000111

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

X **Change a Course - Abbrev & Number: EE&S- 403**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course: --**
Course Title: WATER WASTE LAB

Brief Statement of Change:
The EES 3050 laboratory course will complement the new courses in Water Treatment, EES 3030, and Wastewater Treatment, EES 3040, which are taken by majors in Environmental Engineering. The course is retitled slightly to make it more consistent with the profession. There are no changes to the course content or the method of evaluation.

Last Term taught: 1108 Effective Term: 08/2014	.. **Change Abbrev to:** .. **Change Number to:** 3050
X **Change Catalog Title:** from: Water and Waste Treatment Laboratory to: Water and Wastewater Treatment Laboratory	X **Change Transcript Title:** from: WATER WASTE LAB to: WATER WASTEWATER LAB
.. **Change of Credit**	From: Fixed Credit: 1 (0,) To: Fixed 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	..	.. English Composition	..
X B-Lab (w/fee)	..	X Graded	..	.. Oral Communication	..
.. D-Seminar	..	.. Variable Title	..	.. Mathematics	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Natural Science w/Lab	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Math or Science	..
.. G-Studio	..	maximum credits		.. A&H (Literature)	..
.. H-Field course	..	from:		.. A&H (Non-Literature)	..
.. I-Study Abroad	..	to:		.. Social Science	..
.. L-Lab (no/fee)	..			.. CCA	..
.. N/B-Lecture/Lab(w/fee)	..			.. STS	..
.. N/L-Lecture/Lab(no fee)	..				

X **Change Catalog Description:**
from: Laboratory exercises to accompany EES 4020 in selected water and wastewater treatment operations and processes. Emphasis is on understanding of fundamental principles and operational procedures, experimental design, data analysis, use of experimental data in engineering design applications, and writing of engineering reports.
to: Laboratory exercises to accompany EES 3030 and EES 3040 in selected water and wastewater treatment operations and processes. Emphasis is on understanding of fundamental principles and operational procedures, experimental design, data analysis, use of experimental data in engineering design applications, and writing of engineering reports.

X **Change Prerequisite(s):**
from: Preq: EES 2020; Preq or concurrent enrollment: EES 4020.
to: Preq: EES 2020; Corequisite: EES 3030 and EES 3040.

Learning Objectives: . To develop an understanding of how to design and conduct experiments to collect data that are used in the design of water and wastewater treatment plants.
2. To develop an understanding of how to apply the data collected to design problems.
3. To develop an understanding of how to write laboratory reports and communicate the results in an oral presentation.

Topical Outline: Topics by week:
1 Introduction (safety; data collection)
2 Coagulation and Flocculation
3 Reactor Characterization (Tracer tests)
4 Granular Media Filtration
5 Tour of a water treatment plant
6 Membrane filtration
7 Disinfection
8 Comparison of primary settling and screening
9 Evaluation of nutrient deficiency in activated sludge
10 Effect of organic compounds on nitrification
11 Modeling activated sludge with ASM1
12 Zone settling
13 Tour of the Mauldin Road WWTP
14 Presentations

Evaluation: Lab reports (12 x 7% each) 84%
Presentation 14%
Class Participation and Professional Evaluation 2%

000112

A > 90%; 89% > B > 80%; 79% > C > 70%; 69% > D > 60%; F < 60%

Form Originator: TJVRC, Thomas Overcamp **Date Form Created:** 9/2/2013
Form Last Updated by: , **Date Form Last Updated:** 9/18/2013
Form Number: 6393

Approval

Thomas J. Overcamp	20 Sept 2013	Jessica W. Murdock	11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
Carla Yarnell	9/20/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	9/40/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/21/13		1/18/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

000113

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

Course Abbreviation & Number:
X **New Undergraduate Course:** EE&S- 303
.. **New Honors Course:** --
.. **New Graduate Course:** -

Effective Term: 08/2014
Catalog Title: Water Treatment Systems
Transcript Title: Water Treatment
Fixed Credit Course: 2 (2,0)
Variable Credit Course: - (-), (-)

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

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

Catalog Description: Study of fundamental principles, rational design considerations, and operational procedures of the unit operations and processes employed in water treatment. Introduces the integration of unit operations and processes into water treatment systems.

Prerequisite(s): EES 2020. Corequisites: EES 3040 and EES 3050.

Projected Enrollment:
Year 1 - 30 Year 2 - 30 Year 3 - 30 Year 4 - 30

Required course for students in: Environmental Engineering

Statement of need and justification based on assessment results of student learning outcomes: Drinking water treatment and wastewater treatment have previously been taught together in one course (EES 4020). But these two subjects are key areas of environmental engineering that deserve more in-depth treatment. Assessment of our students - on the Fundamentals of Engineering exam, for example - shows that their mastery of these concepts should be improved. By splitting the previous course into two new courses (3030 [this one] and 3040), we aim to accomplish this learning outcome. Note that the change from 400 to 300 level comes because the course falls in the junior year of the curriculum; the 400 level is a legacy designation from when there was not environmental engineering program and this was taught for civil and other engineering students. EES 4020 will continue to be taught for non-majors.

Textbook(s): Water and Wastewater Engineering, Mackenzie L. Davis, 2011, McGraw-Hill, New York, NY

Learning Objectives: This course will develop the students' understanding of:

1) The functions of water treatment, including an overview of the types and purpose of regulations governing water quality;

2) The overall process configuration of water treatment plants, including an ability to interpret and construct flow diagrams for achieving a desired level of treatment; and

3) How to perform basic design calculations for a variety of unit operations that make up water treatment plants, including rapid mixers, flocculation tanks, sedimentation basins, granular media filters, membrane filters, reverse osmosis, adsorption units, softening processes, and chemical additions for disinfection.

Topical Outline: 1) Design and Construction Processes (1 hr)
2) General Water Supply Design Considerations (2 hr)
3) Coagulation and Flocculation (4 hr)
4) Lime-Soda Softening (3 hr)
5) Sedimentation (3 hr)
6) Granular Media Filtration (3 hr)
7) Membrane Filtration (3 hr)
8) Reverse Osmosis and Nanofiltration (3 hr)
9) Disinfection in Water Treatment (4 hr)
10) Water Plant Residuals Management (2 hr)

Evaluation: Evaluation will include:

--Midterm Exam #1: 25%
--Midterm Exam #2: 25%
--Final Exam: 25%
--Homework (approximately 4): 22%
--Class Participation and Professional Evaluation: 3%

000114

Grades will be calculated based on the following point-percentage system:
A = 90% or greater
B = 80 to 90%
C = 70 to 80%
D = 60 to 70%
F = below 60%

Form Originator: LADNER,David Ladner **Date Form Created:** 7/10/2013
Form Last Updated by: , Date Form Last Updated: 9/17/2013
Form Number: 6260

Approval

Thomas J. Ouellette	9/20/2013	Jessica W. Murdaugh	11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
Taylor Kovarik	9/20/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	9/20/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/24/13	Natalie M. Hyatt	1/18/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

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

000115

Course Abbreviation & Number:
X **New Undergraduate Course:** EE&S- 304
.. **New Honors Course:** --
.. **New Graduate Course:** -

Effective Term: 08/2014
Catalog Title: Wastewater Treatment Systems
Transcript Title: Wastewater Trmt Syst
Fixed Credit Course: 2 (2,0)
Variable Credit Course: - (-), (-)

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

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

Catalog Description: Study of fundamental principles, rational design considerations, and operational procedures of the unit operations and processes employed in wastewater treatment. Both physiochemical and biological treatment techniques are discussed. Introduces the integration of unit operations and processes into wastewater treatment systems.

Prerequisite(s): EES 2020, or consent of instructor; Coerequisite(s) = EES 3030 and EES 3050

Projected Enrollment:
Year 1 - 30 Year 2 - 30 Year 3 - 30 Year 4 - 30

Required course for students in: Environmental Engineering

Statement of need and justification based on assessment results of student learning outcomes: To cover the topics of water and wastewater treatment, majors in Environmental Engineering are currently required to take EES 4020, which is three credit hours and team taught. We propose to split this class into two courses, each for two credit hours. One will cover water treatment, the other will cover wastewater treatment (i.e., this proposed course). This will give us more time to cover topics that are central to the curriculum. Furthermore, we will restrict both new classes to majors in Environmental Engineering, since EES 4020 has grown to an unwieldy size (~50 students). We will continue to offer EE&S 4020 to non-majors.

Textbook(s): Water and Wastewater Engineering, Mackenzie L. Davis, 2011, McGraw-Hill, New York, NY. ISBN-13: 978-0073397863.

Learning Objectives: 1) Develop an understanding of the functions of wastewater treatment, including an overview of the types and purpose of regulations governing water quality; 2) Learn the overall process configuration of wastewater treatment plants, including an ability to interpret and construct flow diagrams for achieving a desired level of treatment; and 3) Perform basic design calculations for a variety of unit operations that make up wastewater treatment plants, including grit chambers, equalization basins, primary and secondary clarifiers, activated sludge reactors, trickling filters, anaerobic and aerobic digesters, and disinfection.

Topical Outline: Class#/Topic
1 Collection Systems and Design Considerations
2 Collection Systems and Design Considerations
3 Headworks and Preliminary Treatment
4 Headworks and Preliminary Treatment
5 Headworks and Preliminary Treatment
6 Primary Treatment
7 Primary Treatment
8 Primary Treatment
9 Primary Treatment
10 Biological Secondary Treatment, Microbiology
11 Biological Secondary Treatment, Microbiology
12 Biological Secondary Treatment, Suspended Growth
13 Biological Secondary Treatment, Suspended Growth
14 Biological Secondary Treatment, Suspended Growth
15 Exam #1 (covering lectures 1-11)
16 Biological Secondary Treatment, Suspended Growth
17 Biological Secondary Treatment, Suspended Growth
18 Biological Secondary Treatment, Suspended Growth
19 Biological Secondary Treatment, Suspended Growth
20 Biological Secondary Treatment, Suspended Growth
21 Secondary Settling
22 Secondary Settling

23 Biological Secondary Treatment, Attached Growth
24 Biological Secondary Treatment, Attached Growth
25 Biological Secondary Treatment, Attached Growth
26 Exam #2 (covering lectures 12-22)
27 Disinfection
28 Sludge Treatment
29 Sludge Treatment
30 Sludge Treatment
- Final exam (comprehensive)

Evaluation: A: 90 - 100% B: 80 - 89.9% C: 70 - 79.9% D: 60 -69.9% F: below 60%

Exam #1 25%
Exam #2 25%
Final Exam 25%
Homework 22%
Class Participation and Professional Evaluation 3%

Form Originator: DFREEDM,David Freedman **Date Form Created:** 2/28/2013
Form Last Updated by: DFREEDM, David Freedman **Date Form Last Updated:** 8/31/2013
Form Number: 5950

Approval

	6 Sept 2013		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	9/6/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	9/20/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/21/13		1/18/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

CLEMSON UNIVERSITY

000117

Curriculum and Course Change System - Print Major Form

Change Major Name: Electrical Engineering (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: The technical depth requirement is being removed from the Electrical Engineering BS curriculum. Students will still take a total of 9 credits of technical electives, but will no longer be required to select at least two technical electives from the same subject area. ECE faculty members believe that the Electrical Engineering program has sufficient depth in several areas without the constraint of the technical elective depth requirement. Also, removing the depth requirement will provide students with more flexibility in exploring subject areas and will also reduce problems that arise from scheduling constraints.
Form Originator: EBRAD, Gibisch,Elizabeth Bradley **Date Form Created:** 10/9/2013
Form Last Updated by: EBRAD, Gibisch,Elizabeth Bradley **Date Form Last Updated:** 10/9/2013
Form Number: 6629

Approval

	10/9/13		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/18/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/21/13		1/18/14
College Dean	Date	President	Date

Electrical Engineering
Bachelor of Science Degree
Curriculum year 2014-2015

000118

FRESHMAN YEAR

Fall semester	Cr	Term completed	Spring semester	Cr	Term completed
ENGR 1020 Intro Engineering	2		CH 1020 & 1021 Gen Chemistry II	4	
CH 1010 & 1011 General Chemistry I	4		ENGR 1410 &1411 Problem solvng	3	
ENGL 1030 Accelerated Composition	3		MTHS 1080 Calculus II	4	
MTHS 1060 Calculus I	4		PHYS 1220 Physics with Calculus I	3	
Hum/Soc Sci req	3		Hum/Soc Sci req	3	
	16			17	

SOPHOMORE YEAR

Fall semester	Cr	Term completed	Spring semester	Cr	Term completed
CPSC 1110 & 1111 C/C++	3		ECE 2120 Electrical Engr Lab II	1	
ECE 2010 Logic & Computing Devices	2		ECE 2620 Electric Circuits II	3	
ECE 2020 Electric Circuits I	3		ECE 2720 Computer Organization	3	
ECE 2090 Logic Lab	1		ECE 2730 Computer Org Lab	1	
ECE 2110 Electrical Engineering Lab I	1		MTHS 2080 Differential Equations	4	
MTHS 2060 Calculus III	4		Hum/Soc Sci req OR EE Tech Elec	3	
PHYS 2210 Physics with Calculus II	3		[ECE 2220 Sys Progrmng]		
	17			15	

JUNIOR YEAR

Fall semester	Cr	Term completed	Spring semester	Cr	Term completed
ECE 3110 Electrical Engr Lab III	1		ECE 3120 Lab IV	1	
ECE 3200 Electronics I	3		ECE 3170 Random Signal	3	
ECE 3300 Signals, Sys, & Transforms	3		ECE 3210 Electronics II	3	
ECE 3600 Electric Power Engineering	3		ECE 3710 Microcntrllr Interfacing	3	
ECE 3800 Electromagnetics	3		ECE 3720 Microcontroller Lab	1	
Adv. Mathematics Elective [1]	3		ECE 3810 Fields, Waves & Circuits	3	
			ENGL 3140 Technical writing	3	
	16			17	

SENIOR YEAR

Fall semester	Cr	Term completed	Spring semester	Cr	Term completed
COMM 1500 &1501 or COMM 2500 &2501	3		ECE 4960 Systems Design II	2	
ECE 4090 Cont &Discrete Sys Design	3		EE Technical Elective OR Hum/Soc Sci req	3	
ECE 4270 Communications Systems	3		Technical Elective	3	
ECE 4950 Systems Design I	2		Hum/Soc Sci req	3	
EE Technical Elective	3		Special Elective [2]	3	
	14			14	

NOTES:

1. Advanced Mathematics Elective Options: MTHS 4190, MTHS 4340, MTHS 4350, MTHS 4530, or MTHS 4540.
2. Special Elective Options:
   a. 3 additional credits of approved Humanities/Social Science courses; or
   b. ELE 3010 - Executive Leadership and Entrepreneurship I or ELE 4010 - Executive Leadership and Entrepreneurship II; or
   c. An additional 3-credit, 400-level course from the EE Technical Elective List or the CpE Technical Elective List; or
   d. An additional 3-credit MTHS course from the following list: MTHS 3110 (Linear Algebra), MTHS 4120 (Intro. to Modern Algebra), MTHS 4190 (Discrete Math I), MTHS 4340 (Advanced Engineering Math), MTHS 4350 (Complex Variables), MTHS 4400 (Linear Programming), MTHS 4410 (Intro to Stochastic Models), and MTHS 4530 (Advanced Calculus I), MTHS 4540 (Advanced Calculus II).

Electrical Engineering Technical Requirements

000119

Courses that satisfy EE technical requirements are shown below. Three courses (9 credits) must be taken. The 6xxx version of courses listed as *ECE 4xxx have been approved for the combined BS EE/MS EE program. Students who qualify for the combined program can use up to 9 credits of approved courses to jointly satisfy BS EE and MS EE requirements. The EE Student Handbook includes a list of ECE 8xxx courses which have also been approved for the combined program.

Subject Area	Course	Semester offered	Pre-requisites
Computer Systems And Architecture [CSA]	ECE 2220	Fall & Spring	CPSC 1110
	ECE 4170	Spring	ECE 3220, ECE 3520, MTHS 4190
	ECE 4290	Fall	ECE 2720
	*ECE 4420	Fall	ECE 3220, ECE 3520
	*ECE 4680	Spring	ECE 2230 and ECE 3710
	ECE 4730	Fall or Spring	ECE 3220
Biomedical Systems	BIOE 2010		BIO E 1010 or BIOL 1030 or1100; CH 1020
	BIOE 3700		ECE 2020, MTHS 2080
	BIOE 4710		MTHS 2080, PHYS 2210, ECE 3200
Communication Systems & Networks [CSN]	* ECE 4300	Fall or Spring	ECE 3170, 3300 AND instructor permission
	* ECE 4380	Spring	Sr. standing in EE, CpE or CPSC
	* ECE 4400	Spring	ECE 2720 and ECE 3170
Digital Signal Processing [DSP]	* ECE 4420	Fall	ECE 3220 and ECE 3520
	* ECE 4670	Fall & Summer	ECE 3300
Applied Electromagnetics [AEM]	* ECE 4350	Spring	ECE 3810
	* ECE 4360	Fall	ECE 3810, co-req MTHS 3110 or 4340
	* ECE 4390	Check with the dept	ECE 3810, co-req MTHS 4340
	* ECE 4460	Spring	ECE 3300, 3810, or 4360; MTHS 3110 or 4340
Electronics [ELE]	* ECE 4040	Fall	ECE 3200, co-req MTHS 3110 or 4340
	* ECE 4060	Fall	ECE 3200, co-req MTHS 3110 or 4340
	* ECE 4220	Check with the dept	ECE 3210, 3300, 3600, 3710, 3810
	* ECE 4320	Spring	ECE 3210, co-req MTHS 3110 or 4340
	* ECE 4590	Check with the dept	ECE 3210, co-req MTHS 3110 or 4340
Intelligent Systems [CRB]	* ECE 4420	Fall	ECE 3220 and ECE 3520
	* ECE 4550	Summer	MTHS 2060, 3110 or instructor consent
	ECE 4570	Summer	ECE 3070 or ECE 3200
	* ECE 4670	Fall & Summer	ECE 3300
	* ECE 4680	Spring	ECE 3710 and ECE 2230
Power [POW]	* ECE 4180	Fall	ECE 3600, 3800
	* ECE 4190	Spring	ECE 3210, 3600, 3800, co-req MTHS 4340
Renewable Energy and Electric Vehicles	* ECE 4190	Spring	ECE 3210, 3600, 3800, co-req MTHS 4340
	ECE 4200	Spring	ECE 3070 or ECE 3200
	ECE 4570	Summer	ECE 3070 or ECE 3200
	ECE 4610	Fall	ECE 3200
	ECE 4700	Spring	ECE 3200
	ECE 4710	Spring	ECE 3200

Other courses: ECE 4050[1], ECE 4600[1], ECE 4910 (HON) [1], ECE 4920[1], ECE 4930[1], ECE 4990[1], ECE 4990 (HON) [1]

[1] A maximum of 3 credits from this category may be used to satisfy the technical elective requirement.

000120

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

Change Major Name: Computer Engineering (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: The technical depth requirement is being removed from the Computer Engineering BS curriculum. Students will still take a total of 12 credits of technical electives, but will no longer be required to select at least two technical electives from the same subject area. ECE faculty believe that the Computer Engineering program has sufficient depth in several areas without the constraint of the technical elective depth requirement. Also, removing the depth requirement will provide students with more flexibility in exploring subject areas and will also reduce problems that arise from scheduling constraints.
Form Originator: EBRAD, Gibisch,Elizabeth Bradley **Date Form Created:** 10/9/2013
Form Last Updated by: EBRAD, Gibisch,Elizabeth Bradley **Date Form Last Updated:** 10/9/2013
Form Number: 6633

Approval

	10/9/13		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/18/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
			1/18/14
College Dean	Date	President	Date

Computer Engineering
Bachelor of Science Degree
Curriculum year 2014-2015

000121

FRESHMAN YEAR

Fall semester	Cr	Term completed	Spring semester	Cr	Term completed
ENGR 1020 Intro Engineering	2		ENGR 1410 & 1411 Problem solving	3	
CH 1010 & 1011 General Chemistry	4		Hum/Soc Sci req	3	
ENGL 1030 Accelerated Composition	3		Hum/Soc Sci req	3	
MTHS 1060 Calculus I	4		MTHS 1080 Calculus II	4	
Hum/Soc Sci req	3		PHYS 1220 Physics with Calculus I	3	
	16			16	

SOPHOMORE YEAR

Fall semester	Cr	Term completed	Spring semester	Cr	Term completed
CPSC 1110 & 1111 C/C++	3		ECE 2120 Electrical Engr Lab II	1	
ECE 2010 Logic & Computing Devices	2		ECE 2220 Systems Programming	3	
ECE 2020 Electric Circuits I	3		ECE 2620 Electric Circuits II	3	
ECE 2090 Logic Lab	1		ECE 2720 Computer Organization	3	
ECE 2110 Electrical Engineering Lab I	1		ECE 2730 Computer Org Lab	1	
MTHS 2060 Calculus III	4		MTHS 2080 Differential Equations	4	
PHYS 2210 Physics with Calculus II	3				
	17			15	

JUNIOR YEAR

Fall semester	Cr	Term completed	Spring semester	Cr	Term completed
ECE 2230 Computer Systems Engr	3		ECE 3170 Random Signal Analysis	3	
ECE 3110 Electrical Engineering Lab III	1		ECE [CPSC] 3220 Introduction to	3	
ECE 3200 Electronics I	3		Operating Systems		
ECE 3300 Signals, Sys, & Transforms	3		ECE 3270 Digital Computer Design	3	
ECE 3710 Microcontroller Interfacing	3		ECE 3520 Programming Systems	3	
ECE 3720 Microcontroller Lab	1		MTHS 4190 Discrete Mathematics	3	
MTHS 3110 Linear Algebra	3				
	17			15	

SENIOR YEAR

Fall semester	Cr	Term completed	Spring semester	Cr	Term completed
COMM 1500 &1501 or COMM 2500 & 2501	3		ECE 4960 Systems Design II	2	
			Hum/Soc Sci req	3	
ECE 4090 Cont &Discrete Sys Design	3		CpE Technical Elective	3	
ECE 4950 & 4951 Systems Design I	2		CpE Technical Elective	3	
ENGL 3140 Technical Writing	3		Special Elective [1]	3	
CpE Technical Elective	3				
CpE Technical Elective	3				
	17			14	

NOTES:

1. Special Elective Options:
   a. 3 additional credits of approved Humanities/Social Science courses; or
   b. ELE 3010 - Executive Leadership and Entrepreneurship I or ELE 4010 - Executive Leadership and Entrepreneurship II; or
   c. An additional 3-credit, 400-level course from the EE Technical Elective List or the CpE Technical Elective List; or
   d. An additional 3-credit MTHS course from the following list: MTHS 4120 (Intro. to Modern Algebra), MTHS 4340 (Advanced Engineering Math), MTHS 4350 (Complex Variables), MTHS 4400 (Linear Programming), MTHS 4410 (Intro to Stochastic Models), and MTHS 4530 (Advanced Calculus).

000122

CpE Technical Requirements

Courses that satisfy CpE technical requirements are shown below. Four courses (12 credits) must be taken. The 6xxx version of courses listed as *ECE 4xxx have been approved for the combined BS CpE/MS CpE program. Students who qualify for the combined program can use up to 9 credits of approved courses to jointly satisfy BS CpE and MS CpE requirements. The CpE Student Handbook includes a list of ECE 8xxx courses which have also been approved for the combined program.

Area	Course	Semester offered	Pre-requisites
Architecture	* ECE 4290	Fall	ECE 2720
	* ECE 4680	Spring	ECE 3710 and ECE 2230
	* ECE 4730	Fall or Spring	ECE 3220
Biomedical Systems	BIO E 3700		ECE 2020, MTHS 2080
	BIO E 4710		MTHS 2080, PHYS 2210, ECE 3200
Communication Systems & Networks	ECE 4270 [P]	Fall, Spring & Summer	ECE 3170 and ECE 3300
	* ECE 4300 [P]	Fall or Spring	ECE 3170, 3300 AND instructor permission
	* ECE 4380	Spring	Sr. standing in EE, CpE or CPSC
	* ECE 4400 [P]	Spring	ECE 2720 and ECE 3170
	* ECE 4490	Fall	Sr standing in CpE
Electric Vehicles	ECE 4700	Spring	ECE 3200
	ECE 4710	Spring	ECE 3200
Electronics	ECE 3210	Fall, Spring & Summer	ECE 3200
	ECE 4590	Check with the dept	ECE 3210, co-req MTHS 3110 or 4340
Robotics	* ECE 4550	Summer	MTHS 2060, 3110
	* ECE 4680	Spring	ECE 3710 and ECE 2230
Signal Processing	* ECE 4670	Fall & Summer	ECE 3300
	ECE 4270 [P]	Fall, Spring, & Summer	ECE 3170 and ECE 3300
Software	* ECE 4170	Spring	ECE 3220 & ECE 3520 &MTHS 4190
	* ECE 4420	Fall	ECE 3220 and ECE 3520
	* ECE 4490	Fall	Sr standing in CpE
	* ECE 4730	Fall or Spring	ECE 3220

	P
Course #1 _____	[ ]
Course #2 _____	[ ]
Course #3 _____	[ ]
Course #4 _____	[ ]

[P] Course satisfies probability and statistics requirement (one is required).

Note: No more than 2 courses collectively from the Biomedical Systems, Electric Vehicles and Electronics areas can be used to satisfy the Technical Elective requirements (12 credits) for Computer Engineering

Other courses: ECE 4050, ECE 4600, ECE 4910 (HON), ECE 4920, ECE 4930, ECE 4990, ECE 4990 (HON) –A maximum of 3 credits from this category may be used to satisfy the technical elective requirement.

000125

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

Change Major Name: Environmental Engineering
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 major change is a change from the old Water & Wastewater Engineering sequence, EES 4020 (2 h) and EES 4030 (1 h) , to a new set of courses: EES 3030 (2 h), EES 3040 (2 h), and EES 3050 (1 h). To accommodate the increase of one hour, the organic chemistry laboratory, CH 2011, will be deleted. In addition, the MICR 3050 will become a required class instead of selective elective, and the one hour of engineering/science courses will be deleted to allow these electives to be usually be completed with three courses of three hours each.
Form Originator: TJVRC, Thomas Overcamp **Date Form Created:** 9/25/2013
Form Last Updated by: TJVRC, Thomas Overcamp **Date Form Last Updated:** 9/25/2013
Form Number: 6481

Approval

Thomas J. Overcamp	4 Oct 2013		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/4/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
			1/18/14
College Dean	Date	President	Date

BS Environmental Engineering
2014-2015 Curriculum

000126

FRESHMAN YEAR			
____ CH 1010 General Chemistry	4	____ ENGR 1410 Programming and Problem Solving	3
____ ENGR 1020 Engineering Disciplines and Skills	2	____ CH 1020 General Chemistry	4
____ ENGL 1030 Accelerated Composition I	3	____ HIST 1240 Environmental History Survey[2]	3
____ MTHS 1060 Calculus of One Variable	4	____ MTHS 1080 Calculus of One Variable II	4
____ Arts and Humanties Requirement[1] *or*		____ PHYS 1220 Physics with Calculus I	3
Social Sciences Requirement[1]	3		
	16		17
SOPHOMORE YEAR			
____ BIOL 1030 General Biology[3]	3	____ CE 2080 Dynamics	2
____ BIOL 1050 General Biology Lab	1	____ CH 2010 Organic Chemistry[4]	3
____ CE 2010 Statics	3	____ EES 2020 Environmental Engineering Fnd II	4
____ EES 2010 Environmental Engineering Fund. I	3	____ ENGR 2100 Engineering Graphics[5]	2
____ MTHS 2060 Calculus of Several Variables	4	____ MTHS 2080 Introduction to Ordinary Diff. Equations	4
____ PHYS 2210 Physics II	3		
	17		15
JUNIOR YEAR			
____ EES 3030 Water Treatment	2	____ EES 4840 Municipal Solid Waste Mgt	3
____ EES 3040 Wastewater Treatment	2	____ EES 4850 Hazardous Waste Management	3
____ EES 3050 Water and Wastewater Trmt Lab	1	____ CE 3410 Intro to Fluid Mechanics	4
____ MICR 3050 General Microbiology	4	____ GEOL 1010 Physical Geology[6]	3
____ MTHS 3020 Statistics for Science and Engineering	3	____ GEOL 1030 Physical Geology Lab[6]	1
____ Arts and Humanties Requirement[1] *or*		____ ME 3100 Thermodynamics and Heat Transfer	3
Social Sciences Requirement[1]	3		
	15		17
SENIOR YEAR			
____ EES 4300 Air Pollution Engineering	3	____ EES 4750 Env Engr Capstone Design	3
____ EES 4500 Professional Seminar	1	____ Engineering or Science Requirement[8]	6
____ EES 4800 Environmental Risk Assessment	3	____ Arts and Humanties Requirement[1] *or*	
____ EES 4860 Pollution Prevention	3	Social Sciences Requirement[1]	6
____ Engineering Economics Requirement[7]	2		
____ Engineering or Science Requirement[8]	3		
	15		15

127 Total Semester Hours

[1]See Policy on Humanities and Social Sciences for Engineering Curricula. Three of these credit hours must also satisfy the Cross-Cultural Awareness General Education requirement.

[2]HIST 1240 satisfies three credits of the social science requirement and the Science and Technology in Society General Education requirement.

[3]May substitute BIOL 1100 for BIOL 1030 and BIOL 1050. BIOL 110 is five hours.

[4]May substitute CH 2230.

[5]May substitute ENGR 2080

[6]May substitute CSEN 2020 for GEOL 1010 and GEOL 1030

[7]Select CE 3520 or IE 3840

[8]Select any combination of engineering and/or science courses from a department approved list.

Notes

[1]Following courses must be completed with a C or better: MTHS 2060, MTHS 2080, CE 2010, CE 2080, CE 3410, PHYS 2210

BS Environmental Engineering
2014-2015 Curriculum

Changes to the Curriculum Map

Change	Reason
ENGR 1410 (footnote)	ENGR 1300 is no longer offered at Clemson and is deleted as an option from the curriculum. The option of substitution CH 1300 was deleted to require all students to have a Matlab course to have a common set of engineering tools and programming skills. This starts addressing a concern of the exit survey from May 2013 graduates that we need greater use of engineering software.
ENGR 2100 (footnote)	ENGR 2080 remains an option. ENGR 2090 is no longer acceptable. No one has used in first years of the degree program. It could be substituted if the content of the transfer course was appropriate.
CH 2010	CH 2010 no longer has an integral laboratory that is a corequisite. This reduction in hours in the curriculum balances the increase of one hour due to EES 3030, EES 3040, and EES 3050.
EES 3030, EES 3040, EES 3050	Clemson's graduate program has been known for its water and wastewater program since its inception. We want also be known in this area with our BS program. To improve the FE exam scores in water and wastewater, we are dividing EES 3020 (3 h) into EES 3020 (2h, drinking water) and EES 3030 (2h, wastewater) to allow greater coverage. The companion laboratory in water and wastewater will be renumbered as EES 3050. This will start in the Fall, 2014. EES 4020 will continue to be taught to non-majors in the Spring Semester starting with Spring 2014.
MICR 3050 (footnote)	This course no longer has BIOL 2110 as an option. The prerequisites for BIOL 2110 were changed in 2013 to require an additional semester of biology that is not part of this curriculum.
MTHS 3020	With the realignment of the statistics courses, we are taking the recommendation of the Department of Mathematical Sciences for the probability and statistics course required by this engineering major.
GEOL 1010 and GEOL 1030	To simplify the appearance of the curriculum and the advising process, the course taken by the vast majority of our students was put as the primary course. CSEN 2020 and its laboratory CSEN 2011 can be substituted.
The engineering economics requirement	The engineering economics requirement was moved to the fall semester senior year to balance credits in previous semesters.
Engineering/science electives	The number was reduced from ten to nine hours to lower the number of credit hours for the degree.

Other Changes (footnote to curriculum map)

Following courses must be completed with a grade of C or better: MTHS 2060, MTHS 2080, CE 2010, CE 2080, CE 3410, PHYS 2210	To ensure that students are prepared for higher-level courses in engineering, a minimum grade of C or better is required in these courses. These courses are usually taught each semester and in summer school at Clemson. Most can be transferred from technical colleges and other universities.

For information only

Departmental approved elective list for BS in Environmental Engineering

All curriculum years

Engineering Options

Course	Title	Credits
BE 3200	Principles and Practices of Geomatics	3
BE 3220	Small Watershed Hydrology & Sedimentology	3
BE 4150	Instrumentation and Controls	4
BE 4220	Hydrologic Modeling Small Watersheds	3
BE 4240	Ecological Engineering	3
BE 4400	Renewable Energy Resource Engineering	3
BE 4640	Non-Point Source Management in Engineered Ecosystems.	3
CE 2060	Structural Mechanics	4
CE 2550	Geomatics	3
CE 3210	Geotechnical Engineering	4
CE 3310	Construction Engineering and Management	3
CE 3420	Applied Hydraulics and Hydrology	3
CE 4430	Water Resources Engineering	3
CE 4470	Stormwater Management	3
CE 4820	Groundwater and Contaminant Transport	3
ECE 3070	Basic Electrical Engineering	2
ECE 3090	Electrical Engineering Laboratory	1
EES 4100	Environmental Radiation Protection I	3
EES 4110	Ionizing Radiation	3
EES 4370	Biodegradation and Bioremediation	3
	Approved creative inquiry experience classes (limited to 2 hours)	2
EES 8020†	Environmental Engineering Principles	3

Science Options

Course	Title	Credits
BCHM 3050	Essentials of Biochemistry	3
BCHM 3060	Essentials of Biochemistry Lab	1
BIOL 2110	Introduction to Toxicology	3
BIOL 4100	Limnology	3
BIOL 4430	Freshwater Ecology	3
BIOL 4440	Freshwater Ecology Laboratory	2
CH 3300	Introduction to Physical Chemistry	3
CH 3310	Physical Chemistry I	3
CH 4130	Chemistry of Aqueous Systems	3
CSEN 2020	Soils	4
CSEN 4850	Soil Chemistry	3
ENSP 4000	Studies in Environmental Science	3
ETOX 4000	Wildlife Toxicology	3
ETOX 4210	Chemical Sources and Fate in Env Systems	4
ETOX 4300	Toxicology	3
GEOL 2700	Experiences in Sustainable Development: Water¶	3

GEOL 3000	Environmental Geology[¶]	3
GEOL 3180	Introduction to Geochemistry	3
GEOL 4210	GIS Applications in Geology	3
GEOL 4820	Geohydrology	3
MTHS 3110	Linear Algebra	3
MTHS 3650	Numerical Methods for Engineers	3
MTHS 4340	Advanced Engineering Mathematics	3
MICR 4100	Soil Microbiology	3
PHYS 2400	Physics of Weather	3
PHYS 2450	Physics of Global Climate Change[¶]	3
PHYS 4200	Atmospheric Physics	3
EES 8430	Environmental Chemistry	3
EES 8510	Biological Principles Environmental Engineering	3

[†]For students eligible to take graduate credit in a BS/MS program or for undergraduate credit.
[‡]Students may CSEN 2020 as a technical elective if it was not substituted for GEOL 1010 and GEOL 1030.
[¶]Students can apply no more than three hours of STS classes to the Engineering and Science electives. The current STS classes on the list are GEOL 2700, GEOL 3000, and PHYS 2450.

Students must meet the prerequisites of any course. Alternative elective classes may be taken with the written permission of their advisor.

000130

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

X **Change a Course - Abbrev & Number: EE&S- 486**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: EE&S- -686
.. **Add Graduate course:** --
Course Title: POLLUTION PREVENTION

Brief Statement of Change:
Change name of EES4860/6860 from Pollution Prevention and Industrial Ecology to Environmental Sustainability. This new class will have a broader aspect related to sustainability and still contain the pollution prevention and industrial ecology component.

Last Term taught: 1108 Effective Term: 01/2014		.. **Change Abbrev to:** .. **Change Number to:**
X **Change Catalog Title:** from: Pollution Prevention and Industrial Ecology to: Environmental Sustainability		.. **Change Transcript Title:** from: POLLUTION PREVENTION to:
.. **Change of Credit**	From: Fixed Credit: 3 (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:
X A-Lecture Only	..	.. Pass/Fail Only	..	.. English Composition	..
.. B-Lab (w/fee)	..	X Graded	..	.. Oral Communication	..
.. D-Seminar	..	.. Variable Title	..	.. Mathematics	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Natural Science w/Lab	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Math or Science	..
.. G-Studio	..	maximum credits		.. A&H (Literature)	..
.. H-Field course	..	from:		.. A&H (Non-Literature)	..
.. I-Study Abroad	..	to:		.. Social Science	..
.. L-Lab (no/fee)	..			.. CCA	..
.. N/B-Lecture/Lab(w/fee)	..			.. STS	..
.. N/L-Lecture/Lab(no fee)	..				

X **Change Catalog Description:**
from: Topics include pollution prevention technology, the role of pollution prevention within a corporation, source reduction and recycling assessments, treatment to reduce disposal, life-cycle assessment, design for environment, and industrial ecology. Emphasizes case studies.
to: Topics include sustainable engineering and industrial ecology with emphasis on pollution prevention methods using source reduction, recycling assessments, treatment to reduce disposal, life-cycle assessment and design for the environment. Emphasizes case studies.

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

Learning Objectives: 1- Understand and apply proactive environmental management methods such as pollution prevention, industrial ecology, and design for the environment – concepts which dismiss end-of-pipe treatment as the primary option for industrial wastes.
2- Perform a LCA of an everyday product using LCA software and database and identify opportunities to reduce its environment impact

Topical Outline: Topics by week:
1-Sustainability and Industrial Ecology
2- Ecological analogies and models
3- Industrial symbiosis and circular economy
4- Material Flows
5- Intro to Life Cycle Assessment
6- Energy and Water
7- Resource use and scarcity
8- Pollution Prevention
9- Disassembly Lab – Design for X
10- Green chemistry and green engineering
11- Introduction to GABI and other LCA softwares
12- Social dimension of IE and Sustainable consumption
13- Systems Analysis and IE models
14- Final Presentations

15- Final Exam

Evaluation: Three exams will be given: two during the semester and a final. The final will be held during finals week, according to the University schedule. Each exam will have equal value and final exam will not be cumulative. Students enrolled in 6860 will have more advanced exams than those in 4860 and additional questions in homework.

Assessment Criteria
1. Homework 20%
2. Project 20%
3. Midterm (2) 40%
4. Final 20%

Grading Scale 4860:
A: 90-100
B: 80-90
C: 70-80
D:60-70
F:< 60

Grading Scale 6860:
A: 90-100
B: 80-90
C: 70-80
F:~~D~~<60 F < 70

Form Originator: AANCTIL, Annick Anctil **Date Form Created:** 9/2/2013
Form Last Updated by: , **Date Form Last Updated:** 10/6/2013
Form Number: 6394

Approval

[signature]	8 Oct 2013	[signature]	11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
[signature]	10/9/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
[signature]	10/11/13		
Chair, College Curriculum Committee	Date	Provost	Date
[signature]	10/21/13	[signature]	1/18/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

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

000132

Add Major Name: Mechanical Engineering
Degree: BS
Effective Catalog Year: 2014
Explanation: Moved a current 2000 level course to the Junior year (and made that course a 3000 level course) Moved a current 3000 level course to the sophomore year (and made that course a 2000 level course)
Form Originator: JANEEN, Putman,Janeen Marie **Date Form Created:** 10/9/2013
Form Last Updated by: JANEEN, Putman,Janeen Marie **Date Form Last Updated:** 10/9/2013
Form Number: 6636

Approval

	10/10/13		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/9/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/21/13		1/18/14
College Dean	Date	President	Date

DEPARTMENT OF MECHANICAL ENGINEERING
BACHELOR OF SCIENCE DEGREE IN MECHANICAL ENGINEERING
(2013 Curriculum)

000133

New Proposed

FRESHMAN YEAR

First Semester	Crs	Second Semester	Crs
CES 1020 Engineering Disciplines & Skills	2	ENGR 2080 Engr. Graphics with Computer Applications	2
CH 1010 General Chemistry	4	ENGR 1410 Programming & Prob Solving in ME	3
ENGL 1030 Accelerated Composition	3	MTHS 1080 Calculus of One Variable II	4
MTHS 1060 Calculus of One Variable I	4	PHYS 1220 Physics with Calculus I	3
Arts/Hum/SS Requirement[1] (NLH)	3	PHYS 1240 Physics Laboratory I	1
		Arts/Hum/SS Requirement[1] (Lit)	3
	16		16

SOPHOMORE YEAR

First Semester	Crs	Second Semester	Crs
ME 2000 Sophomore Seminar	1	ME 2040 (formerly 3020) Mechanics of Materials	3
ME 2010 Statics & Dynamics for Mech. Engr	5	ME 2030 Foundations of Therm & Fluid Sys	3
MTHS 2060 Calculus of Several Variables	4	MTHS 2080 Intro to Ord Differential Eqns.	4
PHYS 2210 Physics with Calculus II	3	ECE 3070 Basic Electrical Engineering	2
		ECE 3090 Electrical Engineering Lab. I	1
Option:[2]		Option:[2]	
MSE 2100 Introduction to Materials Science or ME 2220 Mechanical Engineering Lab	3 or 2	ME 2220 Mechanical Engineering Lab 1 or MSE 2100 Introduction to Materials Science	2 or 3
	16/15		15/16

JUNIOR YEAR

First Semester	Crs	Second Semester	Crs
ME 3070 (formerly ME 2020) Foundations of Mechanics	3	ME 3040 Heat Transfer	3
ME 3080 Fluid Mechanics	3	ME 3050 Model. and Analysis of Dynamic Systems	3
ME 3030 Thermodynamics	3	ME 3060 Fundamentals of Machine Design	3
MTHS 3650 Intro to Numerical Analysis	3	ME 3120 Mfg Processes and Their Application	3
ENGL 3140 Technical Writing	3		
Option:[2]		Option:[2]	
ME 3330 Mechanical Engineering Lab. II or Statistics Requirement[3]	2 or 3	Statistics Requirement[3] or ME 3330 Mechanical Engineering Lab. II	3 or 2
	17/18		15/14

SENIOR YEAR

First Semester	Crs	Second Semester	Crs
ME 4010 Mechanical Engineering Design	3	ME 4000 Senior Seminar	1
ME Technical Requirement 1[4]	3	ME 4020 Internship in Engineering Design	3
Arts/Hum/SS Requirement[1] (SS)	3	ME Technical Requirement 2[4]	3
ME 4030 Control & Integr Multidomain Dyn Sys.	3	Arts/Hum/SS Requirement[1] (x2) (SS, Engr 5th)	6
Option:[2]		Option:[2]	
ME 4440 Mechanical Engineering Lab. III or Technical Requirement 3[4]	2 or 3	Technical Requirement 3[4] ME 4440 Mechanical Engineering Lab. III or	3 or 2
	14/15		16/15

TOTAL CURRICULUM HOURS **125**

[1] See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements. These requirements can be filled in any order

[2] Both courses must be taken but they can be taken in either semester

[3] Select from MTHS 3020 or EXST 4110

[4] See Advisor. Select from Department-approved list.

Enrollment Policy (See Web Site for Complete Statement of Departmental Policy): A student is allowed to enroll in any ME course only when all prerequisites, as defined by the current official listings for that courses, have been passed with a grade of C or higher.

No student may exceed three attempts to complete successfully ME 2010, ME 2020 or ME 2030. Registration for a third attempt to complete one of these courses requires the approval of the Undergraduate Coordinator in the Department of Mechanical Engineering. A grade of W counts as an unsuccessful attempt at completing a course.

For students repeating an ME course, registration preference will be given to students in a degree-granting engineering major whose curriculum requires the course in question.

To change majors into the Mechanical Engineering degree program, students must have a minimum cumulative grade-point ratio of 2.60 or higher at Clemson and earned a C or better in each course in the General Engineering freshman curriculum, EXCLUDING the Arts and Humanities/Social Science requirements

DEPARTMENT OF MECHANICAL ENGINEERING

BACHELOR OF SCIENCE DEGREE IN MECHANICAL ENGINEERING

(2013 Curriculum) 900134

Freshman current

FRESHMAN YEAR

First Semester	Crs	Second Semester	Crs
CES 1020 Engineering Disciplines & Skills	2	ENGR 2080 Engr. Graphics with Computer Applications	2
CH 1010 General Chemistry	4	ENGR 1410 Programming & Prob Solving in ME	3
ENGL 1030 Accelerated Composition	3	MTHS 1080 Calculus of One Variable II	4
MTHS 1060 Calculus of One Variable I	4	PHYS 1220 Physics with Calculus I	3
Arts/Hum/SS Requirement[1] (NLH)	3	PHYS 1240 Physics Laboratory I	1
		Arts/Hum/SS Requirement[1] (Lit)	3
	16		16

SOPHOMORE YEAR

First Semester	Crs	Second Semester	Crs
ME 2000 Sophomore Seminar	1	ME 2020 Foundations of Mechanical Systems	3
ME 2010 Statics & Dynamics for Mech. Engr	5	ME 2030 Foundations of Therm & Fluid Sys	3
MTHS 2060 Calculus of Several Variables	4	MTHS 2080 Intro to Ord Differential Eqns.	4
PHYS 2210 Physics with Calculus II	3	ECE 3070 Basic Electrical Engineering	2
		ECE 3090 Electrical Engineering Lab. I	1
Option:[2]		Option:[2]	
MSE 2100 Introduction to Materials Science or	3 or 2	ME 2220 Mechanical Engineering Lab 1 or	2 or 3
ME 2220 Mechanical Engineering Lab		MSE 2100 Introduction to Materials Science	
	16/15		15/16

JUNIOR YEAR

First Semester	Crs	Second Semester	Crs
ME 3020 Mechanics of Materials	3	ME 3040 Heat Transfer	3
ME 3080 Fluid Mechanics	3	ME 3050 Model. and Analysis of Dynamic Systems	3
ME 3030 Thermodynamics	3	ME 3060 Fundamentals of Machine Design	3
MTHS 3650 Intro to Numerical Analysis	3	ME 3120 Mfg Processes and Their Application	3
ENGL 3140 Technical Writing	3		
Option:[2]		Option:[2]	
ME 3330 Mechanical Engineering Lab. II or	2 or 3	Statistics Requirement[3] or	3 or 2
Statistics Requirement[3]		ME 3330 Mechanical Engineering Lab. II	
	17/18		15/14

SENIOR YEAR

First Semester	Crs	Second Semester	Crs
ME 4010 Mechanical Engineering Design	3	ME 4000 Senior Seminar	1
ME Technical Requirement 1[4]	3	ME 4020 Internship in Engineering Design	3
Arts/Hum/SS Requirement[1] (SS)	3	ME Technical Requirement 2[4]	3
ME 4030 Control & Integr Multidomain Dyn Sys.	3	Arts/Hum/SS Requirement[1] (x2) (SS, Engr 5th)	6
Option:[2]		Option:[2]	
ME 4440 Mechanical Engineering Lab. III or	2 or 3	Technical Requirement 3[4]	3 or 2
Technical Requirement 3[4]		ME 4440 Mechanical Engineering Lab. III or	
	14/15		16/15

TOTAL CURRICULUM HOURS **125**

[1] See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements. These requirements can be filled in any order

[2] Both courses must be taken but they can be taken in either semester

[3] Select from MTHS 3020 or EXST 4110

[4] See Advisor. Select from Department-approved list.

Enrollment Policy (See Web Site for Complete Statement of Departmental Policy): A student is allowed to enroll in any ME course only when all prerequisites, as defined by the current official listings for that courses, have been passed with a grade of C or higher.

No student may exceed three attempts to complete successfully ME 2010, ME 2020 or ME 2030. Registration for a third attempt to complete one of these courses requires the approval of the Undergraduate Coordinator in the Department of Mechanical Engineering. A grade of W counts as an unsuccessful attempt at completing a course.

For students repeating an ME course, registration preference will be given to students in a degree-granting engineering major whose curriculum requires the course in question.

To change majors into the Mechanical Engineering degree program, students must have a minimum cumulative grade-point ratio of 2.60 or higher at Clemson and earned a C or better in each course in the General Engineering freshman curriculum, EXCLUDING the Arts and Humanities/Social Science requirements

000135

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

X **Change a Course - Abbrev & Number: ME- 202**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Founda Mech Syst

Brief Statement of Change:
Changing the current course curriculum map location to strengthen the ties between topics in courses and remove unnecessary overlap.

Last Term taught: 201306	X **Change Abbrev to:** ME
Effective Term: 01/2014	X **Change Number to:** 307

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

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

X **Change Prerequisite(s):**
from: Preq: ME 2010, with a C or better. Preq or concurrent enrollment: ME 2220, with a C or better.
to: Preq: ME 2010, and ME 2040 (formerly ME 3020) each with a C or better. Preq or concurrent enrollment: ME 2220 , with a C or better.

Learning Objectives: 1.Students will develop an understanding of basic element of mechanical systems, underlying principles and apply them to design problems.
2.Students will analyze the behavior of basic mechanical elements used to generate and convey motion by mechanical means, in particular gears and gear trains, cams, linkages, clutches and brakes, and classical mechanisms.
3.Students will employ these basic mechanical elements in the design of simple mechanical systems.
4.Students will demonstrate sound, rational approaches to the solution of engineering problems.
5.Students will demonstrate an ability to use techniques, skills, and modern engineering tools needed for engineering practice.

6.When presented with design problems, students will be able to apply knowledge of mechanical systems and reverse engineering techniques
7.Students will write technical reports and communicate how mechanical systems function, how they are made, and design improvements through technical reports

Topical Outline: Design and the process of design, product decomposition, problem solving strategies 6
Introduction and definition of machine elements 4
Mechanisms, elements of mechanical systems as well as analysis of machines including linkages, cams, gears, transmissions, belts, and chains 14
Application of mechanical components to engineering objectives. 8
Integrated mechanical design problems 10
Tests 3
Total 45

000136

Evaluation: Homework and Projects = 5%
Design Projects = 15%
Tests = 65%
Final Exam = 15%

Form Originator: JANEEN, Putman,Janeen Marie **Date Form Created:** 10/9/2013
Form Last Updated by: JANEEN, Putman,Janeen Marie **Date Form Last Updated:** 10/9/2013
Form Number: 6635

Approval

	10/10/13	11-01-201
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Comm
	10/18/13	
Department Chair	Date	Chair, Graduate Curriculum Committee
	10/9/13	
Chair, College Curriculum Committee	Date	Provost
	10/21/13	1/18/14
College Dean	Date	President
Director, Calhoun Honors College	Date	

000137

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

X **Change a Course - Abbrev & Number: ME- 302**
Corresponding Lab Course: --
Corresponding Honors course: ME--302
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: Mech of Materials

Brief Statement of Change:
Changing the current course curriculum map location to strengthen the ties between topics in courses and remove unnecessary overlap.

Last Term taught: 201305	X **Change Abbrev to:** ME	
Effective Term: 01/2014	X **Change Number to:** 204	
.. **Change Catalog Title:**	.. **Change Transcript Title:**	
from:	from: Mech of Materials	
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:		from:		from:	to:
to:		to:		.. Creative Inquiry	..
X A-Lecture Only	..	.. Pass/Fail Only	..	.. English Composition	..
.. B-Lab (w/fee)	..	X Graded	..	.. Oral Communication	..
.. D-Seminar	..	.. Variable Title	..	.. Mathematics	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Natural Science w/Lab	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Math or Science	..
.. H-Field course	..	from:		.. A&H (Literature)	..
.. I-Study Abroad	..	to:		.. A&H (Non-Literature)	..
.. L-Lab (no/fee)	..			.. Social Science	..
.. N/B-Lecture/Lab(w/fee)	..			.. CCA	..
.. N/L-Lecture/Lab(no fee)	..			.. STS	..

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

X **Change Prerequisite(s):**
from: Preq: ME 2010 and MSE 2100 and MTHS 2060, each with a C or better. Preq or concurrent enrollment: MTHS 2080, with a C or better.
to: Preq: ME 2010 and MTHS 2060, each with a C or better. Preq or concurrent enrollment:ME 2220, and MSE 2100 and MTHS 2080, each with a C or better.

Learning Objectives: 1.Students will be able to choose analysis methods that are appropriate to given situations, such as analysis of open vs. closed thin-walled section in torsion, statically indeterminate vs. statically determinate analysis, etc.
2.Students will be able to determine the stresses and deformations in members that have various cross-sectional shapes and are subject to given loads.
3.Students will be able to analyze statically determinate and statically indeterminate members and assemblies of members.
4.Students will be able to properly combine stresses due to multiple types of simultaneous loads.

5.Students will recognize the role of analysis in the design of structures and machines by using analysis methods to perform sizing of simple members.

Topical Outline: Topics Hours
Introduction 1
Concepts of stress and strain, material behavior, design concepts 4
Stresses and deformation of axially loaded members and assemblies 3
Stresses and deformation of bars under torsion 4
Shear and moment equations and diagrams 3
Bending stresses in beams 2
Shearing stresses in beams 4
Combined stresses - axial, shear, torsion, and bending 4
Stress transformation, principal stresses, intro to failure theories 4
Deflection of beams and indeterminate beams 5
Review and expanded coverage of selected topics 8
Tests 3
Total 45

000138

Evaluation: Homework = 10%
Tests = 60%
Final Exam = 30%

Add course requirements for honors and/or 600-level courses (if applicable): HONORS
Evaulation:
Homework 5%
In-class quizzes 10%
Tests 50%
Final exam 35%

Form Originator: JANEEN, Putman,Janeen Marie **Date Form Created:** 10/9/2013
Form Last Updated by: JANEEN, Putman,Janeen Marie **Date Form Last Updated:** 10/9/2013
Form Number: 6632

Approval

Chair, Department Curriculum Committee	Date 10/10/13	Chair, Undergraduate Curriculum Comm 11-01-2013
Department Chair	Date 10/18/13	Chair, Graduate Curriculum Committee
Chair, College Curriculum Committee	Date 10/9/13	Provost
College Dean	Date 10/21/13	President 1/18/14
Director, Calhoun Honors College	Date	

000139

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

X **Change a Course - Abbrev & Number: M E- 306**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: FUND MACHINE DESIGN

Brief Statement of Change:
There is a lack of connection between some of our courses and an adjustment in ME 3060 topics to inprove continuity and create the connection between the series of courses thereby making all courses stronger together.

Last Term taught: 1306	.. **Change Abbrev to:**
Effective Term: 01/2014	.. **Change Number to:**
.. **Change Catalog Title:**	.. **Change Transcript Title:**
from:	from: FUND MACHINE DESIGN
to:	to:

.. **Change of Credit**	From: Fixed Credit: 3 (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:		from:		from:	to:
to:		to:		.. Creative Inquiry	..
X A-Lecture Only	..	.. Pass/Fail Only	..	.. English Composition	..
.. B-Lab (w/fee)	..	X Graded	..	.. Oral Communication	..
.. D-Seminar	..	.. Variable Title	..	.. Mathematics	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Natural Science w/Lab	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Natural Science w/Lab	..
.. G-Studio	..	maximum credits		.. Math or Science	..
.. H-Field course	..	from:		.. A&H (Literature)	..
.. I-Study Abroad	..	to:		.. A&H (Non-Literature)	..
.. L-Lab (no/fee)	..			.. Social Science	..
.. N/B-Lecture/Lab(w/fee)	..			.. CCA	..
.. N/L-Lecture/Lab(no fee)	..			.. STS	..

X **Change Catalog Description:**
from: Introduction to failure theory, fatigue analysis, andenergy methods for deflection analysis. Integrationof these topics with selected portions of mechanicsof materials and application of them to the designand analysis of machine elements. Preq: ME 2020and ME 3020, each with a C or better.
to: Introduction to failure theory and fatigue analysis. Integration of these topics with selected portions of mechanics of materials and application of them to the design and analysis of machine elements. Preq: ME 3070 (formerly ME 2020) and ME 2040 (formerly ME 3020), each with a C or better.

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

Learning Objectives: 1. Students will be able to identify and quantify the principal stresses at any point in a member when uniaxial, torsional, bending, shear, and pressure loads occur.
2. Students will be able to design components against failure when subjected to static loads. Thus they will be able to relate the design parameters of: (a) loads, (b) dimensions of parts, (c) material properties, and (d) factors-of-safety.

3. Students will be able to design parts made of ductile ferrous materials to withstand fatigue loading.
4. Students will understand how designers, vendors, manufacturers, and users are interconnected and may be responsible for the failure of a product.

Topical Outline: Introduction, Design Practices. (1)

000140

Review of Engineering Materials. (1)
Review of Stress Analysis and Principal Stresses -- Two and Three Dimensions. (1)
Design of thick and thin walled cylinders, press and shrink fits, curved beams, thermal stresses. (4)
Column design. (2)
Design for static loading of brittle and ductile materials. (5)
Stress concentration effects. (2)
Fracture mechanics. (2)
Introduction to fatigue, S-N diagrams, Fatigue strength, endurance limit, and fatigue stresses. (4)
Torsional fatigue, fatigue strength under combined stresses, cumulative fatigue. (2)
Design of components for dynamic and fatigue loading. (6)
Application of Threaded Fasteners. (3)
Welded Connections. (2)
Design of components for wear, and design of rotational components, bearings. (4)
Quizzes. (3)
Review. (3)
Total (45)

Evaluation: Evaluation Methods:
Homework and Projects = 15%
Design Projects = 15%
Tests = 50%
Final Exam = 20%

Form Originator: JANEEN, Janeen Putman **Date Form Created:** 9/27/2013
Form Last Updated by: , **Date Form Last Updated:** 9/27/2013
Form Number: 6498

Approval

		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Comn
	10/9/13	
Department Chair	Date	Chair, Graduate Curriculum Committee
	10-9-13	
Chair, College Curriculum Committee	Date	Provost
	10/18/13	1/18/14
College Dean	Date	President
	10/21/13	
Director, Calhoun Honors College	Date	

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

Change Major Name: Computer Information Systems
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: 1. We are changing the Probability and Statistics requirement to match the new MTHS/EXST (MATH/STAT) course structures that will be implemented next year. Most of our students currently take MTHS 3010 or 3090, since 3020 requires a semester of calculus beyond the two-semester calculus sequence we require. MTHS 3010 is being deleted, so we expect most students will take MTHS 3090. The new footnote 4 identifies two optional sequences but clearly indicates that each option requires a two-semester sequence for normal CIS and CS students rather than a single equivalent course.
2. For the nine credits of Computer Science Requirement we are changing the limit on no more than three credits of CPSC 3990 or 4810 and no more than six credits of 4820 to allow credits for the newly-proposed CPSC 3990 and 4820. Footnote 6 has been revised.
3. Enrolled Student Services (ESS) suggested that we change our curriculum to allow students to be eligible for graduation with un-retaken CPSC courses with grades lower than C, if these courses were not being used for requirements of the major. ESS interprets the current wording as not allowing a CPSC course with a D to count toward general electives. Note 1 has been revised.
Form Originator: , Date Form Created: 10/8/2013
Form Last Updated by: , Date Form Last Updated: 10/8/2013
Form Number: 6575

Approval

	10/9/13		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/9/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/21/13		1/18/14
College Dean	Date	President	Date

B.S. in Computer Information Systems Curriculum
2014-2015 Academic Year

Computer Information Systems
Bachelor of Science

Freshman Year
First Semester
4 – CPSC 1010 Computer Science I
3 – ENGL 1030 Accelerated Composition
3 – MTHS 1020 Introduction to Mathematical Analysis *or*
4 - MTHS 1060 Calculus of One Variable I[1]
4 – Natural Science Requirement[2]
0-1 – Elective[1]

15

Second Semester
4 – CPSC 1020 Computer Science II
3 – MTHS 2070 Multivariable Calculus *or*
4 - MTHS 1080 Calculus of One Variable II[1]
3 – Arts and Humanities (Non-lit.) Requirement[2]
3 – Natural Science Requirement[2]
3 – Social Science Requirement[3]
0-1 – Elective[1]

17

Sophomore Year
First Semester
3 – CPSC 2070 Discrete Structures for Computing
4 – CPSC 2120 Algorithms and Data Structures
3 – Arts and Humanities (Literature) Requirement[3]
3 – Oral Communications Requirement[9]
3 – Social Science Requirement[3]

16

Second Semester
3 – CPSC 2150 Software Development Foundations
4 – CPSC 2310 Intro. to Computer Organization
1 – CPSC 2910 Seminar in Professional Issues I
3 – MGT 2010 Principles of Management
3 – MTHS 3090 Introductory Business Statistics[4]

14

Junior Year
First Semester
3 – ACCT 2010 Financial Accounting Concepts
3 – CPSC 2200 Microcomputer Applications
3 – CPSC 3220 Intro. to Operating Systems
3 – CPSC 3720 Intro. to Software Engineering
3 – Writing Requirement[5]

15

Second Semester
3 – ACCT 2020 Managerial Accounting Concepts
3 – CPSC 3600 Networks and Network Programming
3 – CPSC 3710 System Analysis *or*
3 – MGT 4520 Systems Analysis and Design
3 – ECON 2110 Principles of Microeconomics
3 – Computer Science Requirement[6]

15

Senior Year
First Semester
3 – CPSC 4200 Computer Security Principles *or*
3 – CPSC 4240 System Admin. and Security
3 – CPSC 4620 Database Management Systems
3 – CPSC 4910 Seminar in Professional Issues II
3 – Business Requirement[7]
3 – Computer Science Requirement[6]

15

Second Semester
3 – MGT 3120 Decision Models for Management
3 – MKT 3010 Principles of Marketing
3 – Business Requirement[7]
3 – Computer Science Requirement[6]
3 – Information Systems Requirement[8]

15

122 Total Semester Hours

[1]Select either the MTHS 1020/2070, 1060/2070, or 1060/1080 sequence. Students who select the 1060/1080 sequence will have satisfied the two elective credits in the freshman year.
[2]Select from courses in BIOL, BCHM, CH, GEOL, MICRO, PHYS; or ENSP 2000. At least one course must include a laboratory and satisfy the natural science general education requirement.
[3]See General Education Requirements.
[4]Or EXST 2300 and 3300, or MTHSC 2060 and 3020.
[5]One course of: ENGL 3040, 3120, 3140, 3150, 3160, 3330; AS 3090, 3100, 4090, 4100; ML 3010, 3020, 4010, 4020.
[6]Select from 3000-level or higher CPSC courses. No more than three credits of CPSC 3990 or 4810 may be used, and no more than six credits of CPSC 4820 may be used.
[7]Select from MGT 3900, 4000 and FIN 3060.
[8]Select from MGT 4520, 4540, 4550, 4560, or 4000-level CPSC course. CPSC 4810 may not be used.
[9]One course of: COMM 1500, 2500, HONS H2230; or the cluster of courses AS 3090, 3100, 4090, 4100; or ML 1010, 1020.

Notes:
1. For graduation, a candidate for the BS degree in Computer Information Systems must have earned a grade of C or better in each CPSC course applied to the non-elective requirements of the degree.
2. A grade of C or better must be earned in all prerequisite courses (including CPSC and MTHS courses) before enrolling in the next CPSC course.
3. General Education Cross-Cultural Awareness and Science and Technology in Society requirements must be satisfied.

000143

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

Change Major Name: Computer Science
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: 1. We are changing the Probability and Statistics requirement to match the new MTHS/EXST (MATH/STAT) course structures that will be implemented next year. Most of our students currently take MTHS 3010 or 3090, since 3020 requires a semester of calculus beyond the two-semester calculus sequence we require. MTHS 3010 is being deleted, so we expect most students will take MTHS 3090. The new footnote 3 identifies two optional sequences but clearly indicates that each option requires a two-semester sequence for normal CIS and CS students rather than a single equivalent course.
2. For the 12 credits of Computer Science Requirement we are changing the limit on no more than three credits of CPSC 3990 or 4810 and no more than six credits of 4820 to allow credits for the newly-proposed CPSC 3990 and 4820. Footnote 5 has been revised.
3. Enrolled Student Services (ESS) suggested that we change our curriculum to allow students to be eligible for graduation with un-retaken CPSC courses with grades lower than C, if these courses were not being used for requirements of the major. ESS interprets the current wording as not allowing a CPSC course with a D to count toward general electives. Note 1 has been revised.
Form Originator: MARK, Mark Smotherman **Date Form Created:** 10/8/2013
Form Last Updated by: MARK, Mark Smotherman **Date Form Last Updated:** 10/8/2013
Form Number: 6576

Approval

Chair, Department Curriculum Committee	Date: 10/9/13	Chair, Undergraduate Curriculum Committee	Date: 11/01/2013
Department Chair	Date: 10/9/13	Chair, Graduate Curriculum Committee	Date
Chair, College Curriculum Committee	Date: 10/10/13	Provost	Date
College Dean	Date: 10/21/13	President	Date: 1/18/14

10/8/2013

B.S. in Computer Science Curriculum
2014-2015 Academic Year

Computer Science
Bachelor of Science

Freshman Year
First Semester
4 – CPSC 1010 Computer Science I
3 – ENGL 1030 Accelerated Composition
4 – MTHS 1060 Calculus of One Variable I
4 – Natural Science Requirement[1]

15

Second Semester
4 – CPSC 1020 Computer Science II
4 – MTHS 1080 Calculus of One Variable II
3 – Arts and Humanities (Non-Lit) Requirement[2]
4 – Natural Science Requirement[1]

15

Sophomore Year
First Semester
3 – CPSC 2070 Discrete Structures for Computing
4 – CPSC 2120 Algorithms and Data Structures
3 – Arts and Humanities (Literature) Requirement[2]
3 – Natural Science Requirement[1]
3 – Oral Communications Requirement[7]

16

Second Semester
3 – CPSC 2150 Software Development Foundations
4 – CPSC 2310 Intro. to Computer Organization
1 – CPSC 2910 Seminar in Professional Issues I
3 – Natural Science Requirement[1]
3 – MTHS 3090 Introductory Business Statistics[3]
2 – Elective

16

Junior Year
First Semester
3 – CPSC 3300 Computer Systems Organization
3 – CPSC 3600 Networks and Network Programming
3 – CPSC 3720 Intro. to Software Engineering
3 – MTHS 3110 Linear Algebra
3 – Social Science Requirement[2]

15

Second Semester
3 – CPSC 3220 Intro. to Operating Systems
3 – CPSC 3500 Foundations of Computer Science
3 – CPSC 3620 Distributed and Cluster Computing
3 – Arts and Humanities Requirement[4] *or*
3 – Social Science Requirement[4]
3 – Social Science Requirement[2]

15

Senior Year
First Semester
3 – CPSC 3520 Programming Languages
6 – Computer Science Requirement[6]
3 – Writing Requirement[6]
3 – Elective

15

Second Semester
3 – CPSC 4910 Seminar in Professional Issues II
3 – Arts and Humanities Requirement[4] *or*
3 – Social Science Requirement[4]
6 – Computer Science Requirement[5]
3 – Elective

15

122 Total Semester Hours

[1]Two-semester sequence in the same physical or biological science, each including a laboratory is required. Select from BIOL 1030/1050, 1040/1060; 1100, 1110; CH 1010, 1020; GEOL 1010/1030 and 1020 or 1120/1140; PHYS 1220/1240, 2210/2230. The six remaining hours may be selected from BIOL, BCHM, CH, GEOL, MICR, PHYS; or ENSP 2000.

[2]See General Education Requirements.

[3]Or EXST 2300 and 3300, or MTHSC 2060 and 3020.

[4]Select from courses in AAH, ANTH, ART, CHIN, COMM, DANC, EAS, ECON, ENGL, FR, GEOG, GER, HIST, HUM, ITAL, JAPN, MUSC, PA, PAS, PHIL, POSC, PSYC, REL, RUSS, SOC, SPAN, THEA, WS.

[5]Select from 3000-level or higher CPSC courses. No more than three credits of CPSC 3990 or 4810 may be applied to this requirement, and no more than six credits of CPSC 4820 may be applied. Up to three credits of approved 3000-level or higher MTHS or ECE courses may be substituted.

[6]One course of: ENGL 3040, 3120, 3140, 3150, 3160, 3330; AS 3090, 3100, 4090, 4100; ML 3010, 3020, 4010, 4020.

[7]One course of: COMM 1500, 2500, HONS H2230; or the cluster of courses AS 3090, 3100, 4090, 4100; or ML 1010, 1020.

Notes:
1. For graduation, a candidate for the BS degree in Computer Science must have earned a grade of C or better in each CPSC course applied to the non-elective requirements of the degree.
2. A grade of C or better must be earned in all prerequisite courses (including CPSC and MTHS courses) before enrolling in the next CPSC course.
3. General Education Cross-Cultural Awareness and Science and Technology in Society requirements must be satisfied.

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

Change Major Name: Computer Science (BA)
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: 1. We are changing the Probability and Statistics requirement to match the new MTHS/EXST (MATH/STAT) course structures that will be implemented next year. Most of our students currently take MTHS 3010 or 3090, since 3020 requires a semester of calculus beyond the two-semester calculus sequence we require. MTHS 3010 is being deleted, so we expect most students will take MTHS 3090. The revised footnote 6 identifies two optional sequences but clearly indicates that each new option requires a two-semester sequence rather than a single equivalent course.
2. For the 18 credits of Computer Science Requirement we are changing the limit on no more than three credits of CPSC 3990 or 4810 and no more than six credits of 4820 to allow credits for the newly-proposed CPSC 3990 and 4820. Footnote 5 has been revised.
3. Enrolled Student Services (ESS) suggested that we change our curriculum to allow students to be eligible for graduation with un-retaken CPSC courses with grades lower than C, if these courses were not being used for requirements of the major. ESS interprets the current wording as not allowing a CPSC course with a D to count toward general electives. Note 1 has been revised.
Form Originator: MARK, Mark Smotherman **Date Form Created:** 10/8/2013
Form Last Updated by: MARK, Mark Smotherman **Date Form Last Updated:** 10/8/2013
Form Number: 6577

Approval

Chair, Department Curriculum Committee	Date 10/9/13	Chair, Undergraduate Curriculum Committee	Date 11-01-2013
Department Chair	Date 10/9/13	Chair, Graduate Curriculum Committee	Date
Chair, College Curriculum Committee	Date 10/18/13	Provost	Date
College Dean	Date 10/21/13	President	Date 1/18/14

10/8/2013

B.A. in Computer Science Curriculum
2014-2015 Academic Year

Computer Science
Bachelor of Arts

Freshman Year
First Semester
4 – CPSC 1010 Computer Science I
3 – ENGL 1030 Accelerated Composition
3 – MTHS 1020 Introduction to Mathematical Analysis *or*
4 - MTHS 1060 Calculus of One Variable I[1]
4 – Foreign Language Requirement[2]
0-1 – Elective[1]

15

Second Semester
4 – CPSC 1020 Computer Science II
3 – MTHS 2070 Multivariable Calculus *or*
4 - MTHS 1080 Calculus of One Variable II[1]
3 – Arts and Humanities (Non-Lit.) Requirement[3]
4 – Foreign Language Requirement[2]
0-1 – Elective[1]

15

Sophomore Year
First Semester
3 – CPSC 2070 Discrete Structures for Computing
4 – CPSC 2120 Algorithms and Data Structures
3 – Arts and Humanities (Literature) Requirement[3]
3 – Foreign Language Requirement[2]
3 – Oral Communications Requirement[10]

16

Second Semester
3 – CPSC 2150 Software Development Foundations
4 – CPSC 2310 Intro. to Computer Organization
1 – CPSC 2910 Seminar in Professional Issues I
3 – Foreign Language Requirement[2]
4 – Natural Science Requirement[4]

15

Junior Year
First Semester
6 – Computer Science Requirement[5]
3 – Mathematical Sciences Requirement[6]
3 – Minor Requirement
3 – Natural Science Requirement[4]

15

Second Semester
3 – Computer Science Requirement[5]
6 – Minor Requirement
3 – Social Science Requirement[3]
3 –Writing Requirement[7]

15

Senior Year
First Semester
6 – Computer Science Requirement[5]
3 – Departmental Humanities Requirement[8]
3 – Minor Requirement
3 – Social Science Requirement[3]

15

Second Semester
3 – CPSC 4910 Seminar in Professional Issues II
3 – Computer Science Requirement[5]
3 – Fine Arts Requirement[9]
3 – Minor Requirement
3 – Elective

15

121 Total Semester Hours

[1]Select either the MTHS 1020/2070, 1060/2070 or 1060/1080 sequence. Students who select the 1060/1080 sequence will have satisfied the elective credits in the freshman year. Students interested in computer graphics should select the 1060/1080 sequence.
[2]Four semesters (through 2020) in the same modern foreign language are required.
[3]See General Education Requirements.
[4] Select from courses in BIOL, BIOCH, CH, GEOL, MICRO, PHYS; or ENSP 2000. At least one course must include a laboratory and satisfy the natural science general education requirement.
[5]Select from CPSC courses numbered 3000-level or higher. No more than three credits of CPSC 3990 or 4810 may be applied to this requirement, and no more than six credits of CPSC 4820 may be applied. Up to three credits of approved 3000-level or higher MTHS or ECE courses may be substituted.
[6]MTHS 3090 or 3110, or EXST 2300 and 3300, or MTHSC 2060 and 3020. MTHS 3110 is required for all graphics courses.
[7]One course of: ENGL 3040, 3120, 3140, 3150, 3160, 3330; AS 3090, 3100, 4090, 4100; ML 3010, 3020, 4010, 4020.
[8]Select from courses in AAH, ANTH, ART, CHIN, DANC, ENGL, FR, GER, HUM, ITAL, JAPN, MUSC, PA, PHIL, REL, RUSS, SPAN, THEA.
[9]MUSC 2100 or any course in AAH, ART, or THEA.
[10]One course of: COMM 1500, 2500, HONS H2230; or the cluster of courses AS 3090, 3100, 4090, 4100; or ML 1010, 1020.

Notes:
1. For graduation, a candidate for the BA degree in Computer Science must have earned a grade of C or better in each CPSC course applied to the non-elective requirements of the degree.
2. A grade of C or better must be earned in all prerequisite courses (including CPSC and MTHS courses) before enrolling in the next CPSC course.

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

Change Minor: Digital Production Arts
Effective Catalog Year:

.. Change Minor Name to:
X Change Minor Requirements:
Current Catalog Description: A minor in Digital Production Arts requires DPA 3070 and completion of one of the following options: * Group I (for Architecture or Visual Arts majors) DPA 4000, 4010 and six credits selected from CPSC 4040, 4050, 4160, and 4190. * Group II (for Computer Science, Computer Engineering, and Computer Information Systems majors) DPA 4020, 4030, and six credits selected from ART 2050, 2130, 4210, GC 1020, and 3400. * Group III (for all other majors) DPA 4000, 4010, 4020, and three credits selected from CPSC 4040, 4050, 4160, and 4190.
Proposed Catalog Description: A minor in Digital Production Arts requires DPA 3070 and completion of one of the following options: * Group I (for Architecture or Visual Arts majors) DPA 4000, 4010 and six credits selected from CPSC 4040, 4050, 4160, PKGSC 2200, 3200, THEA 2880, 4870, 4970. * Group II (for Computer Science, Computer Engineering, and Computer Information Systems majors) DPA 4020, 4030, and six credits selected from ART 2050, 2130, 4210, GC 3400, PKGSC 2200, 3200, THEA 2880, 4870, 4970. * Group III (for all other majors) DPA 4000, 4010, 4020, and three credits selected from CPSC 4040, 4050, 4160, PKGSC 2200.
Summary/ Explanation: CPSC 4190 is being removed as an elective, since it is no longer being offered. GC 1020 has been removed as an elective for Group II, since it has been proving to be too elementary for these students, who already have extensive technical background. PKGSC 2200 and 3200 have been added as electives, as they provide broad training in the use of 2D and 3D software, and fabrication from digital models. Note: PKGSC 3200 is not listed for Group III since 2200 is a prerequisite, and Group III only requires one elective. THEA courses added as electives for Groups I and II to expand the artistic options available to these students.

Form Originator: MARK, Mark Smotherman **Date Form Created:** 10/8/2013
Form Last Updated by: MARK, Smotherman,Mark K **Date Form Last Updated:** 10/9/2013
Form Number: 6573

Approval

	10/9/13		11-07-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/9/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/21/13		1/18/14
College Dean	Date	President	Date

000148

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

X **Change a Course - Abbrev & Number: CP SC- 352**
Corresponding Lab Course: --
Corresponding Honors course: --
.. **Add Honors course:** --
Corresponding Graduate course: --
.. **Add Graduate course:** --
Course Title: PROGRAMMING SYSTEMS

Brief Statement of Change:
This corrects a prerequisite for a cross-listed course CPSC/ECE 3520. CPSC 2070 has replaced MTHS 1190 as the discrete structures requirement for computer science students, so CPSC 2070 should replace MTHS 1190 in the prerequisite list. ECE has been contacted and has no problem. (They require MTHS 4190 in for computer engineering students.)

Last Term taught: 1306	.. **Change Abbrev to:**	
Effective Term: 01/2014	.. **Change Number to:**	
.. **Change Catalog Title:**	.. **Change Transcript Title:**	
from:	from: PROGRAMMING SYSTEMS	
to:	to:	
.. **Change of Credit**	From: Fixed Credit: 3 (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:
X A-Lecture Only	..	.. Pass/Fail Only	..	.. English Composition	..
.. B-Lab (w/fee)	..	X Graded	..	.. Oral Communication	..
.. D-Seminar	..	.. Variable Title	..	.. Mathematics	..
.. E-Independent Study	..	.. Creative Inquiry	..	.. Natural Science w/Lab	..
.. F-Tutorial (w/fee)	..	.. Repeatable	..	.. Math or Science	..
.. G-Studio	..	maximum credits		.. A&H (Literature)	..
.. H-Field course	..	from:		.. A&H (Non-Literature)	..
.. I-Study Abroad	..	to:		.. Social Science	..
.. L-Lab (no/fee)	..			.. CCA	..
.. N/B-Lecture/Lab(w/fee)	..			.. STS	..
.. N/L-Lecture/Lab(no fee)	..				

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

X **Change Prerequisite(s):**
from: Preq: ECE 2230; or CPSC 2120 and CPSC 2150. Preq or concurrent enrollment: MTHS 1190 or MTHS 4190.
to: Preq: ECE 2230; or CPSC 2120 and CPSC 2150. Preq or concurrent enrollment: CPSC 2070 or MTHS 4190.

Learning Objectives:
Topical Outline:
Evaluation:

Form Originator: MARK, Mark Smotherman **Date Form Created:** 10/8/2013
Form Last Updated by: MARK, Mark Smotherman **Date Form Last Updated:** 10/8/2013
Form Number: 6574

Approval

Chair, Department Curriculum Committee	10/9/13 Date	Chair, Undergraduate Curriculum Committee	11-01-2013 Date
Department Chair	10/9/13 Date	Chair, Graduate Curriculum Committee	Date
Chair, College Curriculum Committee	10/18/13 Date	Provost	Date
College Dean	10/21/13 Date	President	1/18/14 Date
Director, Calhoun Honors College	Date		

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

Course Abbreviation & Number:
X **New Undergraduate Course:** CPSC- 1990
.. **New Honors Course:** --
.. **New Graduate Course:** -

Effective Term: 01/2014
Catalog Title: Creative Inquiry in Computing
Transcript Title: Creative Inquiry Computing
Fixed Credit Course: (,)
Variable Credit Course: 1-3 (1-3), (0-0)

Method of Instruction	Course Modifier	General Education Designation
.. 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	X Creative Inquiry	.. Mathematics
.. F-Tutorial (w/fee)	X Repeatable	Natural Science No
.. G-Studio	maximum credits: 6	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. 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: Engages students in faculty-led research in the context of a team effort. May be repeated for a maximum of six credits.

Prerequisite(s): Consent of instructor.

Projected Enrollment:
Year 1 - 10 Year 2 - 12 Year 3 - 15 Year 4 - 18

Required course for students in:

Statement of need and justification based on assessment results of student learning outcomes: Our CPSC 4810 course number is used for a variety of purposes, including creative inquiry (variable number of credits), programming team (variable number of credits), guided research (variable number of credits), and special topics courses (three credits). To reduce student confusion among the different sections of 4810 based on the different purposes and the different number of course credits expected for the various purposes, we propose adding separate course numbers for creative inquiry courses. This course is designed for freshman and sophomores who have not yet completed the sophomore-level required computer science courses and thus might lack programming maturity and implementation skills.

Textbook(s): None

Learning Objectives: The learning objectives will be chosen by the faculty advisor. For example, learning objectives could include: 1) Apply the research process to a specific research question approved by the faculty advisor, 2) Develop a better ability to function in teams, and, 3) Use techniques, skills, and tools appropriate for modern computing practice.

Topical Outline: The topic will be chosen by the faculty advisor. For example, the CyberTiger Systems CI led by Prof. Jim Martin focuses on computer systems and networks that support the rapidly evolving needs of an "always-connected" society. A set of common milestones structures the semester. As a more detailed example, consider the Mapping Broadband Wireless project.
Week 1: Introduction and course expectations; guidance in selection of project.
Week 2: Milestone 1 is a 2-page document that identifies and describes the semester project.
Week 3: Research into tools that allow broadband users to quantify and assess services.
Week 3: Milestone 2 is a presentation of a tutorial or published paper that relates to the project.
Week 4: Further research.
Week 5: Definition of a tool for smartphone users to assess and monitor wireless service.
Week 6: Further specification of the tool.
Week 7: Work on implementation of tool.
Week 8: Further implementation.
Week 9: Milestone 3 is a Powerpoint presentation of the status of the project and a demonstration of project.
Week 10: Further implementation.
Week 11: Further implementation.
Week 12: Testing and debugging of tool.
Week 13: Further testing of tool and preparation of final presentation.
Week 14: Milestone 4 is the final submission of the project.
Week 15: Milestone 5 is a 20-minute talk on what you did, why you did it, and demonstrate that the project works.

Evaluation: This is a graded course. The evaluation scheme will be chosen by the faculty advisor. An example evaluation scheme is:
Attendance at team meetings 50%;
Team interaction and completion of team activities 25%;
Individual effort and completion of individually-assigned tasks 25%.
The grading scheme will be:
A: 90 and above;
B: 80-89;
C: 70-79;
D: 60-69;
F: below 60.

Form Originator: MARK,Mark Smotherman **Date Form Created:** 10/8/2013
Form Last Updated by: MARK, Smotherman,Mark K **Date Form Last Updated:** 10/9/2013
Form Number: 6579

Approval

	10/9/13		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/9/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/21/13		1/18/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

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

Course Abbreviation & Number:
X **New Undergraduate Course:** CPSC- 3990
.. **New Honors Course:** --
.. **New Graduate Course:** -

Effective Term: 01/2014
Catalog Title: Advanced Creative Inquiry in Computing
Transcript Title: Adv Creative Inquiry Computing
Fixed Credit Course: (,)
Variable Credit Course: 1-3 (1-3), (0-0)

Method of Instruction	Course Modifier	General Education Designation
.. 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	X Creative Inquiry	.. Mathematics
.. F-Tutorial (w/fee)	X Repeatable	Natural Science No
.. G-Studio	maximum credits: 6	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. 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: Engages upper-division students in faculty-led research in the context of a team effort. May be repeated for a maximum of six credits.

Prerequisite(s): Junior standing, consent of instructor.

Projected Enrollment:
Year 1 - 8 Year 2 - 10 Year 3 - 12 Year 4 - 15

Required course for students in:

Statement of need and justification based on assessment results of student learning outcomes: Our CPSC 4810 course number is used for a variety of purposes, including creative inquiry (variable number of credits), programming team (variable number of credits), guided research (variable number of credits), and special topics courses (three credits). To reduce student confusion among the different sections of 4810 based on the different purposes and the different number of course credits expected for the various purposes, we propose adding separate course numbers for creative inquiry courses. This course is for students with programming experience through the sophomore year, and therefore carries a prerequisite of junior standing. This course is intended to count toward the Computer Science Requirement in one of our three undergraduate degrees.

Textbook(s): None

Learning Objectives: The learning objectives will be chosen by the faculty advisor. For example, learning objectives could include: 1) Apply the research process to a specific research question approved by the faculty advisor, 2) Develop a better ability to function in teams, and, 3) Use techniques, skills, and tools appropriate for modern computing practice.

Topical Outline: The topic will be chosen by the faculty advisor. For example, the CyberTiger Systems CI led by Prof. Jim Martin focuses on computer systems and networks that support the rapidly evolving needs of an "always-connected" society. A set of common milestones structures the semester. As a more detailed example, consider the Mapping Broadband Wireless project.
Week 1: Introduction and course expectations; guidance in selection of project.
Week 2: Milestone 1 is a 2-page document that identifies and describes the semester project.
Week 3: Research into tools that allow broadband users to quantify and assess services.
Week 3: Milestone 2 is a presentation of a tutorial or published paper that relates to the project.
Week 4: Further research.
Week 5: Definition of a tool for smartphone users to assess and monitor wireless service.
Week 6: Further specification of the tool.
Week 7: Work on implementation of tool.
Week 8: Further implementation.
Week 9: Milestone 3 is a Powerpoint presentation of the status of the project and a demonstration of project.
Week 10: Further implementation.
Week 11: Further implementation.
Week 12: Testing and debugging of tool.
Week 13: Further testing of tool and preparation of final presentation.
Week 14: Milestone 4 is the final submission of the project.
Week 15: Milestone 5 is a 20-minute talk on what you did, why you did it, and demonstrate that the project works.

Evaluation: This is a graded course. The evaluation scheme will be chosen by the faculty advisor. An example evaluation scheme is:
Attendance at team meetings 50%;
Team interaction and completion of team activities 25%;
Individual effort and completion of individually-assigned tasks 25%.
The grading scheme will be:
A: 90 and above;
B: 80-89;
C: 70-79;
D: 60-69;
F: below 60.

Form Originator: MARK,Mark Smotherman **Date Form Created:** 10/8/2013
Form Last Updated by: MARK, Smotherman,Mark K **Date Form Last Updated:** 10/9/2013
Form Number: 6584

Approval

	10/9/13		11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
	10/9/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/10/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/21/13		1/18/14
College Dean	Date	President	Date
Director, Calhoun Honors College	Date		

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

Course Abbreviation & Number:
X **New Undergraduate Course:** CPSC- 4820
.. **New Honors Course:** --
X **New Graduate Course:** CPSC- 682

Effective Term: 01/2014
Catalog Title: Special Topics in Computing
Transcript Title: Spec Topics Computing
Fixed Credit Course: 3 (3,0)
Variable Credit Course: - (-), (-)

Method of Instruction	Course Modifier	General Education Designation
X A-Lecture Only	.. Pass/Fail Only	.. Creative Inquiry
.. B-Lab (w/fee)	X Graded	.. English Composition
.. D-Seminar	X Variable Title	.. Oral Communication
.. E-Independent Study	.. Creative Inquiry	.. Mathematics
.. F-Tutorial (w/fee)	X Repeatable	Natural Science No
.. G-Studio	maximum credits: 99	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. 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: In-depth treatment of topics not fully covered in regular courses. Topics vary from semester to semester. May be repeated but only if different topics are covered.

Prerequisite(s):

Projected Enrollment:
Year 1 - 30 Year 2 - 30 Year 3 - 30 Year 4 - 30

Required course for students in:

Statement of need and justification based on assessment results of student learning outcomes: Our current CPSC 4810 course number is used for a variety of purposes, including creative inquiry (variable number of credits), guided research for individual students (variable number of credits), and special topics courses (three credits). To reduce student confusion among the different sections of 4810 based on the different purposes and the different number of course credits expected for the various purposes, we propose adding this course as a fixed-credit, special topics course.

Textbook(s): To be determined by the instructor.

Learning Objectives: The learning objectives will be determined by the instructor. An example learning objective might be to use techniques, skills, and tools appropriate for modern computing practice.

Topical Outline: The topical outline will be determined by the instructor. An example outline for a special topics course in educational technologies might be:
Week 1: Course introduction, current debates in educational technology
Week 2: Creativity and construction
Week 3: Learning design
Week 4: Scratch programming tool from MIT
Week 5: Scratch
Week 6: Scratch
Week 7: Scratch
Week 8: Alice programming tool from CMU
Week 9: Alice
Week 10: Alice
Week 11: Choice programming tool
Week 12: Choice
Week 13: Work on final project
Week 14: Work on final project
Week 15: Project presentations

Evaluation: This is a graded course. The evaluation scheme will be chosen by the instructor. An example grading scheme for CPSC 4820:
Assignments 37.5%;
Final project artifact 37.5%;
Final project presentation 25%.

The grading scheme for CPSC 4820 will be:
A: 90 and above;
B: 80-89;
C: 70-79;
D: 60-69;
F: below 60.

An example grading scheme for CPSC 6820 with additional expectations for graduate students:
In-class presentations and discussion leadership 20%;

Assignments 30%;
Final project artifact 30%;
Final project presentation 20%.
The grading scheme for CPSC 6820 will be:
A: 90 and above;
B: 80-89;
C: 70-79;
D: not applicable;
F: below 70.

Add course requirements for honors and/or 600-level courses (if applicable): Additional projects or assignments will be required of graduate students and will be determined by the instructor.

Form Originator: MARK,Mark Smotherman **Date Form Created:** 10/8/2013
Form Last Updated by: , Date Form Last Updated: 10/9/2013
Form Number: 6587

Approval

Chair, Department Curriculum Committee	Date 10/9/13	Chair, Undergraduate Curriculum Committee	Date 11-01-2013
Department Chair	Date 10/9/13	Chair, Graduate Curriculum Committee	Date
Chair, College Curriculum Committee	Date 10/18/13	Provost	Date
College Dean	Date 10/21/13	President	Date 1/18/14
Director, Calhoun Honors College	Date		

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

000155

Course Abbreviation & Number:
X **New Undergraduate Course:** ENGR- 1051
X **New Honors Course:** ENGR-H-1050
.. **New Graduate Course:** -

Effective Term: 05/2014
Catalog Title: Engineering Discipline & Skills I
Transcript Title: ENG DISC & SKILLS I

Fixed Credit Course: 1 (0,2)
Variable Credit Course: - (-), (-)

Method of Instruction	Course Modifier	General Education Designation
.. 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 No
.. G-Studio	maximum credits:	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. 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: Provides solid foundation of skills to solve engineering problems. Students demonstrate problem solving techniques with spreadsheets, dimensions and units. Introduces professional and societal issues appropriate to engineering.

Prerequisite(s): Co-Req: MTHS 1040 or 1060

Projected Enrollment:
Year 1 - 1200 Year 2 - 1200 Year 3 - 1200 Year 4 - 1200

Required course for students in: General Engineering

Statement of need and justification based on assessment results of student learning outcomes: Current course ENGR 1020 will be split into two courses: ENGR 1051 and ENGR 1061. The result of this change will aid in student scheduling; transfer student evaluation and awarding credit; facilitate offering courses online; and ensure student understanding of material before progressing onto more difficult topics.

Textbook(s): Thinking Like an Engineer, 3rd edition, Stephan et al., Pearson Prentice Hall @ 2015

Learning Objectives: Identify basic and derived dimensions and units; Express observations in appropriate units and perform conversions when necessary; Apply basic principles from mathematical and physical sciences, such as trigonometry, Hooke's Law, and the ideal gas law, to analyze engineering problems.
Use Microsoft Excel to enhance problem solution techniques, including: enter, sort and format data in a worksheet; apply built-in functions, including mathematical, statistical, and trigonometric; read, write, and predict conditional statements, LOOKUP functions, and data validation statements; utilize conditional formatting to aid in problem solutions.

Topical Outline: Course Mechanics – 3 hours - 10%
o Course Introduction
o Computer Quizzes
o Exam Review
Introduction to Engineering Profession & Clemson University – 4 hours - 13.3%
o Introduction to engineering disciplines at Clemson
Dimensions & Units – 12 hours – 40%
o Use of estimation and reasonableness in problem solving
o Fundamental and derived dimensions; base and derived units
o Conversion of units as single values and within equations
o Understanding the relationship and importance of units in solving complex equations
o Equations and problems related to density, energy, force, mass, moles, power, pressure, specific gravity, temperature and weight
Excel and Problem Solving Procedures – 11 hours – 36.7%
o Basic worksheet structure and organization, including data entry, sorting, formatting
o Conditional statements, conditional formatting
o Graphical representation and interpretation of data
o Functions, including mathematical, statistical, trigonometry, lookup

Evaluation: Exam = 60%
Quiz = 24%
Assignments = 12%
Individual Reflection Portfolio = 4%

Add course requirements for honors and/or 600-level courses (if applicable): Topics Covered:
Dimensionless groups, Rayleigh's method, Basic Fluid Flow

Form Originator: BETHSTE,Elizabeth Stephan **Date Form Created:** 9/10/2013
Form Last Updated by: BETHSTE, Stephan,Elizabeth Anne **Date Form Last Updated:** 10/18/2013
Form Number: 6413

000156

Approval

		Jessica M. Burriss	11-04-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
E Stephan	10/18/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/18/13	Nicholas M. Apgar	1/18/14
College Dean	Date	President	Date
	10/21/13		
Director, Calhoun Honors College	Date		

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

000157

Course Abbreviation & Number:
X **New Undergraduate Course:** ENGR- 1061
X **New Honors Course:** ENGR-H-1061
.. **New Graduate Course:** -

Effective Term: 05/2014
Catalog Title: Engineering Discipline & Skills II
Transcript Title: ENG DISC & SKILL II

Fixed Credit Course: 1 (0,2)
Variable Credit Course: - (-), (-)

Method of Instruction	Course Modifier	General Education Designation
.. 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 No
.. G-Studio	maximum credits:	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. 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: Continuation of topics introduced in ENGR 1051. Students demonstrate problem solving techniques using spreadsheet, using modeling techniques, and by interpreting validity of experimental results. Students complete projects on multi-discipline teams. Various forms of technical communication are emphasized.

Prerequisite(s): Pre-Req: ENGR 1051 with a grade of C or higher; Co-Req: MTHS 1040 or 1060

Projected Enrollment:
Year 1 - 1200 Year 2 - 1200 Year 3 - 1200 Year 4 - 1200

Required course for students in: General Engineering

Statement of need and justification based on assessment results of student learning outcomes: Current course ENGR 1020 will be split into two courses: ENGR 1051 and ENGR 1061. The result of this change will aid in student scheduling; transfer student evaluation and awarding credit; facilitate offering courses online; and ensure student understanding of material before progressing onto more difficult topics.

Textbook(s): Thinking Like an Engineer, 3rd edition, Stephan et al., Pearson Prentice Hall @ 2015

Learning Objectives: Use graphical techniques to create "proper" plots, sketch functions, and determine graphical solutions to problems. Create graphs using Microsoft Excel.
Describe and interpret mathematical models in terms of physical phenomena. Determine an appropriate mathematical model to describe experimental data using physical knowledge and logarithmic plots, then apply the model to form graphical solutions to engineering problems. Use Microsoft Excel to model experimental data with a trendline and create logarithmic plots.
Formulate and justify a solution to an engineering problem within a team structure. Express technical information effectively by correctly applying graphing conventions and composing clear and concise descriptions of results.

Topical Outline: Course Mechanics – 3 hours = 14.3%
o Course Introduction
o Computer Quizzes
o Exam Review
Introduction to Engineering Profession & Clemson University – 1 hour = 3%
o Opportunities at Clemson (Co-op, Internship)
Excel and Problem Solving Procedures – 11 hours = 36.7%
o Graphical representation and interpretation of data
o Project: Breakeven analysis
Mathematical Models and Logarithmic Plots – 4 hours = 13.3%
o Choice of trendlines based on physical properties, R2, and logarithmic plots
o Introduction to semi-log and log-log plots
Trendlines and Data Analysis – 11 hours = 36.7%
o Interpretation of trendline in terms of physical phenomena
o Introduction to three trend types (linear, power and exponential)
o Reinforcement of concepts of units, graphing and Excel through data analysis
o Trendline choice based upon physical phenomena
o Project: Trendline Analysis (such as Hooke's Law, Pendulums, Bouncing Springs)

Evaluation: Exam 60%
Quiz 22%
Assignments 8%
Individual Reflection Portfolio (IRP) 2%
Projects (2 @ 4%) 8%

Add course requirements for honors and/or 600-level courses (if applicable): Topics Covered:
Statistical variables, histograms, distributions
Project: Cantilever Beams [in place of two smaller projects]

000158

Form Originator: BETHSTE,Elizabeth Stephan **Date Form Created:** 9/10/2013
Form Last Updated by: BETHSTE, Stephan,Elizabeth Anne **Date Form Last Updated:** 10/18/2013
Form Number: 6414

Approval

		Jessica W. Thurston	11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
E Stephan	10/18/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/18/13	M. Abt	1/18/14
College Dean	Date	President	Date
	10/21/13		
Director, Calhoun Honors College	Date		

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

000159

Course Abbreviation & Number:
X **New Undergraduate Course:** ENGR- 1071
X **New Honors Course:** ENGR-H-1071
.. **New Graduate Course:** -

Effective Term: 05/2014
Catalog Title: Programming and Problem Solving I
Transcript Title: PROG/PROB SOLV I
Fixed Credit Course: 1 (0,2)
Variable Credit Course: - (-), (-)

Method of Instruction	Course Modifier	General Education Designation
.. 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 No
.. G-Studio	maximum credits:	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. 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: Students formulate and solve engineering problems using MATLAB; estimate answers for comparison to computed solutions; read, interpret and write programs, instructions and output (both written and graphical); and debug.

Prerequisite(s): Co-Req: MTHS 1060 or 1070; Co-Req for honors students: MTHS 1080; Pre-Req with a grade of C or better or concurrent Enrollment: ENGR 1061

Projected Enrollment:
Year 1 - 1000 Year 2 - 1000 Year 3 - 1000 Year 4 - 1000

Required course for students in: General Engineering

Statement of need and justification based on assessment results of student learning outcomes: Current course ENGR 1410 will be split into three courses: ENGR 1071, ENGR 1081 and ENGR 1091. The result of this change will aid in student scheduling; transfer student evaluation and awarding credit; facilitate offering courses online; and ensure student understanding of material before progressing onto more difficult topics.

Textbook(s): Thinking Like an Engineer, 3rd edition, Stephan et al., Pearson Prentice Hall @ 2015

Learning Objectives: Generate a written (numbered list/pseudo code) description and sketch a flowchart/concept map of an algorithm of a problem or process.
Formulate algorithmic steps into code utilizing input instructions, formatted output, looping structures, conditional statements, and file input/output.
Read, write, interpret, and debug MATLAB programs and functions. Trace the value of variables through MATLAB program and function execution. Verify output against a published or manually calculated solution.
Use MATLAB to enhance problem solution techniques, including entering and formatting data; applying functions, including mathematical, statistical, and trigonometric; create and format data into graphs.

Topical Outline: Course Mechanics – 3 hours = 10%
o Computer Quizzes
o Course Introduction
o Exam Review
Introduction to Engineering Profession & Clemson University – 4 hours = 13.3%
o Grand Challenges
o Introduction to engineering disciplines at Clemson
Algorithms – 4 hours = 13.3%
o Creating algorithms by hand
o Drawing a flowchart of a given algorithm
Functions & Programs – 6 hours = 20%
o Anatomy and definition of a proper function / program; Creating a program / function with proper documentation
o Handling functions with multiple input and/or output variables
o Syntax and order of execution for MATLAB commands and mathematical expressions
o Variable data types (string / number / array / matrix / cell)
Input & Output– 5 hours = 16.7%
o Definition and discussion of disp, fprintf, input, and menu functions
o Discussion of special string characters (\n, \\, %s, %f, etc)
o Importing data (CSV, Excel, text) into MATLAB; Writing data from programs into Microsoft Excel worksheets
Matrix Operations – 4 hours = 13.3%
o Applying a built-in function to an array or matrix
o Building and entering arrays and matrices in MATLAB

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o Definition of array and matrix
o Discussion of matrix arithmetic (addition, subtraction, multiplication)
o Replacing, adding, deleting elements, rows, or columns of a matrix
o Term-by-term operations (multiplication, raising to a power) basics of matrix multiplication
o Transposing matrices: definition and MATLAB operator
Plotting – 4 hours = 13.3%
o Creating a figure with a single plot with multiple data series on the plot
o Creating a figure with multiple plots using subplot
o Creating proper plots with MATLAB using built-in functions (xlabel, legend, axis, markers, etc)
o Discussion of plot and fplot functions

Evaluation: Exam 60%
Quiz 24%
Assignments 14%
Individual Reflection Portfolio (IRP) 2%

Add course requirements for honors and/or 600-level courses (if applicable): Topics Covered may include:
GUI Development
Algorithm Efficiency
Image / Audio Processing

Form Originator: BETHSTE,Elizabeth Stephan **Date Form Created:** 9/10/2013
Form Last Updated by: BETHSTE, Stephan,Elizabeth Anne **Date Form Last Updated:** 10/18/2013
Form Number: 6415

Approval

		Jessica W. Anderson	11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
E Stephan	10/18/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/18/13		1/18/14
College Dean	Date	President	Date
	10/21/13		
Director, Calhoun Honors College	Date		

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

000161

Course Abbreviation & Number:
X **New Undergraduate Course:** ENGR- 1081
X **New Honors Course:** ENGR-H-1081
.. **New Graduate Course:** -

Effective Term: 05/2014
Catalog Title: Programming and Problem Solving II
Transcript Title: PROG/PROB SOLV II

Fixed Credit Course: 1 (0,2)
Variable Credit Course: - (-), (-)

Method of Instruction	Course Modifier	General Education Designation
.. 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 No
.. G-Studio	maximum credits:	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. 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: Continuation of topics introduced in ENGR 1071. Students formulate and solve engineering problems using MATLAB; read, interpret and write programs; utilize trendlines; iterate/loops; evaluate and compose conditional statements; and debug.

Prerequisite(s): Pre-Req: ENGR 1061 with a grade of C or higher and ENGR 1071 with a grade of C or higher; Co-Req: MTHS 1060 or 1070. Co-Req for honors students: MTHS 1080.

Projected Enrollment:
Year 1 - 1000 Year 2 - 1000 Year 3 - 1000 Year 4 - 1000

Required course for students in: General Engineering

Statement of need and justification based on assessment results of student learning outcomes: Current course ENGR 1410 will be split into three courses: ENGR 1071, ENGR 1081 and ENGR 1091. The result of this change will aid in student scheduling; transfer student evaluation and awarding credit; facilitate offering courses online; and ensure student understanding of material before progressing onto more difficult topics.

Textbook(s): Thinking Like an Engineer, 3rd edition, Stephan et al., Pearson Prentice Hall @ 2015

Learning Objectives: Generate a written (numbered list/pseudo code) description and sketch a flowchart/concept map of an algorithm of a problem or process.
Formulate algorithmic steps into code utilizing input instructions, formatted output, looping structures, conditional statements, and file input/output.
Read, write, interpret, and debug MATLAB programs and functions. Trace the value of variables through MATLAB program and function execution. Verify output against a published or manually calculated solution.
Use MATLAB to fit experimental data with a trendline; describe and interpret mathematical models in terms of physical phenomena

Topical Outline: Course Mechanics – 3 hours = 10%
o Computer Quizzes
o Course Introduction
o Exam Review
Introduction to Engineering Profession & Clemson University – 3 hours = 10%
o Introduction to engineering disciplines at Clemson
o Opportunities at Clemson (Co-op, Internship)
Algorithms – 4 hours = 13.3%
o Creating algorithms by hand
o Drawing a flowchart of a given algorithm
Logic & Conditional Statements – 6 hours = 20%
o Converting written sentences into a structured conditional statement
o Definition and discussion of conditional statements
o Definition and discussion of else, elseif, end, and if operators
o Definition of all logical operators (&&, ||, ~, &, | (bit-wise))
o Definition of all relational operators (<, >, <=, >=, ~=, ==)
Looping Structures – 9 hours = 30%
o Arithmetic of looping structures – calculating number of times for loop will execute
o Definition and discussion of for and while operators
o Recursion
Plotting – 5 hours = 16.7%
o Discussion of polyfit functions

Evaluation: Exam 60%
Quiz 24%
Assignments 14%
Individual Reflection Portfolio (IRP) 2%

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Add course requirements for honors and/or 600-level courses (if applicable): Topics Covered may include:
GUI Development
Algorithm Efficiency
Image / Audio Processing

Form Originator: BETHSTE,Elizabeth Stephan **Date Form Created:** 9/10/2013
Form Last Updated by: BETHSTE, Stephan,Elizabeth Anne **Date Form Last Updated:** 10/18/2013
Form Number: 6416

Approval

		Patricia W. Hudson	11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
E Stephan	10/18/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		
Chair, College Curriculum Committee	Date	Provost	Date
	10/18/13	M. Lee McAdk	1/18/14
College Dean	Date	President	Date
	10/21/13		
Director, Calhoun Honors College	Date		

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

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Course Abbreviation & Number:
X **New Undergraduate Course:** ENGR- 1090
X **New Honors Course:** ENGR-H-1090
.. **New Graduate Course:** -

Effective Term: 05/2014
Catalog Title: Programming and Problem Solving Applications
Transcript Title: PROG/PROB SOLV APPS

Fixed Credit Course: 1 (0,2)
Variable Credit Course: - (-), (-)

Method of Instruction	Course Modifier	General Education Designation
.. 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 No
.. G-Studio	maximum credits:	.. Lab
.. H-Field course		.. Natural Science w/Lab
.. I-Study Abroad		.. Math or Science
.. L-Lab (no/fee)		.. A&H (Literature)
.. 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: Students formulate and solve engineering problems on multi-discipline teams using MATLAB. Various forms of technical communication are emphasized.

Prerequisite(s): Co-Req: MTHS 1060 or 1070. Co-Req for honors students: MTHS 1080. Pre-Req with a grade of C or higher or concurrent enrollment: ENGR 1081

Projected Enrollment:
Year 1 - 1000 Year 2 - 1000 Year 3 - 1000 Year 4 - 1000

Required course for students in: General Engineering

Statement of need and justification based on assessment results of student learning outcomes: Current course ENGR 1410 will be split into three courses: ENGR 1070, ENGR 1080 and ENGR 1090. The result of this change will aid in student scheduling; transfer student evaluation and awarding credit; facilitate offering courses online; and ensure student understanding of material before progressing onto more difficult topics. Will add more time for team-/project-based work than current structure allows.

Textbook(s): Thinking Like an Engineer, 3rd edition, Stephan et al., Pearson Prentice Hall @ 2015

Learning Objectives: Communicate technical information effectively by correctly apply graphing conventions and composing clear and concise descriptions of experiments and projects;
Formulate and justify a solution to an engineering problem within a team structure
Formulate algorithmic steps into code utilizing input instructions, formatted output, looping structures, conditional statements, and file input/output.

Topical Outline: Course Mechanics – 1 hour = 3.3%
o Course Introduction
Project Work - 29 hours = 96.7%

Evaluation: Project = 100%
* Anticipate 2 to 3 projects per course, each with a programming component (75% of the project grade) and a results presentation component (25% of the project grade)

Add course requirements for honors and/or 600-level courses (if applicable): Topics Covered may include:
GUI Development
Image / Audio Processing

Form Originator: BETHSTE,Elizabeth Stephan **Date Form Created:** 9/10/2013
Form Last Updated by: BETHSTE, Stephan,Elizabeth Anne **Date Form Last Updated:** 10/18/2013
Form Number: 6417

Approval

		Jessica W. Morrison	11-01-2013
Chair, Department Curriculum Committee	Date	Chair, Undergraduate Curriculum Committee	Date
E Stephan	10/18/13		
Department Chair	Date	Chair, Graduate Curriculum Committee	Date
	10/18/13		

Chair, College Curriculum Committee	Date	Provost	Date
	10/18/13		1/18/14
College Dean	Date	President	Date
	10/21/13		
Director, Calhoun Honors College	Date		

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