab.
4 - GEOL 2110 Geoanalysis I[2]
1 - GEOL 2910 Introduction to Research I
1 - Elective
15

Second Semester
4 - CSEN 2020 Soils
4 - GEOL 2120 Geoanalysis II[2]
1 - GEOL 2920 Introduction to Research II
3 - PHYS 1220 Physics with Calculus I
3 - Social Science Requirement[1]
15

Junior Year

First Semester
3 - ENSP 2000 Intro. to Environmental Science
4 - GEOL 3020 Structural Geology
3 - GEOL 3160 Igneous and Metamorphic Petrol.
2 - GEOL 3910 Research Methods I
3 - Arts and Humanities (Literature) Requirement[1]
15

Second Semester
3 - GEOL 3000 Environmental Geology
4 - GEOL 3130 Sedimentology and Stratigraphy
2 - GEOL 3920 Research Methods II
3 - Geology Requirement[3]
3 - Social Science Requirement[1]
2 - Elective
17

Summer

6 - Summer Geology Field Course[4]

Senior Year

First Semester
4 - GEOL 4050 Surficial Geology
3 - GEOL 4080 Geohydrology
3 - GEOL 4910 Research Synthesis I
2 - Elective
12

Second Semester
4 - GEOL 4090 Subsurface Methods
3 - GEOL 4920 Research Synthesis II
3 - Geology Requirement[3]
2 - Elective
12

122 Total Semester Hours

[1]See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
[2]MTHS 2060 and 2080 or 3010 or EXST 3010 may be substituted.
[3]Select from department-approved list.
[4]See advisor.

ENVIRONMENTAL SCIENCE CONCENTRATION

Freshman Year

First Semester
4 - CH 1010 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - GEOL 1010 Physical Geology
1 - GEOL 1030 Physical Geology Lab.
4 - MTHS 1060 Calculus of One Variable I
15

2014 - 2015 Curriculum

FRESHMAN YEAR

CH 1010 General Chemistry	4	____	CH 1020 General Chemistry	4
ENGL 1030 Accelerated Composition	3	____	GEOL 1120 Earth Resources	3
GEOL 1010 Physical Geology	3	____	MATH 1080 Calculus of One Variable II	4
GEOL 1030 Physical Geology Lab	1	____	A&H/SS Reqt[1] _____	3
MATH 1060 Calculus of One Variable I	4	____	A&H/SS Reqt[1] _____	3
	15			17

SOPHOMORE YEAR

GEOL 2050 Mineralogy and Intro. Petrology	3	____	GEOL 2020 Earth History	4
GEOL 2070 Mineral. And Intro. Petrology Lab	1	____	GEOL 2920 Introduction to Research II	1
GEOL 2910 Introduction to Research I	1	____	STEM Reqt[2] _____	4
PHYS 1220 Physics with Calculus I	3	____	STEM Reqt[2] _____	3
STEM Reqt[2] _____	3	____	Quantitative Science[3] _____	3
A&H/SS Reqt[1] _____	3			
A&H/SS Reqt[1] _____	3			
	17			15

JUNIOR YEAR

GEOL 3020 Structural Geology	4	____	Geology Reqt[4] _____	3
GEOL 3910 Research Methods I	2	____	Geology Reqt[4] _____	4
Quantitative Science[3] _____	3	____	GEOL 3920 Research Methods II	2
STEM Reqt[2] _____	3	____	STEM Reqt[2] _____	3
	12			12

SUMMER FIELD EXPERIENCE

Field Experience[5]	6

SENIOR YEAR

GEOL 4910 Research Synthesis I	3	____	GEOL 4920 Research Synthesis II	3
Geology Reqt[4] _____	4	____	Geology Reqt[4] _____	4
STEM Reqt[2] _____	3	____	STEM Reqt[2] _____	3
STEM Reqt[2] _____	3	____	STEM Reqt[2] _____	3
	13			13

120 Total Semester Hours

neral Education Requirements. Three of these credits must also satisfy the Cross Cultural Awareness ıent.

-eight credit hours selected from department approved list. No more than 14 hours below the 3000-level and than 8 hours below the 2000-level. Courses cannot be used to satisfy any other requirement.

rom department approved list. Courses cannot be used to satisfy any other requirement.

credit hours. Select from GEOL 3130, 3180, 4050, 4090, 4150, 4210, or 4820. Only excess hours can be used to EM requirement hours.

750, or other 6 cr hr summer geology field camp, or a combination of GEOL 2750 plus a three credit hour field geology or other approved discipline. Students desiring to become registered professional geologists should -credit hour summer field camp.

STS Requirement: _____

CCA Requirement: _____

Total # of General Education Hours Completed: ____

Geology B.S. Degree

2014 - 2015 Curriculum

Environmental Science Concentration

FRESHMAN YEAR

__ CH 1010 General Chemistry	4	____ CH 1020 General Chemistry	4
__ ENGL 1030 Accelerated Composition	3	____ GEOL 1120 Earth Resources	3
__ GEOL 1010 Physical Geology	3	____ MATH 1080 Calculus of One Variable II	4
__ GEOL 1030 Physical Geology Lab	1	____ A&H/SS Reqt[1] _____	3
__ MATH 1060 Calculus of One Variable I	4	____ A&H/SS Reqt[1] _____	3
	15		17

SOPHOMORE YEAR

__ BIOL 1030 General Biology I	3	____ BIOL 1040 General Biology II	3
__ BIOL 1050 General Biology Lab I	1	____ BIOL 1060 General Biology Lab II	1
__ GEOL 2050 Mineralogy and Intro. Petrology	3	____ GEOL 2020 Earth History	4
__ GEOL 2070 Mineral. And Intro. Petrology Lab	1	____ GEOL 2920 Introduction to Research II	1
__ ENSP 2000 Intro. To Environmental Science	3	____ PHYS 1220 Physics with Calculus I	3
__ GEOL 2910 Introduction to Research I	1	____ Organic Chemistry[2]	3
__ A&H/SS Reqt[1] _____	3		
	15		15

JUNIOR YEAR

__ GEOL 3000 Environmental Geology	3	____ GEOL 3180 Introduction to Geochemistry	3
__ GEOL 3020 Structural Geology	4	____ GEOL 3920 Research Methods II	2
__ GEOL 3910 Research Methods I	2	____ GEOL 4210 GIS Applications in Geology	3
__ GEOL 4150 Analysis of Geological Processes[3]	4	____ Statistics[4] _____	3
		____ Env Sci Concentration Reqt[5] _____	4
	13		15

SUMMER FIELD EXPERIENCE

__ Field Experience[6] 6

SENIOR YEAR

__ GEOL 4820 Groundwater and Contaminant Transport	3	____ GEOL 4920 Research Synthesis II	3
__ GEOL 4910 Research Synthesis I	3	____ Env Sci Concentration Reqt[5] _____	4
__ ENSP 4000 Studies in Environmental Science	3	____ Env Sci Concentration Reqt[5] _____	3
__ A&H/SS Reqt[1] _____	3	____ Env Sci Concentration Reqt[5] _____	3
	12		13

121 Total Semester Hours

General Education Requirements. Three of these credits must also satisfy the Cross Cultural Awareness
irement
2010 or CH 2230.
TH 2060 can be substituted
T 2300 or MATH 3020.
al of 14 credit hours selected from department approved list. No more than 8 hours below the 3000-level.
ies cannot be used to satisfy any other requirement.

L 4750 or a combination of GEOL 2750 plus a three credit hour field course in geology, ecology, or other approved
line. Students desiring to become registered professional geologists should take a six-credit summer geology field camp.

STS Requirement: _____
CCA Requirement: _____
Total # of General Education Hours Completed: ____

ENVIRONMENTAL SCIENCE REQUIREMENT OPTIONS - See Advisor for list (Pick 14 hours total)

Geology B.S. Degree

2014 - 2015 Curriculum

HYDROGEOLOGY CONCENTRATION

FRESHMAN YEAR

__ CH 1010 General Chemistry	4	____ CH 1020 General Chemistry	4
__ ENGL 1030 Accelerated Composition	3	____ GEOL 1120 Earth Resources	3
__ GEOL 1010 Physical Geology	3	____ MATH 1080 Calculus of One Variable II	4
__ GEOL 1030 Physical Geology Lab	1	____ A&H/SS Reqt[1] _____	3
__ MATH 1060 Calculus of One Variable I	4	____ A&H/SS Reqt[1] _____	3
	15		17

SOPHOMORE YEAR

__ GEOL 2050 Mineralogy and Intro Petrology	3	____ GEOL 2020 Earth History	4
__ GEOL 2070 Mineralogy and Intro Petrology Lab	1	____ GEOL 2920 Introduction to Research II	1
__ GEOL 2910 Introduction to Research I	1	____ Statistics[3] _____	3
__ PHYS 1220 Physics with Calculus I	3	____ PHYS 2210 Physics with Calculus II	3
__ PHYS 1240 Physics Lab I	1	____ Hydrogeology Concentration Reqt[2]: _____	3
__ Hydrogeology Concentration Reqt[2]: _____	3	____ A&H/SS Reqt[1] _____	3
__ A&H/SS Reqt[1] _____	3		
	15		17

JUNIOR YEAR

__ GEOL 3000 Environmental Geology	3	____ GEOL 3130 Sedimentology and Stratigraphy	4
__ GEOL 3020 Structural Geology	4	____ GEOL 3180 Introduction to Geochemistry	3
__ GEOL 3910 Research Methods I	2	____ GEOL 3920 Research Methods II	2
__ GEOL 4150 Analysis of Geological Processes[4]	4	____ GEOL 4210 GIS Applications in Geology	3
	13		12

SUMMER FIELD EXPERIENCE

__ GEOL 4750 Summer Geology Field Camp 6

SENIOR YEAR

__ GEOL 4820 Groundwater and Contaminant Transport	3	____ EES 4010 Environmental Engineering	3
__ GEOL 4910 Research Synthesis I	3	____ GEOL 4050 Surficial Processes	4
__ Hydrogeology Concentration Reqt[2]: _____	3	____ GEOL 4090 Subsurface Methods	4
__ Hydrogeology Concentration Reqt[2]: _____	3	____ GEOL 4920 Research Synthesis	3
	12		14

121 Total Semester Hours

General Education Requirements. Three of these credits must also satisfy the Cross Cultural
ness Requirement
l of 12 credit hours selected from department approved list. Courses cannot be used to satisfy any
requirement.

T 2300 or MATH 3020.

TH 2060 can be substituted.

____ STS Requirement: _____

____ CCA Requirement: _____

Total Number of General Education Hours Completed: _____

rogeology Concentration Requirement -- See Advisor (Pick 12 hours total)

29

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

X **Change a Course - Abbrev & Number: GEOL- 1020**
Corresponding Lab Course: GEOL--1021
Corresponding Honors course: GEOL--1020
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Earth History

Brief Statement of Change:
The course number is being changed to GEOL 2020 to better reflect the level of material that is being covered in the course. The corresponding lab course and honors course will also be renumbered to GEOL 2021 and GEOL 2020 for consistency.

Last Term taught: 201301	.. **Change Abbrev to:**
Effective Term: 01/2014	X **Change Number to:** 2020

.. **Change Catalog Title:**	.. **Change Transcript Title:**
from:	from: Earth History
to:	to:

..	From: Fixed Credit: 4 (3,3)	To: Fixed Credit: (,)
Change of Credit	Variable Credit: - (-), (-)	Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
.. A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
X N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:
.. **Change Prerequisite(s):**
from:
to:
Learning Objectives:
Topical Outline:
Evaluation:

Form Originator: MSCHLAU, Schlautman,Mark A. **Date Form Created:** 10/28/2013
Form Last Updated by: MSCHLAU, Schlautman,Mark A. **Date Form Last Updated:** 10/28/2013
Form Number: 6731

Approval

Thomas J. Owecamp	4 Nov 2013	Jessica W. Mundorff	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
David J. Freda / for TK	11/4/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13	Helen M. Grigg	1/20/14
College Dean	Date	President	Date

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print New Course Form**

000203

Course Abbreviation & Number:
X **New Undergraduate Course:** GEOL- 2750
.. **New Honors Course:** --
.. **New Graduate Course:** -

Effective Term: 08/2014
Catalog Title: Field Methods
Transcript Title: Field Methods
Fixed Credit Course: 3 (1,4)
Variable Credit Course: - (-), (-)

Method of Instruction	Course Modifier	General Education Designation
.. A-Lecture Only	.. Pass/Fail Only	.. Creative Inquiry
.. B-Lab (w/fee)	X Graded	.. English Composition
.. D-Seminar	.. Variable Title	.. Oral Communication
.. E-Independent Study	.. Creative Inquiry	.. Mathematics
.. F-Tutorial (w/fee)	.. Repeatable	Natural Science No
.. G-Studio	maximum credits:	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		X Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
X N/B-Lecture/Lab(w/fee)		.. A&H (Non-Literature)
.. N/L-Lecture/Lab(no fee)		.. Social Science
		.. CCA
		.. STS

Add cross-listing with the following child course(s):

Catalog Description: Geology is a field-based science. Being a successful observer and interpreter of phenomena you encounter in the field depends in large measure on what you have been prepared to see and record. This course provides the experience and skills needed to be a competent field geologist.

Prerequisite(s): Geol 1010

Projected Enrollment:
Year 1 - 15 Year 2 - 15 Year 3 - 15 Year 4 - 15

Required course for students in: Geology

Statement of need and justification based on assessment results of student learning outcomes: Students lack the field-based skills and associated confidence required of professional geologists. The shift in geological training over the last 30 years has shifted away from spending time in the field to spending time in front of a computer. Employers in the earth science field have reported that applicants lack a basic understanding of field skills that are essential to solving the complex problems they are addressing. A student who is confident in both their field-based technical skills and computer-based analytic reasoning will be better prepared for positions in a field that is both demanding and varies widely in its expectations of graduates.

Textbook(s): Geological Field Techniques, edited by Angela Coe, Wiley-Blackwell 2010, ISBN: 1444330624

Learning Objectives: • Become proficient and comfortable with the basic tools and methods used in field interpretation.
• Learn to characterize field sites. Your goal is examine each site and determine what tools and skills are needed to adequately characterize that site.
• Make geologic maps. You will learn to integrate field data into existing digital products and create new products that reflect your geologic interpretations.
• Develop the ability to visualize geologic structures in multiple dimensions. This critical skill is necessary to interpret complex geologic settings.
• Build upon your experience as you become more confident and apply this to different geologic settings. This ability is what sets an ordinary geologist apart from an extraordinary geologist.
• Learn to be adapatable. The unique conditions at each field setting will often force you to modify your methods and apply novel solutions. This will require you to cultivate the ability to think "outside the box".
• Become confident communicating your geologic interpretations with a wide audience. This means you should be able to discuss your knowledge not only in class, but with your friends, environmental professionals, employers, and eventually clients.

Topical Outline: Class
Week 1: Overview and basic expectations for field and class
Week 2: Importance of note taking
Week 3: Basics of field measurements
Week 4: Map Reading and Surveying
Week 5: Surveying
Week 6: Introduction to GIS
Week 7: Midterm and converting field data into digital geologic maps
Week 8: Soils analysis and characterization
Week 9: Making field observations at different scales
Week 10: Making and interpretation of geologic maps: Part 1
Week 11: Making and interpretation of geologic maps: Part 2
Week 12: Planning a successful mapping project
Week 13: Putting it all together and wrapping up Field Project
Week 14: Interpreting complex geologic settings

Week 15: Project Presentations
Laboratory
Week 1: Fundamental tools used in field investigations
Week 2: Visit known sites with visible geologic features
Week 3: Making measurements in the field
Week 4: Map interpretation, Pace and Compass techniques, closing a traverse
Week 5: Use of Transit and GPS in small scale area
Week 6: Downloading field data into digital formats and creating preliminary digital maps
Week 7: Converting field data into a digital map
Week 8: Coring soil samples in different geological settings
Week 9: Characterization of an outcrop
Week 10: Mapping a small section of the Clemson Forest: Part 1
Week 11: Mapping a small section of the Clemson Forest: Part 2
Week 12: Project: Part 1: Mapping a new site
Week 13: Project: Part 2: Creating a digital geologic map of the data collected last week
Week 14: Mapping Walhalla and Jocassee thrust sheet rocks across the Jocassee thrust fault
Week 15: Tracing the Brevard Fault Zone in Gorges State Park, NC

0002013

Evaluation: There will be a midterm and final that will assess the basic knowledge they have learned in the class and field. For each lab, they will be required to produce a result (map, sketch, description) that assesses their skill level and probes their ability to connect these skills to the underlying concepts. The critical assessment of their progress toward achieving the goals of this class will be in the informal and formal presentations.

Form Originator: BRAMES,Brame,Scott E **Date Form Created:** 10/27/2013
Form Last Updated by: BRAMES, Brame,Scott E **Date Form Last Updated:** 11/2/2013
Form Number: 6721

Approval

Thomas J. Crawford	4 Nov 2013		
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
David L. Freedman /for TK	11/4/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13	Nancy M. Gore	1/20/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

Memorandum

To: University Undergraduate Curriculum Committee

From: College of Engineering and Science Curriculum Committee

Dated: November 15, 2013

Subject: Change of First Year for all Engineering BS curricula in the 1415 Undergraduate Announcements

The College of Engineering and Science hereby supports the proposed change in the first year curriculum proposed by Dr. Beth Stephan in the General Engineering Program.

Chair, College Curriculum Committee	Date 11/15/13
College Dean	Date 11/15/13
Chair, Undergraduate Curriculum Committee	Date 12/6/2013
Provost	Date 1/20/14
President	Date

General Engineering Catalog Changes – Proposed November 2013

000204

General Engineering would like to propose to change the catalog [current 2013 – 2014 page 91]

Freshman Curriculum

First Semester

4 - CH 1010 General Chemistry

3 - ENGL 1030 Accelerated Composition

1 - ENGR 1050 Engineering Disciplines and Skills I

1 - ENGR 1060 Engineering Disciplines and Skills II

4 - MATH 1060 Calculus of One Variable I

3 - General Education Requirement[1]

16

Second Semester

1 - ENGR 1070 Programming and Problem Solving I[2]

1 - ENGR 1080 Programming and Problem Solving II[2]

1 - ENGR 1090 Programming and Problem Solving Applications[2]

4 - MATH 1080 Calculus of One Variable II

3 - PHYS 1220 Physics with Calculus I

2-4 - Departmental Science Requirement[3]

3 - General Education Requirement[1]

15-17

[1]See Policy on General Education Requirements for Engineering Curricula below

[2]See advisor for Chemical Engineering Requirement

[3]**See advisor for specific engineering major requirements**

General Engineering Catalog Changes – Proposed November 2013

Admission into Engineering Degree Programs

To transfer into an engineering degree program, a student must have completed the following courses in the freshman engineering curriculum with a grade of *C* or better:

4 - CH 1010 General Chemistry

3 - ENGL 1030 Accelerated Composition

1 - ENGR 1050 Engineering Disciplines and Skills I[4]

1 - ENGR 1060 Engineering Disciplines and Skills II[4]

1 - ENGR 1070 Programming and Problem Solving I[4]

1 - ENGR 1080 Programming and Problem Solving II[4]

1 - ENGR 1090 Programming and Problem Solving Applications[4]

4 - MATH 1060 Calculus of One Variable I

4 - MATH 1080 Calculus of One Variable II

3 - PHYS 1220 Physics with Calculus I

[4] Chemical Engineering requirements may vary; please see an advisor for details

General Engineering Catalog Changes – Proposed November 2013

The changes to the individual department curriculum would be as follows.

All engineering would replace the current course ENGR 1020 with the new course sequence ENGR 1050 / 1060 in the individual department curricula (in 2013 – 2014 catalog, pages 92 – 100). No total credit hour change is needed.

First Semester

2 - ENGR 1020 Engineering Disciplines and Skills

is replaced with

1 - ENGR 1050 Engineering Disciplines and Skills I

1 - ENGR 1060 Engineering Disciplines and Skills II

All engineering departments EXCEPT Chemical Engineering would replace the current course ENGR 1410 with the new course sequence ENGR 1070 / 1080 / 1090 in the individual department curricula (in 2013 – 2014 catalog, pages 92 – 100). No total credit hour change is needed.

Second Semester

3 - ENGR 1410 Programming and Problem Solving

is replaced with

1 - ENGR 1070 Programming and Problem Solving I

1 - ENGR 1080 Programming and Problem Solving II

1 - ENGR 1090 Programming and Problem Solving Applications

The changes to the coursework would be as follows, with the exception of ENGR 1020, 1021 and ENGR 1410, 1411 which should remain as currently listed.

Change all PRE_REQUISITES	from:	ENGR 1020	to:	ENGR 1060
		ENGR 1410		ENGR 1090
Change all CONCURRENT ENROLLMENT:	from:	ENGR 1020	to:	ENGR 1050
		ENGR 1410		ENGR 1070

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CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Major Form**

000207

Change Major Name: Industrial Engineering (BS - 201405)
Degree: BS
Effective Catalog Year: 2014
.. **Change Major Name to:**
.. **Change Degree to:** (CHE approval required)
X **Change Curriculum Requirements**
(Submit or upload Curriculum map in catalog format. CHE approval required for > 18 hours of changes)
.. **Change General Education Requirements**
(Must also submit a General Education Checklist)
.. **Add, Change or Delete Concentration(s)**
(Submit or upload Curriculum map in catalog format. CHE approval required)
.. **Add, Change or Delete Emphasis Area(s)**
Explanation: The BSIE curriculum has been the same since 0910. Based on several inputs, we considered several changes, most of which did not result in any change. However, the following 4 changes are proposed.
1. Swap HSS and Math/Science requirement: To support students taking their HSS early for ePortfolio
2. Delete CE 2080:The new IE specifications for the FE do not specify topics from dynamics to such a degree as to warrant requiring this course in lieu of other courses.
3. Add Ethics and Professional Practice requirement: The new IE specifications for the FE specify additional emphasis on ethics and professional practice. The selected courses support aspects of these knowledge areas.
4. Delete 3 units Engineering requirement, replace with 3 units IE technical requirements:The new IE specifications require much more IE content, but we prefer our students have some flexibility in exploring the field. The list of courses in the current Engineering requirement (which are not in the IE department) do not support the revised specifications. These non-IE courses are also difficult for our students to take due to increasing prerequisites outside of our major and course capacity limitations.
Form Originator: MKURZ, Kurz,Mary Elizabeth **Date Form Created:** 11/6/2013
Form Last Updated by: MKURZ, Kurz,Mary Elizabeth **Date Form Last Updated:** 11/6/2013
Form Number: 6819

Approval

	11/6/13		12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	11/8/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13		1/20/14
College Dean	Date	President	Date

1415 BSIE Curriculum

000203

Freshman Year

16	**First Semester**	17	**Second Semester**
4	MTHSC 1060 Calculus of One Variable I [1]	4	MTHS 1080 Calculus of One Variable II [1]
3	ENGL 1030 Composition [1]	3	Humanities/Social Science Requirement [2]
2	ENGR 1020 Engineering Disciplines and Skills [1]	3	ENGR 1410 [1]
4	CH 1010 General Chemistry I [1]	4	Lab Science Requirement [2]
3	Humanities/Social Science Requirement [2]	3	PHYS 1220 Physics with Calculus I [1]

Sophomore Year

16	**First Semester**	17	**Second Semester**
4	MTHS 2060 Calculus of Several Variables	3	IE 2100 Design and Analysis of Work Systems
4	IE 2010 System Design I	2	ENGR 2080 *or* ENGR 2090 Engineering Graphics
3	IE 2800 Methods of Operational Research I	3	MSE 2100 Intro to Materials Science
3	PHYS 2210 Physics with Calculus II	3	CE 2010 Statics [3]
1	PHYS 2230 Physics Laboratory II [4]	3	IE 3840 Engineering Economic Analysis
1	IE 2000 Sophomore Seminar in IE	3	Humanities/Social Science Requirement [2]

Junior Year

16~~5~~	**First Semester**	15	**Second Semester**
3	IE 4400 Decision Support Systems in IE	3	IE 3860 Production Planning and Control
3	IE 3600 Design and Control of Industrial Systems I	3	IE 3810 Methods of Operational Research II
3	Humanities/Social Science Requirement [2]	3	IE 3610 Design and Control of Industrial Systems II
~~2~~	~~CE 2080~~ [3]	3	COMM 1500 Introd to Speech Communication *or*
1	IE 3680 Professional Practice in IE		3 - COMM 2500 Public Speaking
~~3~~	~~Math / Science Requirement~~ [2]	3	Electrical Engineering Reqt (ECE 3070/3090 or 2020/2110)
3	Humanities/Social Science Requirement [2]		
3	Ethics and Professional Practice Requirement [2]		

Senior Year

16	**First Semester**	12	**Second Semester**
4	IE 4820 Systems Modeling	3	IE 4670 Systems Design II
3	IE 4610 Quality Engineering	3	Management Requirement [2]
6~~3~~	IE Technical Requirement [2]	3	IE Technical Requirement [2]
3	IE 4650 Facilities Planning and Design	~~3~~	~~Humanities/Social Science Requirement~~ [2]
		3	Math / Science Requirement [2]

12~~5~~4 total semester hours

---

[1] This course must be passed with a C or better either to transfer into IE from General Engineering or to satisfy later course prerequisites

[2] Select from department-approved lists; see next page

[3] ME 2010 can be used to satisfy CE 2010

[4] PHYS 1240 may be substituted

1415 BSIE Curriculum – Lists of Approved Courses

DegreeWorks provides a list of the current set of courses associated with your degree. Please consult your advisor if there appears to be an error.

Each requirement in the degree must be satisfied without "double-dipping", except CCA and STS.

Lab Science Requirement: 4 units required
BIOL 1030/1050
BIOL 1040/1060
BIOL 1100
CH 1020
GEOL 1010/1030

Management Requirement: 3 units
MGT 2010
MGT 3070
MGT 4110
E L E 4000
ML 3010
AS 3090

Ethics & Professional Practice Requirement: 3 units
PHIL 103
PHIL 344
PHIL 3450
PHIL 3460
LAW 3220

IE Technical Requirement: 9 units
IE 4000 (6 units maximum)
IE 4020 (6 units maximum)
IE 4030 (3 units maximum)
IE 4300
IE 4520
IE 4560
IE 4570
IE 4600
IE 4620
IE 4630
IE 4850
IE 4870
IE 4880
IE 4890
IE 4910

Math / Science Requirement: 3 units
BIOL 2030
BIOL 2040
BIOL 3150
CH 1020
CH 2230
ENSP 2000
GEOL 2700
GEOL 3000
MICRO 2050
PHYS 2220
PHYS 3210
PHYS 4170
PHYS 4320
MATH 2080 (4 units)
MATH 3110
MATH 3600
MATH 3650
MATH 4000
MATH 4050
MATH 4100
MATH 4310
MATH 4340
MATH 4350
MATH 4530
MATH 4630

1415 BSIE Curriculum – Summary of Changes

The change in FE requirements for the IE exam have prompted the IE department to review our curriculum. The resulting minor changes are proposed to support our program educational objectives.

Change	Rationale	ABET impact
Swap HSS and Math/Science requirement	To support students taking their HSS early for ePortfolio	None
Delete CE 2080	The new IE specifications for the FE do not specify topics from dynamics to such a degree as to warrant requiring this course in lieu of other courses.	Reduction, 2 hours engineering
Add Ethics and Professional Practice requirement	The new IE specifications for the FE specify additional emphasis on ethics and professional practice. The selected courses support aspects of these knowledge areas.	None
Delete 3 units Engineering requirement, replace with 3 units IE technical requirements	The new IE specifications require much more IE content, but we prefer our students have some flexibility in exploring the field. The list of courses in the current Engineering requirement (which are not in the IE department) do not support the revised specifications. These non-IE courses are also difficult for our students to take due to increasing prerequisites outside of our major and course capacity limitations.	None

Current ABET unit counts:
36 Math / Science (minimum of 32 required)
54 Engineering (minimum of 48 required)

40

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

000211

X **Change a Course - Abbrev & Number: IE- 2000**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Soph Seminar in I E

Brief Statement of Change:
Students must earn a C or better in the prerequisite courses in order to declare IE as a major. As such, it is consistent to require a C or better in the prerequisite courses to take this course.

Last Term taught: 201208	.. **Change Abbrev to:**
Effective Term: 0[illegible]2014	.. **Change Number to:**
.. **Change Catalog Title:**	.. **Change Transcript Title:**
from:	from: Soph Seminar in I E
to:	to:

..	From: Fixed Credit: 1 (1,0)	To: Fixed Credit: (,)
Change of Credit	Variable Credit: - (-), (-)	Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
.. A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
X D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
.. N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

X **Change Prerequisite(s):**
from: ENGR 1020 or ENGR 1300 or ENGR 1410
to: ENGR 1020 or ENGR 1300 or ENGR 1410, each with C or better

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator: MKURZ, Kurz,Mary Elizabeth **Date Form Created:** 10/24/2013
Form Last Updated by: MKURZ, Kurz,Mary Elizabeth **Date Form Last Updated:** 10/24/2013
Form Number: 6710

Approval

[signature]	10/25/13	[signature]	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
[signature]	10/31/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
[signature]	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
[signature]	11/15/13	[signature]	1/20/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

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CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

X **Change a Course - Abbrev & Number: IE- 2010**
Corresponding Lab Course: IE--2011
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Systems Design I

Brief Statement of Change:
Students must earn a C or better in the prerequisite courses in order to declare IE as a major. As such, it is consistent to require a C or better in the prerequisite courses to take this course. Also, we are adding ENGL 1020 as a prerequisite to simplify prerequisite checking.

Last Term taught: 201301	.. **Change Abbrev to:**	
Effective Term: 08/2014	.. **Change Number to:**	
.. **Change Catalog Title:**	.. **Change Transcript Title:**	
from:	from: Systems Design I	
to:	to:	
..	From: Fixed Credit: 4 (3,3)	To: Fixed Credit: (,)
Change of Credit	Variable Credit: - (-), (-)	Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
.. A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
X N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

X **Change Prerequisite(s):**
from: Preq: ENGR 1020 and ENGL 1030. Coreq: IE 2011
to: Preq: ENGR 1020 and (ENGL 102 or ENGL 1030), each with C or better. Coreq: IE 2011

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator: MKURZ, Kurz,Mary Elizabeth **Date Form Created:** 10/24/2013
Form Last Updated by: MKURZ, Kurz,Mary Elizabeth **Date Form Last Updated:** 10/24/2013
Form Number: 6711

Approval

	10/25/13	Patricia W. Mercer	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
Scott Mason	10/31/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13		1/20/14
College Dean	Date	President	Date

4E

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

000213

X **Change a Course - Abbrev & Number: IE- 2100**
Corresponding Lab Course: IE--2101
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Des Analysis Wrk Sys

Brief Statement of Change:
Students must earn a C or better in the prerequisite courses in order to declare IE as a major. As such, it is consistent to require a C or better in the prerequisite courses to take this course.

Last Term taught: 201301	.. **Change Abbrev to:**
Effective Term: 08/2014	.. **Change Number to:**
.. **Change Catalog Title:**	.. **Change Transcript Title:**
from:	from: Des Analysis Wrk Sys
to:	to:

.. **Change of Credit**	From: Fixed Credit: 3 (2,3) Variable Credit: - (-), (-)	To: Fixed Credit: (,) Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
.. A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
X N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

X **Change Prerequisite(s):**
from: Preq: ENGR 1020 and (ENGL 102 or ENGL 1030). Coreq: IE 2101
to: Preq: ENGR 1020 and (ENGL 102 or ENGL 1030), each with C or better. Coreq: IE 2101

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator: MKURZ, Kurz,Mary Elizabeth **Date Form Created:** 10/24/2013
Form Last Updated by: MKURZ, Kurz,Mary Elizabeth **Date Form Last Updated:** 10/24/2013
Form Number: 6712

Approval

Chair, Department Curriculum Committee	10/25/13	Chair, Undergraduate Curriculum Committee	12/6/2013
Department Chair	10/31/13	Chair, Graduate Curriculum Committee	Date
Chair, College Curriculum Committee	11/15/13	Provost	Date
College Dean	11/15/13	President	1/20/14
Director, Calhoun Honors College	Date		

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CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

X **Change a Course - Abbrev & Number: IE- 2800**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Deterministic Operations Rsrch

Brief Statement of Change:
Students must earn a C or better in the prerequisite courses in order to declare IE as a major. As such, it is consistent to require a C or better in the prerequisite courses to take this course. Also, we are adding MTHS 1070 to facilitate prerequisite checking.

Last Term taught: 201208	.. **Change Abbrev to:**	
Effective Term: 08/2014	.. **Change Number to:**	
.. **Change Catalog Title:**	.. **Change Transcript Title:**	
from:	from: Deterministic Operations Rsrch	
to:	to:	
.. **Change of Credit**	From: Fixed Credit: 3 (3,0) Variable Credit: - (-), (-)	To: Fixed Credit: (,) Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
X A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
.. N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

X **Change Prerequisite(s):**
from: MTHS 1060
to: MTHS 1060 or MTHS 1070, either with C or better.

Learning Objectives:

Topical Outline:

Evaluation:

Form Originator: MKURZ, Kurz,Mary Elizabeth **Date Form Created:** 10/24/2013
Form Last Updated by: MKURZ, Kurz,Mary Elizabeth **Date Form Last Updated:** 10/24/2013
Form Number: 6713

Approval

	10/25/13		12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
Scott Mason	10/31/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13		1/20/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

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CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Change/Delete Course Form**

0000265

X **Change a Course - Abbrev & Number: IE- 4820**
Corresponding Lab Course: IE--4821
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: IE--6820
.. **Add Graduate course:** --
Course Title: Systems Modeling

Brief Statement of Change:
This course was taught as a 3 unit lecture, 2 unit lab. Based on recent offerings, we find that 4 contact hours is sufficient for the content required and will make scheduling easier for the students and staff. The 5th contact hour has been unused often.

Last Term taught: 201208	.. **Change Abbrev to:**	
Effective Term: 08/2014	.. **Change Number to:**	
.. **Change Catalog Title:**	.. **Change Transcript Title:**	
from:	from: Systems Modeling	
to:	to:	
X **Change of Credit**	From: Fixed Credit: 4 (3,2) Variable Credit: - (-), (-)	To: Fixed Credit: 4 (4,0) Variable Credit: - (-),(-)

.. **Add cross-listing with the following child course(s):**
.. **Delete cross-listing with the following child course(s):**
.. **Reverse Parent/Child relationship with:**

.. **Change Method of Instruction**		.. **Change Course Modifier**		.. **Change General Education Designation**	
from:	to:	from:	to:	from:	to:
X A-Lecture Only	..	.. Pass/Fail Only	..	.. Creative Inquiry	..
.. B-Lab (w/fee)	..	X Graded	..	.. English Composition	..
.. D-Seminar	..	.. Variable Title	..	.. Oral Communication	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Mathematics	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Natural Science w/Lab	..
.. H-Field course	..	from:		.. Math or Science	..
.. I-Study Abroad	..	to:		.. A&H (Literature)	..
.. L-Lab (no/fee)	..			.. A&H (Non-Literature)	..
X N/B-Lecture/Lab(w/fee)	..			.. Social Science	..
.. N/L-Lecture/Lab(no fee)	..			.. CCA	..
				.. STS	..

.. **Change Catalog Description:**
from:
to:

.. **Change Prerequisite(s):**
from:
to:

Learning Objectives: At the end of the course, each student should be able to
- Develop credible and appropriately detailed simulation models;
- Analyze one system or a set of alternate systems with the correct statistical procedures;
- Summarize and explain the findings of a simulation analysis

Topical Outline: Topics and weeks
Event-based Simulation - 2.5 weeks
Basic Simulation and Process Modeling - 2.5 weeks
Input Analysis - 1 week
Random Number Generation / Random Variate Generation - 1 week
Output Analysis – Finite and Infinite Horizon Simulations - 1 week
Comparing Alternate System Configurations - 2 weeks
Queueing and Inventory Models - 2 weeks
Entity Transfer, Material Handling, and Advanced Topics - 1 week
exams - 1 week

Evaluation: IE 4820
In-Class Exercises (10-12 exercises) 10%
Homework Assignments (Individually, 4-5 assignments) 15%
Lab Assignments (Two people per team, 3 assignments) 30%
Exams 45%

IE 6820
In-Class Exercises (10-12 exercises) 10%
Homework Assignments (Individually, 4-5 assignments) 10%
Lab Assignments (Two people per team, 3 assignments) 20%
Exams 35%

000216 45

Semester Project 25%

Add course requirements for honors and/or 600-level courses (if applicable): The 6820 students have a semester project.

Form Originator: MKURZ, Kurz,Mary Elizabeth **Date Form Created:** 10/24/2013
Form Last Updated by: MKURZ, Kurz,Mary Elizabeth **Date Form Last Updated:** 10/24/2013
Form Number: 6707

Approval

	10/25/13	Jessica W. Murdaugh	12/6/2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
Scott Mason	10/31/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13		1/20/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

00022350

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Major Form**

Change Major Name: Mathematical Sciences (BA - 201401)
Degree: BA
Effective Catalog Year: 2014
.. **Change Major Name to:**
.. **Change Degree to:** (CHE approval required)
X **Change Curriculum Requirements**
(Submit or upload Curriculum map in catalog format. CHE approval required for > 18 hours of changes)
.. **Change General Education Requirements**
(Must also submit a General Education Checklist)
.. **Add, Change or Delete Concentration(s)**
(Submit or upload Curriculum map in catalog format. CHE approval required)
.. **Add, Change or Delete Emphasis Area(s)**
Explanation: Curriculum has changed so that there are fewer course substitutions. Also, a new course, MATH 3190, has been added to the curriculum to prepare students better for proof-writing courses.
Form Originator: CAWOOD, Cawood,Mark E. **Date Form Created:** 11/3/2013
Form Last Updated by: CAWOOD, Cawood,Mark E. **Date Form Last Updated:** 11/3/2013
Form Number: 6769
Approval

	11/4/2013		12/6/2013 11/4/13
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	11/4/2013		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13		1/20/14
College Dean	Date	President	Date

MATHEMATICAL SCIENCES

The Mathematical Sciences curriculum is designed to be versatile. Students gain a broad knowledge of mathematical concepts and methods that are applicable in sciences, engineering, business, industry, and other professions requiring a strong mathematical background. In addition to the basic courses that provide necessary mathematical skills, the curriculum allows students to select an emphasis area or concentration, providing an introduction to a specific area where mathematics is used. These are Abstract Mathematics, Actuarial Science/Financial Mathematics, Applied and Computational Mathematics, Biology, Computer Science, Operations Research/Management Science, and Statistics.

In addition to the overall goal of preparing students to cope with a variety of mathematical problems, the curriculum seeks to provide an adequate background for students who plan to pursue graduate study or positions in business, industry, or government. Students electing the Biology Concentration will have the necessary preparation for entering medical school. More information about the degree program can be found at *www.clemson.edu/ces/departments/math*.

All mathematical sciences majors are required to complete a capstone experience that provides an opportunity to pursue research, independent study, or an approved internship under the direction of a faculty member, or the opportunity to study mathematical models in some area of the mathematical sciences. The capstone experience requires a written report (thesis, computer code, project description, intern experience, etc.) and an oral or poster presentation by each student.

Combined Bachelor's/Master's Plan

Under this plan, students may reduce the time necessary to earn both degrees by applying up to twelve graduate credits to both undergraduate and graduate program requirements. Students are encouraged to obtain the specific requirements for pursuing the combined degree from the Department of Mathematical Sciences (*www.clemson.edu/ces/departments/math*) as early as possible in their undergraduate program. Enrollment guidelines and procedures can be found under *Academic Regulations* in this catalog.

MATHEMATICAL SCIENCES

Bachelor of Arts

Freshman Year

First Semester

3 - Social Science Requirement[1]
3 - ENGL 1030 Accelerated Composition
4 - MATH 1060 Calculus of One Variable I
3 - Foreign Language Requirement[2]
1 - Elective

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Second Semester

4 - MATH 1080 Calculus of One Variable II
3 - Foreign Language Requirement[2]
3 - Computer Science Requirement[3]
3 - Science and Tech. in Society Requirement[4]
3 - Social Science Requirement[4]

16

Sophomore Year

First Semester

4 - MATH 2060 Calculus of Several Variables
1 - MATH 2500 Intro. to Mathematical Sciences
3 - MATH 3600 Intermed. Math. Computing *or*
  3 - EDSC 4370 Technology in Sec. Math.
3 - Arts and Humanities (Literature) Requirement[4]
3 - Cross-Cultural Awareness Requirement[4]

14

Second Semester

4 - MATH 2080 Intro. to Ordinary Diff. Equations
3 - MATH 3020 Statistics for Science and Engr.
3 - MATH 3110 Linear Algebra
3 - Arts and Humanities (Non-Lit.) Requirement[4]
3 - Minor Requirement[5] *or*
  3 - Second Major Requirement

16

Junior Year

First Semester

3 - Advanced Writing Requirement[6]
3 - MATH 3190 Introduction to Proof
3 - Math Science Requirement[7]
4 - Natural Science Requirement[4]
3 - Elective

16

Second Semester

3 - COMM 2500 Public Speaking
3 - MATH 4120 Introduction to Modern Algebra
3 - Minor Requirement[5] *or*
  3 - Second Major Requirement
4 - Natural Science Requirement[4]
3 - Elective

16

Senior Year

First Semester

3 - MATH 4530 Advanced Calculus I
3 - Arts and Humanities Requirement[4] *or*
  3 - Education Requirement[8]
3 - Capstone Experience[9]
3 - Minor Requirement[5] *or*
  3 - Second Major Requirement
3 - Math Science Requirement[7]

15

Second Semester

1 - MATH 4920 Professional Development *or*
  1 - EDF 4250 Instructional Tech. Strategies
3 - Capstone Experience[9]
3 - Math Science Requirement[7]
6 - Minor Requirement[5] *or*
  6 - Second Major Requirement
2 - Elective

15

122 Total Semester Hours

[1]See General Education Requirements. ECON 2000 or 2110 is recommended.

[2]Six credits in any foreign language, including American Sign Language, numbered 2000 or above

[3]CPSC 1010, 1110, 1610, or 2200

[4]See General Education Requirements.

[5]See page 110 for approved minors.

[6]Any one of the courses EDSC 2260, ENGL 3040, 3120, 3140, 3150; the cluster of courses A S 309, 310, 409, and 410; or the cluster of courses M L 3010, 3020, 4010, and 4020.

[7]MATH 3080 or any 4000-level MATH or STAT course.

[8]See advisor.

[9]May be satisfied by (1) completion of six credits of MATH 4820; (2) completion of six credits of MATH 4910 or an approved substitution; (3) completion of three credits of MATH 4500 and three credits of an additional course approved by advisor; or (4) EDSC 4460 for students seeking a double major in Secondary Education–Mathematics.

Notes:

1. For graduation, a candidate for the BA degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point average in all required MATH courses.
2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MATH course.
3. Students who change majors to Mathematical Sciences must have achieved the Minimum Cumulative Grade-Point Average (MCGPA) by Total Credit Hour Level as defined in the Academic Regulations section of the *Undergraduate Announcements* and must have received a grade of C or better in all MATH courses taken.

Problem 4 (15 points)

For each of the following sequences indicate whether the sequence is

A. an Arithmetic Progression
B. a Geometric Progression
C. an Arithmetic Series
D. a Geometric Series
E. a Hailstone sequence
F. None of the above

Ignored

1. A $\{1, 2, 3, 4, 5, 6, \ldots\}$
2. E $\{3, 10, 5, 16, 8, 4, \ldots\}$
3. C $\{1, 3, 6, 10, 15, 21, \ldots\}$ +2 +3 +4
4. B $\{3, 6, 12, 24, 48, 96, \ldots\}$
5. A $\{7, 9, 11, 13, 15, 17, \ldots\}$
6. D $\{3, 9, 21, 45, 93, 189, \ldots\}$
7. E $\{6, 3, 10, 5, 16, 8, \ldots\}$
8. ___ $\{2, 3, 5, 7, 11, 13, \ldots\}$ 1 2 2 4 2
9. F $\{1, 1, 2, 3, 5, 8, \ldots\}$ Fib
10. ___ $\{0, 1, 6, 18, 40, 75, \ldots\}$ 1 5 12 22 35

4 7 10 13

3 3 3

$\Delta^3 s_n = 3$ $\Delta^4 s_n = 0$

COURSES 53

CLEMSON UNIVERSITY **Curriculum and Course Change System - Print Minor Form**

Change Minor: Mathematical Sciences
Effective Catalog Year:

.. **Change Minor Name to:**
X **Change Minor Requirements:**
Current Catalog Description: A minor in Mathematical Sciences requires MTHS 2080 and 12 additional credits in mathematical sciences courses numbered 3000 or higher.
Proposed Catalog Description: A minor in Mathematical Sciences requires MATH 2080 and 12 additional credits in MATH or STAT courses numbered 3000 or higher, excluding MATH 3080, 3150, 3160, 3820, 3990, 4080, 4300, 4320, 4810, 4820, 4910, 4920, and 4990; and STAT 3090.
Summary/ Explanation: Because of the proliferation of special topics, creative inquiry, and undergraduate research courses, the Department of Mathematical Sciences feels it is necessary to limit courses that count toward the minor to traditional math and statistics courses.

Form Originator: CAWOOD, Mark Cawood **Date Form Created:** 4/2/2013
Form Last Updated by: CAWOOD, Mark Cawood **Date Form Last Updated:** 9/4/2013
Form Number: 6028

Approval

	10/22/2013		12/6/2013 10/22/13
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/22/2013		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	11/15/13		
Chair, College Curriculum Committee	Date	Provost	Date
	11/15/13		1/20/14
College Dean	Date	President	Date