Add Undergraduate Course

000100

Course Attributes

Subject Abbreviation:	AMFG-Advanced Manufacturing	**Catalog Title:**	Introduction to Manufacturing Systems and Processes
Course Number:	3800	**Transcript Title:**	Intro Man Systems & Processes
Effective Term:	Fall 2016	**Cross-reference(s):**	
College:	Engineering and Science	**Grade Mode:**	Standard Letter
Department:	COES Commitments CES	☐ **Additional Fee?**	

Justification

Form

User ID: jsummer **Name:** Joshua Summers
Date: 09/25/2015 **Number:** 9689

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Rationale for Add Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

part of a new certificate program

Schedule Types

- ○ **Field Course**
- ○ **Independent Study**
- ○ **Internship**
- ○ **Lab No Fee**
- ○ **Lab With Fee**
- ◉ **Lecture**
- ○ **Other**
- ○ **Seminar**
- ○ **Studio**
- ○ **Tutorial**

Projected Enrollment

Year 1: 0
Year 2: 0
Year 3: 0
Year 4: 0

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

30% weekly individual essays; 30% weekly group "findings"; 30% final report; 10% assessment quizzes

Catalog Description

Students will be introduced to how products are manufactured through team reverse engineering projects. Class discussions will be driven by the students' external research on manufacturing topics. A system model will be developed by the course to capture the complexity of the process.

Required course for students in

Advanced Manufacturing Certificate

Statement of need and justification based on assessment of student learning outcomes

This course has been developed as part of an advanced manufacturing certificate program, but should be accessible to all students within the College of Engineering and Science

Textbook(s)

None

Learning Objectives

Learning Objectives (technical): • Students will develop an appreciation of the complexity of a manufacturing enterprise. • Students will understanding how parts and assemblies are made. • Students will understand how to apply engineering tools (FMEA, black box diagramming, change management, verification and validation planning, lean, six sigma) Learning Objectives (professional): • Students will develop and apply communication and technical presentation skills. • Students will develop skills in background research. • Students will develop and apply team skills.

Topical Outline

System Modeling (2 units) Reverse Engineering (1 unit) Supply Chain/Logistics (1 unit) Packaging (1 unit) Assembly (2 units) Component Manufacturing Processes (3 units) Electronic Assembly (1 unit) Recycling (1 unit) Materials Processing (1 unit) Industry Tools (2 unit)

Syllabus

Upload File: 2015-09-3800-Introduction-20150925124613.docx

Prerequisites – sophomore standing.

Chair, Department Curriculum Committee — Date: 10-19-2015

000102

Department Chair — Date: 10/21/15

Chair, College Curriculum Committee — Date: 10/21/15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/2016

President — Date

test

AMFG 3800 – Introduction to Manufacturing Systems and Processes

Course Description:

AMFG 3800: Introduction to Manufacturing Systems and Processes. 3(3,0).
Students will be introduced to how products are manufactured through team reverse engineering projects. Class discussions will be driven by the students' external research on manufacturing topics. A system model will be developed by the course to capture the complexity of the process.

Textbook:

none

References:

Course Guide. Prepared and updated each semester by the Advanced Manufacturing Certificate Faculty

Coordinator:

Joshua D. Summers, Professor of Mechanical Engineering

Objectives:

1. Learning Objectives (technical):
   - Students will develop an appreciation of the complexity of a manufacturing enterprise.
   - Students will understanding how parts and assemblies are made.
   - Students will understand how to apply engineering tools (FMEA, black box diagramming, change management, verification and validation planning, lean, six sigma)
2. Learning Objectives (professional):
   - Students will develop and apply communication and technical presentation skills.
   - Students will develop skills in background research.
   - Students will develop and apply team skills.

Pre-requisite by Topic

1. NA

Topical Outline:

1. System Modeling (2 units)
2. Reverse Engineering (1 unit)
3. Supply Chain/Logistics (1 unit)
4. Packaging (1 unit)
5. Assembly (2 units)
6. Component Manufacturing Processes (3 units)
7. Electronic Assembly (1 unit)

8. Recycling (1 unit)
9. Materials Processing (1 unit)
10. Industry Tools (2 unit)

1 unit = 1 week

Design Project:

End of Course Deliverable:

- Students will develop a system model of how a consumer electro-mechanical product is produced. This system model will include identification of relationships between different activities required to produce each component. This system model will be created with "state of the art" system modeling tools, such as SysML based modelers. The details within the nodes will not be explored. For instance, a part may be made from injection molding. The process parameters, product features, and material options will be linked to other processes, but the simulation of the injection molding process will not be covered in this course (reserved for other classes such as ME 3120). The system model will be based on a reverse engineered product and will evolve throughout the course. A persistent model (either whiteboard, poster printouts, or computer display) will be updated with each lecture.

Course Project:

- Students will be placed into teams that will conduct a product teardown and analysis from a production point of view. This product will be used through the entire course. Students will identify production aspects, conduct background research, and present their findings on a weekly basis. The lecture following the presentations will be used for class discussion, reflection, tool introduction, and workshopping. Basic tools will be required for the reverse engineering.

Computer Usage:

Students will use computers for engineering analysis, synthesis, and documentation.

Evaluation Methods:

1. Weekly Individual Essays = 30%
2. Weekly Group "findings" = 30%
3. Final Report = 30%
4. Tests/Quizzes = 10%
5. Final Exam = 0%
6. Laboratory Reports = 0%

Prepared by: Joshua D. Summers Date: September 8, 2015

Chair, Department Curriculum Committee — 10-19-2015 — Date

0105

Department Chair — 10/21/15 — Date

Chair, College Curriculum Committee — 10/21/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 — Date

President — Date

000106

Add 4000/6000 Course

Course Attributes

Subject Abbreviation: AMFG-Advanced Manufacturing
Course Number: 4800 / 6800
Effective Term: Spring 2016
College: Engineering and Science
Department: COES Commitments

Catalog Title: Practicum Experience in Advanced Manufacturing
Transcript Title: Pract in Adv Manufacturing
Cross-reference(s):
Grade Mode: Standard Letter
☑ **Additional Fee?**

Justification
This course will require travel and materials to support the lab experience.

Form

User ID: mkurz **Name:** Mary Kurz-Edsall
Date: 09/24/2015 **Number:** 7989

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Rationale for Add Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

Schedule Types

- ○ Field Course
- ○ Independent Study
- ○ Internship
- ○ Lab No Fee
- ○ Lab With Fee
- ○ Lecture
- ○ Other
- ○ Seminar
- ◉ Studio
- ○ Tutorial

Projected Enrollment

Year 1: 10
Year 2: 15
Year 3: 20
Year 4: 20

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Course Project: 100%

6000

A	90	-	100
B	80	-	89
C	70	-	79
F	<		70

Course Project: 90% Course Leadership: 10% Grad students will be required to develop activities and documentation to increase lab documentation.

Catalog Description

Students will solve open-ended, real world manufacturing process and system design problems typically provided by industrial partners. Students will experience various aspects of a team-project design process from development of a mission statement, selection of appropriate design methodologies, project management, economic decision making, recommendation justification, reporting and presentation.

☑ **Prerequisite(s)** ☑ **Corequisite(s)**

prerequisite: For AMFG 4800:3800; for AMFG: none corequisite: For AMFG 4800: AMFG 4801; For AMFG 6800: AMFG 6801

Required course for students in

Certificate in Advanced Manufacturing

Statement of need and justification based on assessment of student learning outcomes

Students in the Advanced Manufacturing Certificate need a design experience that provides a large unstructured project in order to better replicate the environment into which we hope they will become employed.

Textbook(s)

None.

Learning Objectives

• Communicate with external stakeholders, peers and faculty through oral and written means • Select appropriate engineering tools to solve the open-ended problems at hand • Justify engineering solutions for advanced manufacturing systems

Topical Outline

Lecture (1 contact hour per week) Week 01: Introductions, expectations Week 02: Background of problem, primary objectives, metrics Week 03: PLC Introduction Week 04: PLC case example workthrough (Trilog-1 software http://www.tri-plc.com/iTrilogi6Edu/download.htm) Week 05: Microcontroller introduction, programming Week 06: Project review and discussion Week 07: Project review and discussion Week 08: Technical communication Week 09: Project review and discussion Week 10: Project review and discussion Week 11: Project review and discussion Week 12: Project review and discussion Week 13: Project review and discussion Week 14: Project review and discussion Week 15: Reflection, course feedback

Add course requirements for 6000-level courses

Grad students will be required to develop activities and documentation to increase lab documentation.

Syllabus

Upload File: AMFG 4800 6800 and 4801 6801-20150911144630.docx

Description: AMFG 4800 6800 syllabus

Chair, Department Curriculum Committee — Date: 10-19-2015

000108

Department Chair — Date: 10/21/15

Chair, College Curriculum Committee — Date: 10/21/15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/4/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/2016

President — Date

108.2

Add 4000/6000 Course

Course Attributes

Subject Abbreviation:	AMFG-Advanced Manufacturing	Catalog Title:	Practicum Lab in Advanced Manufacturing
Course Number:	4801 / 6801	Transcript Title:	Pract Lab in Adv Manufacturing
Effective Term:	Spring 2016	Cross-reference(s):	
College:	Engineering and Science	Grade Mode:	Standard Letter
Department:	COES Commitments	☑ Additional Fee?	

Justification
To support travel and materials to support the lab experience

Form

User ID: mkurz Name: Mary Kurz-Edsall
Date: 11/06/2015 Number: 8009

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
0	6

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Rationale for Add Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☑ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

Schedule Types

- ○ Field Course
- ○ Independent Study
- ○ Internship
- ○ Lab No Fee
- ◉ Lab With Fee
- ○ Lecture
- ○ Other
- ○ Seminar
- ○ Studio
- ○ Tutorial

Projected Enrollment

Year 1: 10
Year 2: 15
Year 3: 20
Year 4: 20

Evaluation

4000				6000			
A	90	-	100	A	90	-	100
B	80	-	89	B	80	-	89
C	70	-	79	C	70	-	79
D	60	-	69	F	<		70
F	<		60				

All grading included in Lecture — All grading included in Lecture

Catalog Description

Lab for AMFG 4801/6801

☐ Prerequisite(s) ☑ Corequisite(s)

Corequisite: For AMFG 4801: AMFG 4800; for AMFG 6801: AMFG 6800

Required course for students in

Advanced Manufacturing Certficate

Statement of need and justification based on assessment of student learning outcomes

See AMFG 4800/6800

Textbook(s)

None

108.4

Learning Objectives

See AMFG 4800/6800

Topical Outline

Laboratory (6 contact hours per week) Week 01: Team assessment and dynamics Week 02: Team formation/organization, goal setting Week 03: Lab organization and safety, PLC project Week 04: PLC project Week 05: Microcontroller programming exercise Week 06: Project work Week 07: Project work Week 08: Mid-semester presentations Week 09: Project work Week 10: Project work Week 11: Project work Week 12: Project work Week 13: Project work Week 14: Final project presentations Week 15: Lab cleanup

Add course requirements for 6000-level courses

See AMFG 4800/6800

Syllabus

Upload File: AMFG 4800 6800 and 4801 6801-20150911145019.docx

Description: syllabus

108.6

Chair, Department Curriculum Committee — Date

Department Chair — 11/9/15 — Date

Chair, College Curriculum Committee — 11/6/205 — Date

College Dean — 11/6/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/2016 — Date

President — Date

Add 4000/6000 Course

000109

Course Attributes

Subject Abbreviation:	BMOL-Biomolecular Engineering	**Catalog Title:**	Bioprocess Engineering
Course Number:	4290 / 6290	**Transcript Title:**	Bioprocess Engineering
Effective Term:	Fall 2016	**Cross-reference(s):**	
College:	Engineering and Science	**Grade Mode:**	Standard Letter
Department:	Chemical & Biomolecular Eng		

☐ **Additional Fee?**

Justification

This is a new course that will be developed and required for all CHE majors. It will replace MICRO 4130 in the curriculum and contain concepts relating to both bioreactionss and bioseparations. These concepts have been deemed weaknesses from student assessments, thus we are bringing it into the department. This change also helps with ABET evaluation because it increases the number of engineering credits in the curriculum.

Form

User ID: ckitche **Name:** Christopher Kitchens

Date: 10/16/2015 **Number:** 12096

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Rationale for Add Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☑ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

Schedule Types

- ○ **Field Course**
- ○ **Independent Study**
- ○ **Internship**
- ○ **Lab No Fee**
- ○ **Lab With Fee**
- ◉ **Lecture**
- ○ **Other**
- ○ **Seminar**
- ○ **Studio**
- ○ **Tutorial**

Projected Enrollment

Year 1: 60
Year 2: 65
Year 3: 70
Year 4: 70

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Midterm Exam 1 20 % Midterm Exam 2 20 %Projects 10 % Homework and Quizzes 20 %Final Exam 30 %

6000

A	90	-	100
B	80	-	89
C	70	-	79
F	<		70

Midterm Exam 1 20 % Midterm Exam 2 20 % Projects 10 % Homework and Quizzes 10 % Final Exam 30 % Case Study 10 %

Catalog Description
This course applies chemical engineering principles to bioprocess design. Emphasis is placed on designing bioreactors and bioseparation unit operations used in industrial biotechnology and the chemical process industry. Application of bioreaction and bioseparation operations to other chemical processes will be discussed.

☑ **Prerequisite(s)** ☐ **Corequisite(s)**
ChE 3300 and ChE 4500

Required course for students in
Chemical Engineering Major

Statement of need and justification based on assessment of student learning outcomes
The evolving nature of Chemical Engineering and our industry has developed a specific need within our curriculum to educate our students on the topics of bioprocess engineering including bioreaction engineering and bioseparations. This course will cover these topics as they relate to chemical engineering and fit within the broader interdisciplinary realm of science and engineering. As our society becomes more aware of the environmental and safety impacts of chemical processes, biochemical processes are increasingly sought as safer, lower energy, more sustainable alternatives. Furthermore, a paradigm shift is underway in industry where chemical processes and products become more biologically focused. This trend is rapidly emerging in industry as well as a need for more curriculum content focused on these topics. This course satisfies all of these needs while also improving students teamwork, critical thinking, communication, and creativity skills.

Textbook(s)
Harrison, R.G., Todd, P.W., Rudge, S.R., Petrides, D.P.; Bioseparations Science and Engineering. Oxford Press, 2015

Learning Objectives
By the end of this course the student should be able to: • Design a bioreactor based on the microbial growth kinetics, growth requirments, and cellular metabolism. • Design separation processes typically used for separating biochemicals. • Communicate effectively and knowledgably with students and professionals from other disciplines on current, historical, and future topics related to bioprocessing.

Topical Outline
Week 1: Introduction; Principles of Bioprocess Engineering Week 2: Microbial Growth & Nutrition Week 3: Microbial Growth Kinetics Week 4: Chemostats and Industrial Bioreactors Week 5: Wastewater Treatment Week 6: Cell Lysis/Flocculation Week 7: Filtration Week 8: Centrifugation Weeks 9-10 Adsorption & Chromatography Week 11-12 Precipitation & Crystallization Week 13 Drying Week 14 Presentations; Case Studies

Duplication (if applicable)
This course will have some overlap with BE 4280 Biochemical Engineering and the faculty in EEES have been contacted to ensure that there is no duplication. This course replaces MICRO 4130 Industrial Microbiology in our current curriculum and the motivation for this change is based on the difference in course material that is needed for our students

Add course requirements for honors courses (if applicable)
NA

Add course requirements for 6000-level courses
BMOLE 6290: The graduate section of this course will be required to perform a case study that presents an example of a company replacing a traditional chemical process with one that incorporates bioprocess engineering. The case studies will be presented in a written report and in a 15 minute oral presentation to the class during the last week of classes for the semester.

Learning Activities associated with General Education competencies (if applicable)
NA

Syllabus
Upload File: BMOL 4290 6290 syllabus-20151016171129.pdf

Description: CHE 4290 Bioprocess Engineering

Department of Chemical & Biomolecular Engineering—Clemson University

BMOLE 4290 / 6290: Bioprocess Engineering - Spring Semester 20XX

Instructor: Mark Blenner; 207A Earle Hall; Tel.: 656-0290; blenner@clemson.edu

Office hours: Monday and Wednesday 10-12 a.m. unless cancelled ahead of time, other times are available by appointment.

Required Textbook:

Harrison, R.G., Todd, P.W., Rudge, S.R., Petrides, D.P.; *Bioseparations Science and Engineering.* Oxford Press, 2015

Supplemental Textbooks:

Blanch, H., Clark. D.; *Biochemical Engineering.* Marcel Dekker, Inc., 1997.

Fogler, S.; *Elements of Chemical Reaction Engineering*; Prentice Hall., 2005.

Course prerequisites: ChE 3300 and ChE 4500 or equivalent

Meeting times: MWF 9:05 to 9:55 am in 124 Earle Hall

Note: If I am more than 5 minutes late for a lecture and I am not in my office, someone in the class should take initiative and begin a class-wide discussion of the lecture material for the past week and not wait for me. Class will not be cancelled. The student(s) who take initiative to lead the discussion should relate back to me the content of the discussion and this will be taken into consideration in the assignment of final grades.

Attendance policy: Regular, timely attendance is expected. Please inform me in writing if you must miss a class.

Catalog Description: (45 words) This course applies chemical engineering principles to bioprocess design. Emphasis is placed on designing bioreactors and bioseparation unit operations used in industrial biotechnology and the chemical process industry. Application of bioreaction and bioseparation operations to other chemical processes will be discussed.

Learning Objectives: By the end of this course the student should be able to:

- Design a bioreactor based on the microbial growth kinetics, growth requirments, and cellular metabolism.
- Design separation processes typically used for separating biochemicals.
- Communicate effectively and knowledgably with students and professionals from other disciplines on current, historical, and future topics related to bioprocessing.

Statement of Need: The evolving nature of Chemical Engineering and our industry has developed a specific need within our curriculum to educate our students on the topics of bioprocess engineering including bioreaction engineering and bioseparations. This course will cover these topics as they relate to chemical engineering and fit within the broader interdisciplinary realm of science and engineering. As our society becomes more aware of the environmental and safety impacts of chemical processes, biochemical processes are increasingly sought as safer, lower energy, more sustainable alternatives. Furthermore, a paradigm shift is underway in industry where chemical processes and products become more biologically focused. This trend is rapidly emerging in industry as well as a need for more curriculum content focused on these topics. This course satisfies all of these needs while also improving students teamwork, critical thinking, communication, and creativity skills.

General Engineering Competencies: If done correctly; your classroom exercises, homework, exams, and group projects will provide evidence for the following competencies:

Written and Oral Communication Skills

1. Demonstrate effective communication skills appropriate for topic, audience, and occasion.
2. Compose coherent, well-supported, and carefully edited speeches, essays, or reports suitable for a range of different audiences and purposes.
4. Incorporate appropriate print and electronic resources into speeches, presentations, and written documents.
5. Demonstrate effective verbal and nonverbal delivery skills for speeches and presentations.

Mathematical, Scientific, and Technological Literacy

1. Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically, and applying mathematical or statistical methods using multiple representations.
2. Develop an understanding of the principles and theories of a natural science and its applications.
4. Apply information technologies to intellectual and professional development.
5. Understand the role of science and technology in society.

Social Sciences

1. Develop an understanding of social science methodologies in order to explain the causes and consequences of human actions.

Cross-Cultural Awareness

1. Develop an understanding of world cultures in historical and contemporary perspectives.

Critical Thinking

1. Acquire, analyze, and evaluate information to determine its quality and utility.
2. Analyze disciplinary and interdisciplinary knowledge and abilities gained during the undergraduate experience.

Ethical Judgment

1. Demonstrate knowledge of what ethics is and is not, its relation to academic integrity, and its importance in one's life and work.
2. Demonstrate understanding of common ethical issues and construct a personal framework in which ethical decisions can be made in a systematic, reflective, and responsible way.

Academic Integrity Policy: Students should refer to the University policy on academic integrity found in the Undergraduate Announcements. It is the instructors understanding and expectation that all academic work submitted for grading contains an implicit pledge by the student that the work is completely original and no unauthorized aid was received. Authorized aid on homework and/or group assignments includes discussing the interpretation of the problem statement, sharing ideas for problem solving, and explaining concepts involved in solving problems. Any other aid would be considered a violation of the academic integrity policy. If any information is obtained from an outside source, it should be from a credible source and referenced or cited appropriately.

It is the responsibility of every member of the Clemson University community to enforce the Academic Integrity Policy. If you find evidence that another student has committed an act of academic dishonesty, then you should contact the instructor to discuss the incident. The instructor is obligated to make a formal written charge of any case of academic dishonesty that will be noted on the student's official academic record and conveyed to the Dean of Undergraduate Studies and the Undergraduate Academic Integrity Committee. Students found guilty of a first offense of academic dishonesty will receive an 'F' for the course – it's not worth it!!

Exams: Three comprehensive take-home exams are scheduled during the semester. In addition, a comprehensive final exam will be given on **Friday, December 13th from 8:00-10:30 a.m.**

If you must miss an exam because of extreme circumstances, then you must provide a written description prior to the exam of why you must miss the exam. No make-up exams will be given for a particular exam during the semester. In this case, the grade on the final exam will be used as the midterm exam grade.

Homework: Homework is due at the beginning of class on the due date and must be turned in in person. If you will not be attending class then arrangements should be made before class. Students are encouraged to collaborate in working out-of-class assignments. However, verbatim copying is prohibited and violates the Honor Code policy of the College of Engineering and Science and of Clemson University. *Late homework assignments will not be accepted for any reason.*

Homework assignments should be neat and legible, answers should be clearly marked, and work must be clear to receive partial credit. Assignments that are tuned in should be single-sided, stapled together in the upper left hand corner, and folded vertically with your name on the outside of the folded assignment.

Quizzes: Ten minute, in-class quizzes may be given at any point in the semester on unannounced dates. These quizzes will be comprehensive and will count as a homework grade. Format is the same as for homework assignments.

Projects: Group projects will be assigned for students to present on the development of pre-chosen bioprocess. The presentation will focus on the unit operations of the bioprocess.

BMOLE 6290: The graduate section of this course will be required to perform a case study that presents an example of a company replacing a traditional chemical process with one that incorporates bioprocess engineering. The case studies will be presented in a written report and in a 15 minute oral presentation to the class during the last week of classes for the semester.

Grading:	**Undergraduate**		**Graduate**	
	Midterm Exam 1	20 %	Midterm Exam 1	20 %
	Midterm Exam 2	20 %	Midterm Exam 2	20 %
	Projects	10 %	Projects	10 %
	Homework and Quizzes	20 %	Homework and Quizzes	10 %
	Final Exam	30 %	Final Exam	30 %
			Case Study	10 %

An overall course grade of 90 % will guarantee an A; 80 % a B; 70 % a C; and 60 % a D.

Week 1:	Introduction; Principles of Bioprocess Engineering
Week 2:	Microbial Growth & Nutrition
Week 3:	Microbial Growth Kinetics
Week 4:	Chemostats and Industrial Bioreactors
Week 5:	Wastewater Treatment
Week 6:	Cell Lysis/Flocculation
Week 7:	Filtration
Week 8:	Centrifugation
Weeks 9-10	Adsorption & Chromatography
Week 11-12	Precipitation & Crystallization
Week 13	Drying
Week 14	Presentations; Case Studies

000114

Chair, Department Curriculum Committee — 10/7/15 — Date

Department Chair — 10/7/15 — Date

Chair, College Curriculum Committee — 10/19/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 — Date

President — Date

115

Change Undergraduate Course

Change a Course

Subject: CHE-Chemical Engineering

Number: 1300

Effective Term: Summer 2016

Title: Chemical Eng Tools

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
Change in the course title to be more appropriate and change in number of hours from 2 (1) plus lab 0 (2) to a 3 hour course without lab. Hours are now consistent with the ENGR 1070/1080/1090 sequence and representative of the course content.

Rationale for Changing a Course

☑ **Strengthen Program Requirement(s)**

☐ **Alignment of Student Learning Outcomes**

☐ **Alternative Delivery of Content**

☐ **Improve Time to Degree**

☐ **Evolution of the Discipline**

☐ **Changing Prerequisites**

☐ **Address DWF Rates**

☐ **General Education Modifications**

☐ **Other (Please specify.)**

☑ Change Catalog Title

From Chemical Engineering Tools

To Introduction to Chemical Engineering

☑ Change Transcript Title

From Chemical Eng Tools

To Intro to Chemical Eng

☑ Change of Credit

From

Fixed Credit Course

Credit Hrs	Contact Hrs
2	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

To

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Learning Objectives

NA

Topical Outline

NA

Duplication (if applicable)

NA

Evaluation

Undergraduate

A 90 - 100

B 80 - 89

115 1/2

C	70	-	79
D	60	-	69
F	<		60

You can earn 1020 points from assignments, exams, and surveys: Individual Assignments (190 points) Group Assignments (190 points) In-Class Activities (50 points) Exams (550 points) Surveys (40 points) Course Grades • 900 points or more will guarantee an A• 800 points or more will guarantee aB's • 700 points or more will guarantee aC's • 600 points or more will guarantee aD's

Syllabus

Description: CHE 1300 Syllabus

Form

User ID:	ckitche	**Name:**	Christopher Kitchens
Date:	10/07/2015	**Number:**	11909

000116

Chair, Department Curriculum Committee — Date: 10/7/15

Department Chair — Date: 10/7/15

Chair, College Curriculum Committee — Date: 10/19/15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/16

President — Date

.0.117

Delete Undergraduate Course

Delete a Course

Subject: CHE-Chemical Engineering
Number: 1301
Effective Term: Summer 2016
Title: Chem Eng Tools Lab
☐ Delete Honors Course:
Last Term Course was taught: 999999

Brief Statement of Change Based on Assessment Results:
CHE1300 was changed from a 2(1) to a 3(0), a 3 hour lecture without a lab course, thus the zero hour lab CHE 1301 is no longer needed.

Rationale for Delete Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

Form

User ID: ckitche **Name:** Christopher Kitchens
Date: 10/07/2015 **Number:** 12087

Chair, Department Curriculum Committee — Date 10/7/15

Department Chair — Date 10/7/15

Chair, College Curriculum Committee — Date 10/19/15

College Dean — Date 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date 2/11/16

President — Date

test

Chair, Department Curriculum Committee — Date 10/7/15

Department Chair — Date 10/7/15

Chair, College Curriculum Committee — Date 10/19/15

College Dean — Date 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date 2/11/16

President — Date

000120

Chair, Department Curriculum Committee — Date: 10/7/15

Department Chair — Date: 10/7/15

Chair, College Curriculum Committee — Date: 10/19/15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

30.121

Change Undergraduate Course

Change a Course

Subject: CHE-Chemical Engineering
Number: 2110
Effective Term: Fall 2016
Title: Intro to Chem Eng
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201408

Brief Statement of Change Based on Assessment Results:
Change of Name to better reflect the course material. Course content will not change.

Rationale for Changing a Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ **Change Catalog Title**
From Introduction to Chemical Engineering
To Mass and Energy Balances

☑ **Change Transcript Title**
From Intro to Chem Eng
To Mass and Energy Balances

Learning Objectives
NA

Topical Outline
NA

Duplication (if applicable)
NA

Evaluation
Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Grading: Category Percentage of final grade Team homeworks & challenge problems 5.0% Homework quizzes 10.0% Tests 2 total higher score @ 20.0%, lower score @ 10.0% 30.0% Exams 1 midterm and 1 final higher score @ 25.0%, lower score @ 20.0% 45.0% In-class assignments 4.0% Reading quizzes 3.0% Participation 3.0% Extra credit Adds to final percentage

Syllabus

Description: CHE 2110 Syllabus

Form
User ID: ckitche **Name:** Christopher Kitchens
Date: 10/07/2015 **Number:** 11923

000122

Chair, Department Curriculum Committee — Date: 10/7/15

Department Chair — Date: 10/7/15

Chair, College Curriculum Committee — Date: 10/19/15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/16

President — Date

000123

Change Undergraduate Course

Change a Course

Subject: CHE-Chemical Engineering
Number: 2111
Effective Term: Fall 2016
Title: Intro to Chem En Lab

Honors Course:
☐ Add Honors Course:

Last Term Course was taught: 999999

Brief Statement of Change Based on Assessment Results:
Change of Name to better reflect the course material. Course content will not change.

Rationale for Changing a Course

- ☑ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☐ Evolution of the Discipline
- ☐ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Catalog Title

From Introduction to Chemical Engineering Laboratory
To Mass and Energy Balances Laboratory

☑ Change Transcript Title

From Intro to Chem En Lab
To Mass and Energy Balances Lab

Learning Objectives

NA

Topical Outline

NA

Duplication (if applicable)

NA

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Grading: Category Percentage of final grade Team homeworks & challenge problems 5.0% Homework quizzes 10.0% Tests 2 total higher score @ 20.0%, lower score @ 10.0% 30.0% Exams 1 midterm and 1 final higher score @ 25.0%, lower score @ 20.0% 45.0% In-class assignments 4.0% Reading quizzes 3.0% Participation 3.0% Extra credit Adds to final percentage

Syllabus

Description: CHE 2110 Syllabus

Form

User ID: ckitche **Name:** Christopher Kitchens
Date: 10/07/2015 **Number:** 11924

000124

Chair, Department Curriculum Committee — 10/2/15 — Date

Department Chair — 10/7/15 — Date

Chair, College Curriculum Committee — 10/19/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 — Date

President — Date

Change Undergraduate Course

Change a Course

Subject: CHE-Chemical Engineering
Number: 2990
Effective Term: Spring 2016
Title: CI in Chem & Biomolecular Engr
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
We are changing the CHE 2990 Creative Inquiry Course from Graded to Pass/No Pass. Upper level (3990 and 4990) Creative Inquiry Courses are still graded.

Rationale for Changing a Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Grade Mode

From Standard Letter
To Pass/No Pass

Learning Objectives

NA

Topical Outline

NA

Duplication (if applicable)

NA

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Change to Pass / No Pass Bi-weekly Progress Reports 30% Final Report 15% Poster or Oral Presentation 15% Laboratory Practice / Participation 40% Grading in Pass / No Pass with a total of 60% or greater constituting a Passing grade.

Syllabus

Description: CI syllabus

Form

User ID: ckitche **Name:** Christopher Kitchens
Date: 10/07/2015 **Number:** 11920

000126

Chair, Department Curriculum Committee — 10/7/15 — Date

Department Chair — 10/7/15 — Date

Chair, College Curriculum Committee — 10/19/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 — Date

President — Date

Add 4000/6000 Course

Course Attributes

Subject Abbreviation:	CHE-Chemical Engineering	**Catalog Title:**	Green Engineering
Course Number:	4140 / 6140	**Transcript Title:**	Green Engineering
Effective Term:	Fall 2016	**Cross-reference(s):**	
College:	Engineering and Science	**Grade Mode:**	Standard Letter
Department:	Chemical & Biomolecular Eng		

☐ **Additional Fee?**

Justification
This course is currently being taught for the fourth time as a CHE 4450/6450 Special Topics course. Current enrollment in 18 students.

Form

User ID: ckitche **Name:** Christopher Kitchens
Date: 10/06/2015 **Number:** 11956

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Rationale for Add Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☑ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

Schedule Types

- ○ **Field Course**
- ○ **Independent Study**
- ○ **Internship**
- ○ **Lab No Fee**
- ○ **Lab With Fee**
- ◉ **Lecture**
- ○ **Other**
- ○ **Seminar**
- ○ **Studio**
- ○ **Tutorial**

Projected Enrollment

Year 1: 20
Year 2: 25
Year 3: 30
Year 4: 30

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Midterm Exam 1 15 % Midterm Exam 2 15 % Midterm Exam 3 15 % Projects 15 % Homework and Quizzes 10 % Final Exam 30 %

6000

A	90	-	100
B	80	-	89
C	70	-	79
F	<		70

Midterm Exam 1 12 % Midterm Exam 2 12 % Midterm Exam 3 12 % Projects 10 % Homework and Quizzes 10 % Final Exam 30 % Case Study 14%

Catalog Description

This course applies green chemistry/engineering principles to process and product design. Green engineering metrics are applied to quantify the sustainability, life cycle and environmental impact of chemical technologies, processes, and products. Emphasis is placed on industrial sustainability, product innovation, risk assessment, policy, and societal implications.

☑ Prerequisite(s) ☐ Corequisite(s)

MATH 1080 and CHE 2110 or Consent of Instructor

Required course for students in

Elective course in Chemical Engineering, Satisfies requirements for Emphasis Areas as well as the Sustainability Minor.

Statement of need and justification based on assessment of student learning outcomes

The evolving nature of Chemical Engineering and our industry has developed a specific need within our curriculum to educate our students on the topics of green chemistry, green engineering, and sustainability. This course will cover these topics as they relate to chemical engineering and fit within the broader interdisciplinary realm of science and engineering. As our society is faced with growing population and increasing globalization, the resulting environmental impact is becoming more evident; case in point is global climate change. Furthermore, increasing environmental regulations in response to chemical disasters is leading to the need for a paradigm shift where chemical processes and products become inherently safe. This coupled with public perception, marketing, and potential for innovation, necessitates a need for metrics and tool to assess whether or not one product or process is "greener" than another. This trend is rapidly emerging in industry as well as a need for more curriculum content focused on safety, as dictated by our industrial advisory board and ABET. This course satisfies all of these needs while also improving students teamwork, critical thinking, communication, and creativity skills.

Textbook(s)

Allen, D. T., Shonnard, D. R.; Green Engineering: Environmentally Conscious Design of Chemical Processes. Prentice Hall, 2002

Learning Objectives

By the end of this course the student should be able to:• Apply metrics and design tools of Green Chemistry and Green Engineering to evaluate chemical processes and products in order to determine how "green" a process or product is and how to make a product or process more "green"• Understand risk assessment and how it applies to the chemical industry, including methods of assessing hazard and exposure.• Evaluate an industrial sustainability plan and assess how "green" a commercial process or product is. • Communicate effectively and knowledgably with students and professionals from other disciplines on current, historical, and future topics related to Green Chemistry, Green Engineering, and Sustainability.

Topical Outline

Week 1: Introduction; Principles of Green Chemistry and Engineering Week 2: Risk Assessment; Ethics, Policy, and Regulations; Role of Chemical Engineers Week 3: Exposure Evaluation: Chemical Properties, Environmental Fate, Occupational Hazard Week 4: Green Process Design; Mass and Energy Balances, Unit Operations Weeks 5-6 Green Chemistry Metrics Week 7 Life Cycle Assessment, Process Metrics Week 8 Industrial Ecology; Environmental Transport Weeks 9-10 Tools for Evaluating Green Processes Week 11 Green Product Design; Product Innovation Week 12 Renewable Resources; Alternative Energy Week 13 Policy, Ethics, and Sustainability of Globalization Week 14 Project Reports; Presentations; Case Studies

Duplication (if applicable)

Courses currently offered that have similat content include EES 4800 Env. Risk Assessment and EES 4860 Env. Sustainability. Kevin Finneran in EEES has been contacted to ensure that there is no duplication of courses.

Add course requirements for honors courses (if applicable)

NA

Add course requirements for 6000-level courses

The graduate section of this course will be required to perform a case study that presents an example of a company making an improvement in their methodologies (product development, alternative synthesis, process design improvement, etc.) that incorporates green engineering and sustainability concepts. The case studies will be presented in a written report and in a 15 minute oral presentation to the class during the last week of classes for the semester.

Learning Activities associated with General Education competencies (if applicable)

NA

Syllabus

Description: CHE Green Engineering SYL

000128

Chair, Department Curriculum Committee — Date: 10/7/15

Department Chair — Date: 10/7/15

Chair, College Curriculum Committee — Date: 10/19/15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/16

President — Date

Add 4000/6000 Course

000129

Course Attributes

Subject Abbreviation:	CHE-Chemical Engineering	**Catalog Title:**	Alternative Energy
Course Number:	4150 / 6150	**Transcript Title:**	Alternative Energy
Effective Term:	Fall 2016	**Cross-reference(s):**	
College:	Engineering and Science	**Grade Mode:**	Standard Letter
Department:	Chemical & Biomolecular Eng		

☐ **Additional Fee?**

Justification
This course has been taught three times as a CHE 4450/6450 Special Topics course. This is an elective course in Chemical Engineering

Form

User ID: ckitche **Name:** Christopher Kitchens
Date: 10/16/2015 **Number:** 11970

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Rationale for Add Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☑ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

Schedule Types

- ○ **Field Course**
- ○ **Independent Study**
- ○ **Internship**
- ○ **Lab No Fee**
- ○ **Lab With Fee**
- ◉ **Lecture**
- ○ **Other**
- ○ **Seminar**
- ○ **Studio**
- ○ **Tutorial**

Projected Enrollment

Year 1: 20
Year 2: 25
Year 3: 30
Year 4: 30

Evaluation

4000

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Homework and Project(s) 35% Tests (2 equally weighted) 40% Final Exam 25%

6000

A	90	-	100
B	80	-	89
C	70	-	79
F	<		70

Homework and Project(s) 31.5% Tests (2 equally weighted) 36% Final Exam 22.5% Special Project 10%

Catalog Description
This course addresses the technological, environmental, political, social, and economic fundamentals associated with using alternative energy

sources to meet global energy needs. Engineering analysis will be used to evaluate several alternative energy technologies, including biomass, geothermal, hydropower, nuclear, solar, and wind.

☑ **Prerequisite(s)** ☐ **Corequisite(s)**

CHE 2200 and CHE 2300 or Concent of Instructor

Required course for students in

Elective course in Chemical Engineering, Satisfies requirements for Emphasis Areas This course has been taught 3 times already as a special topics course and is being developed into an online course to serve as a core course for an Alternative Energy Certificate.

Statement of need and justification based on assessment of student learning outcomes

The environmental impact and limited long term availability of fossil fuels as the primary source of energy for human efforts demands that future generations, especially chemical engineers , be educated about the magnitude of energy use across the planet and the feasibility of replacing fossil fuels with low-cost alternative or renewable energy sources. This course will cover these topics as they relate to chemical engineering and fit within the broader interdisciplinary realm of science and engineering. This course will provide insight to student about the geopolitical and environmental consequences associated with the production and use of carbon based fuels. It will also provide an engineering and science perspective, built upon thermodynamics and geophysics, to evaluate the extent to which biomass, geothermal, hydropower, solar and wind technologies could be used to replace fossil fuels. The course will also address the social and political aspects associated with transitioning from fossil fuels to alternative technologies. Despite recent reductions in the price of fossil fuels, the environmental and geopolitical driving forces for developing alternative energy technologies is still very strong. This course will enlighten students about all of these energy related topics and prepare them to become key decision makers in future energy related areas. The course will develop students teamwork, critical thinking, communication, and creativity skills as a result of presentations and open-ended projects assigned in the course.

Textbook(s)

MacKay, David JC, Sustainable Energy - Without the Hot Air; UIT Cambridge Ltd.: Cambridge, UK, 2009. ISBN: 978-0954452933

Learning Objectives

By the end of this course: • Students will present an overview and write a technical report that outlines how a specified region (e.g., city, state, or country) could best transition to alternative energy sources optimized for that location. • Students will be active participants in discussions related to the use of specific energy sources by analyzing, evaluating and creatively combining topics discussed in lecture and external reading materials. • Students will review, create and discuss strategies that could be used by governments to bring about changes in energy use habits by individuals and companies. • Students will select a specific method for alternative energy generation that is of personal interest, identify the technical difficulties keeping the technology from gaining wider use, and write a brief proposal explaining how directed research funding could help commercialize or increase use of the technology.

Topical Outline

Topics (Classes) 1. Overview of energy sources, demand trends, and environmental and health impacts of energy production, distribution and use (5) 2. Energy fundamentals: thermodynamics, kinetics, and efficiency (5) 3. Fossil fuels: oil, natural gas, coal, tar sands, methane clathrates, etc. (3) 4. Nuclear power: fuel cycle (for both fission and fusion), cost, as well as political and social issues {MacKay Chpt. 24} (3) 5. Environmental effects of current energy use – need for alternative energy (3) 6. Economics of energy production, distribution and use (3) 7. Renewable fuels overview: availability, feasibility (short and long term), cost, as well as social and political aspects (5) 8. Biomass and biofuels (4) 9. Geothermal energy {MacKay Chpt. 16} (2) 10. Hydropower (oceans, rivers, lakes) {MacKay Chpts. 8, 12, 14, F, and G} (2) 11. Solar energy {MacKay Chpts. 6 and D} (3) 12. Wind power {MacKay Chpts. 4, 10, and B} (2) 13. Other sources of renewable energy (1) 14. Energy storage and distribution (3) 15. The big picture - energy for the future: conservation, production, transportation, storage, cost, as well as social and political aspects (3)

Duplication (if applicable)

Faculty in Civil Engineering and Environmental Engineering and Earth Sciences have been contacted to ensure there is no duplication with CE 4370, CE 4400, and BE 4400

Add course requirements for honors courses (if applicable)

NA

Add course requirements for 6000-level courses

Those students taking the graduate course ChE 645 will have to conduct an additional special project to receive full credit. The project will be weighted to 10% of the final grade with the above criterion carrying 90% weight.

Learning Activities associated with General Education competencies (if applicable)

NA

Syllabus

Upload File: syllabus-che445-energy-2014-20151007170141.doc

Description: Alt Energy Syllabus

ChE 4150/6150 Alternative Energy
Clemson University
Fall Semester, 2014

Lecture: MWF 9:05-9:55 am, 124 Earle Hall
Instructor: Dr. David A. Bruce
Office Phone: 656-5425 E-Mail: dbruce@clemson.edu
Office Hours: TBA Office: 211 Earle Hall
Teaching Assistants: TBA

If neither myself nor my designated replacement has arrived within 15 minutes after the nominal starting time for the class, you may assume that the class has been canceled.

Required Text
Most of the material to be covered in this class will come from a variety of online and in-print sources, which will be provided as the course progresses. Additionally, the free text listed below will also be used. **There is no need to buy a textbook for this course!**

MacKay, David JC, *Sustainable Energy - Without the Hot Air*; UIT Cambridge Ltd.: Cambridge, UK, 2009. ISBN: 978-0954452933
(download free version at www.withouthotair.com/download.html)

Supplementary Material (not required)
Boyle, Godfrey, *Renewable Energy: Power for a Sustainable Future*; 2nd ed., Oxford University Press: Oxford, UK, 2004.

Boyle, Godfrey; Everett, Bob; Ramage, Janet, Energy Systems and Sustainability: Power for a Sustainable Future; Oxford University Press: Oxford, UK, 2004.

Berinstein, Paula, *Alternative Energy: Facts, Statistics, and Issues*; Greenwood, 2001.

da Rosa, Aldo Vieira, *Fundamentals of Renewable Energy Processes*, 2nd ed.; Elsevier Academic Press: New York, 2009.

Nelson, Jenny, *The Physics of Solar Cells*; Imperial College Press: London, UK, 2003.

O'Hayre, Ryan P., *Fuel Cell Fundamentals*; Wiley & Sons: New York, 2005.

Tester, Jefferson; Drake; Driscoll; Golay; Peters, *Sustainable Energy: Choosing Among Options*; The MIT Press: Cambridge MA, 2005. ISBN: 978-0262201537

Relevant excerpts from these books and other sources will be handed out as appropriate.

Course Prerequisites
ChE 220 (thermodynamics) and ChE 230 (fluid and heat transport) or equivalent courses

Honor Code and Academic Integrity

Honor Code: Students will be expected to obey the College of Engineering and Science Honor Code. Consultation on non-group homework assignments is permitted, but the exchange of detailed work and answers, by any means, is not allowed. Although collaboration is encouraged, plagiarism is not permitted. Plagiarism is in violation of academic integrity and if in violation, you will be referred to the University. Plagiarism is when you take someone else's ideas or work and make them your own, even if permission is granted. The Clemson University Academic Integrity Policy says plagiarism "includes the copying of language, structure or ideas of another and attributing the work to one's own efforts." Be advised that the definition makes no distinction between deliberately using someone else's work without attribution and doing so unintentionally; both are plagiarism. More information about plagiarism can be found here: http://www.grad.clemson.edu/plagiarism.php

Academic Integrity: "As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form."

The Clemson University Title IX (Sexual Harassment) Statement

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator, and is also the Director of Access and Equity. His office is located at 111 Holtzendorrf Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

Disability Access

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students with disabilities who need accommodations should make an appointment with Dr. Arlene Stewart, Director of Student Disability Services, to discuss specific needs within the first month of classes. Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Student Disability Services is located in Suite 239 Academic Success Building (656-6848; sds-l@clemson.edu). Please be aware that accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.

Attendance

Quoting from the Faculty Manual, "A student who incurs excessive absences in a given course may be dropped from a course by the instructor in accordance with a stated course policy." For this course, *excessive means missing more than 25% of the course lectures.* Attendance is required for all tests. Make up tests will only be given if you have an acceptable excuse (documented illness, death in family, etc.) or I approve an excused absence for you before the

scheduled test. You are also expected to participate in class discussions and are responsible for all assignments and announcements made in class.

Course Description & Objectives

This course will address the technological, environmental, political, social, and cost fundamentals of conventional and emerging energy technologies, including biomass, fossil fuels, geothermal, hydropower, nuclear, oceanic, solar, wind, as well as other less widely used energy sources. The course will also examine the prevalence, extraction methods, conversion, distribution, and end uses for these varied energy sources and how they could be optimally used to meet global energy needs in the 21st century.

Upon completing the course, students will be able to explain the economic and environmental consequences associated with the continued use of non-renewable (e.g., fossil) fuels. Further, students will be able to evaluate the technical and economic viability of a wide array of sustainable (or alternative) energy sources, and be able to identify which sustainable energy technologies are the closest to commercialization and which show the greatest long-term economic viability.

Course material will come from D. MacKay (online) as well as many other online and in-print sources that are more up to date than these texts. To facilitate the learning process, the order in which topics will be covered are listed below. This list also contains the approximate number of classes that will be devoted to each of the topics.

	Topics	Classes
1.	Overview of energy sources, demand trends, and environmental and health impacts of energy production, distribution and use	5
2.	Energy fundamentals: thermodynamics, kinetics, and efficiency	5
3.	Fossil fuels: oil, natural gas, coal, tar sands, methane clathrates, etc.	3
4.	Nuclear power: fuel cycle (for both fission and fusion), cost, as well as political and social issues {MacKay Chpt. 24}	3
5.	Environmental effects of current energy use – need for alternative energy	3
6.	Economics of energy production, distribution and use	3
7.	Renewable fuels overview: availability, feasibility (short and long term), cost, as well as social and political aspects	5
8.	Biomass and biofuels	4
9.	Geothermal energy {MacKay Chpt. 16}	2
10.	Hydropower (oceans, rivers, lakes) {MacKay Chpts. 8, 12, 14, F, and G}	2
11.	Solar energy {MacKay Chpts. 6 and D}	3
12.	Wind power {MacKay Chpts. 4, 10, and B}	2
13.	Other sources of renewable energy	1
14.	Energy storage and distribution	3
15.	The big picture - energy for the future: conservation, production, transportation, storage, cost, as well as social and political aspects	3

Note: Every effort will be made to abide by the course outline presented above, but it is subject to change (especially the number of classes per topic) in the event of extenuating circumstances.

Evaluation
The course grade will be determined by student performance according to the following scheme:

Homework and Project(s)	35%
Tests (2 equally weighted)	40%
Final Exam	25%

The scheduled time for the final exam is Friday, December 12, 8:00 am - 10:30 am.

Those students taking the graduate course ChE 645 will have to conduct an additional special project to receive full credit. The project will be weighted to 10% of the final grade with the above criterion carrying 90% weight.

If judged to be appropriate, final grades will be curved at the end of the semester. However, individual test and homework scores will not be curved. You may drop your lowest homework grade.

Homework Policy
All homework is due at the beginning of class on the assigned day. Late homework will not be accepted except for special circumstances (e.g., documented illness, death in your family, University related travel). You may discuss aspects of homework assignments with others, but you may not copy solutions or exchange tangible or electronic information. Cloned solutions will receive one grade, divided equally among the participants.

General Education Competencies. All Clemson undergraduates following the 2006-2007 and subsequent *Announcements* must satisfy the General Education Competency requirements in six competency areas (each with a code letter):

W…Written and Oral Communication Skills

R…Reasoning, Critical Thinking, and Problem Solving

M…Mathematical, Scientific, and Technological Literacy

S…Social and Cross-Cultural Awareness

A…Arts and Humanities

E…Ethical Judgment

Each of these areas has several competencies listed with them. For example, "Reasoning, Critical thinking, and Problem-Solving" (R) has skills R1, R2, R3, and R4.

If done correctly, all of your homework, quizzes, and team projects will provide evidence for competencies R1, R2, R3, M1 and M2 that are described below. In addition, your team projects will provide evidence for competency in Information and Technology (IT), and your assignments pertaining to safety and environmental topics will provide evidence for competencies E1 and E2.

M1: Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically and applying mathematical or statistical methods using multiple representations.

M2: Develop an understanding of the principles and theories of a natural science and its applications.

IT: Apply information technologies to intellectual and professional development.

E1: Demonstrate knowledge of what ethics is and is not, its relation to academic integrity, and its importance as a field of study.

E2: Demonstrate understanding of common ethical issues, and construct a personal framework in which ethical decisions can be made in a systematic, reflective, and responsible way.

R2: Differentiate deductive and inductive reasoning processes.

R3: Acquire and analyze information to determine its quality and utility.

R4: Recognize parallels between and among disciplines and apply knowledge, skills or abilities learned in one discipline to another.

000136

Chair, Department Curriculum Committee — 10/7/15 — Date

Department Chair — 10/7/15 — Date

Chair, College Curriculum Committee — 10/19/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/2016 — Date

President — Date

Change Undergraduate Course

000137

Change a Course

Subject: CHE-Chemical Engineering

Number: 4430

Effective Term: Fall 2016

Title: Senior Seminar I

Honors Course:

☐ Add Honors Course.

Last Term Course was taught: 201408

Brief Statement of Change Based on Assessment Results:
Change name to Safety, Environmental, and Professional Practice I to reflect change in course content, Change from 1 hr to 2 hrs to accommodate additional course content. This change is motivated by ABET and the need to incorporate more Safety into the curriculum.

Rationale for Changing a Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Title

From Chemical Engineering Senior Seminar I

To Safety, Environmental, and Professional Practice I

☑ Change Transcript Title

From Senior Seminar I

To Safety Env & Prof Practice I

☑ Change of Credit

From

Fixed Credit Course

Credit Hrs	Contact Hrs
1	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

To

Fixed Credit Course

Credit Hrs	Contact Hrs
2	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

☑ Change Catalog Description

From Preparation of senior chemical engineering students for entry into the profession. Timely information on job interviewing skills, career placement and guidance, professional registration, professional behavior and ethics, and management of personal finances. Outside speakers are used frequently.

To Preparation of senior chemical engineering students for entry into the profession, with an emphasis on process safety. Timely information will be presented on career options for chemical engineers, professional practice, and a host of safety-related topics. Outside speakers are used frequently.

Learning Objectives

By the end of this course the student should be able to – - Develop professional skills that will serve you throughout your career - Develop knowledge related to many important safety topics ranging from laboratory- to plant-scale - Perform calculations to quantify issues related to plant safety - List ways to improve process safety

Topical Outline

Professional Practice – 1. Resume writing; 2. Interviewing skills; 3. Job searching; 4. Internet resources; 5. Career fair; 6. Graduate School; 7-10. Experiences/advice from alumni; 11. Diversity in the workplace; 12. Professional protocol; 13. FE exam; 14. Intellectual property Safety/Environmental – 1. Introduction; 2. Toxicology; 3. Industrial hygiene; 4-5. Source models; 6. Toxic release and dispersion models; 7. Fires and explosions; 8. Designs to prevent fires and explosions; 9. Introduction to reliefs; 10. Relief sizing; 11.Safety procedures; 12. Hazards identification; 13-14. Risk assessment

Duplication (if applicable)

NA

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Course is Pass / No Pass

Syllabus

Upload File: C443SYL modified for safety-20151016165136.doc

Description: CHE 4430 Safety Env Prof Prac I SYL

Form

User ID: ckitche **Name:** Christopher Kitchens

Date: 10/16/2015 **Number:** 11925

Statement of Need

Currently, safety issues are addressed in an ad hoc fashion in a few courses/laboratories. Moreover, there is no specific, identifiable safety training in the Chemical Engineering curriculum. We propose to upgrade our current 1-credit course, CH E 4430 Chemical Engineering Senior Seminar I, into a 2-credit course renamed as CH E 4430 Safety, Environmental, and Professional Practice I. This proposal is driven by several factors: (i) there is a need for a more coordinated and identifiable effort in specific safety-related topics as well as in holistic safety training; (ii) ABET has now mandated in their program criteria that Chemical Engineering curricula incorporate safety training; (iii) our Industrial Advisory Board, and our industry partners in general, have strongly endorsed the incorporation of safety in the curriculum; (iv) additional safety training will be beneficial to our students in the long run.

CLEMSON UNIVERSITY
Department of Chemical and Biomolecular Engineering

CH E 4430: Safety, Environmental, and Professional Practice I

Fall Semester 20XX
Prerequisite: ChE 3300 Corequisite: ChE 4310

Time and Place: 11:00-11:50 Tuesdays/Thursdays, 100 Earle Hall

Instructor: D. E. Hirt, 125 Earle Hall, hirtd@clemson.edu

Catalog Description: Preparation of senior chemical engineering students for entry into the profession, with an emphasis on process safety. Timely information will be presented on career options for chemical engineers, professional practice, and a host of safety-related topics. Outside speakers are used frequently.

Textbook: D.A, Crowl and J.F. Louvar, *Chemical Process Safety, Fundamentals with Applications*, Third edition, Prentice Hall, 2011.

Learning Objectives: By the end of this course the student should be able to –

- Develop professional skills that will serve you throughout your career
- Develop knowledge related to many important safety topics ranging from laboratory- to plant-scale
- Perform calculations to quantify issues related to plant safety
- List ways to improve process safety

Topical Outline:

Professional Practice – 1. Resume writing; 2. Interviewing skills; 3. Job searching; 4. Internet resources; 5. Career fair; 6. Graduate School; 7-10. Experiences/advice from alumni; 11. Diversity in the workplace; 12. Professional protocol; 13. FE exam; 14. Intellectual property

Safety/Environmental – 1. Introduction; 2. Toxicology; 3. Industrial hygiene; 4-5. Source models; 6. Toxic release and dispersion models; 7. Fires and explosions; 8. Designs to prevent fires and explosions; 9. Introduction to reliefs; 10. Relief sizing; 11.Safety procedures; 12. Hazards identification; 13-14. Risk assessment

Attendance: Required, only 1 unexcused and 2 excused absences will be allowed. Excuses will be granted only for plant trips (but not on-campus interviews unless no other times are available), for other approved university-sponsored events, and for serious illnesses. Requests for excused absences must be presented in writing as an official, written medical or university excuse (or letter from potential employer signifying a plant trip), preferably in advance. In the event that an instructor is late to class, please wait for 15 minutes before leaving.

Grading: 2 credit, pass/fail

To pass this course you must meet the attendance standards, participate actively in the topics under discussion, and complete all assigned work. While the quality of your participation may not be reflected by a letter grade, it will have an effect on your career development, and it may be factored into recommendations written on your behalf by the instructor.

You also must complete all of the safety modules and exercises assigned.

Academic integrity:

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form."

Disability access statement from the Office of Student Disability Services:

"It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students are encouraged to contact Student Disability Services to discuss their individual needs for accommodation."

The Clemson University Title IX (Sexual Harassment) Statement: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by

Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator, and is also the Director of Access and Equity. His office is located at 111 Holtzendorrf Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

000143

Chair, Department Curriculum Committee — 12/7/15 — Date

Department Chair — 10/7/15 — Date

Chair, College Curriculum Committee — 10/19/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 — Date

President — Date

Change Undergraduate Course

Change a Course

Subject: CHE-Chemical Engineering
Number: 4440
Effective Term: Fall 2016
Title: Senior Seminar II
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201501
Brief Statement of Change Based on Assessment Results:
Change name to Safety, Environmental, and Professional Practice II to reflect change in course content

Rationale for Changing a Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Title

From Chemical Engineering Senior Seminar II
To Safety, Environmental, and Professional Practice II

☑ Change Transcript Title

From Senior Seminar II
To Safety Env & Prof Practice II

☑ Change Catalog Description

From Working in groups, students present and discuss topics related to professional practice, ethics, business, industrial safety, the environment, and selected technical subjects of interest to society.

To Students will work on safety modules available from SAChE that will culminate in a safety certificate. Working in groups, students will also present and discuss topics related to ethics, safety, the environment and current events.

Learning Objectives

By the end of this course the student should be able to: - Complete a safety certificate offered by SAChE - Be prepared for entry into the professional world through presentation and discussion of topics related to ethics, business, industrial safety and responsibility, the environment, social responsibility, and current events; - Present a team-based oral presentation

Topical Outline

1-4. SAChE modules; 5-13. Oral presentations; 14. Senior exit surveys

Duplication (if applicable)

NA

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Course is Pass / No Pass

Syllabus

Description: CHE 4440 Saftey Env Prof Prac II SYL

This course applies green chemistry/engineering principles to process and product design. Green engineering metrics are applied to quantify the sustainability, life cycle and environmental impact of chemical technologies, processes, and products. Emphasis is placed on industrial sustainability, product innovation, risk assessment, policy, and societal implications.

Prerequisite(s) Corequisite(s)

MATH 1080 and CHE 2110 or Consent of Instructor

Required course for students in

Elective course in Chemical Engineering, Satisfies requirements for Emphasis Areas as well as the Sustainability Minor.

Statement of need and justification based on assessment of student learning outcomes

The evolving nature of Chemical Engineering and our industry has developed a specific need within our curriculum to educate our students on the topics of green chemistry, green engineering, and sustainability. This course will cover these topics as they relate to chemical engineering and fit within the broader interdisciplinary realm of science and engineering. As our society is faced with growing population and increasing globalization, the resulting environmental impact is becoming more evident; case in point is global climate change. Furthermore, increasing environmental regulations in response to chemical disasters is leading to the need for a paradigm shift where chemical processes and products become inherently safe. This coupled with public perception, marketing, and potential for innovation, necessitates a need for metrics and tool to assess whether or not one product or process is "greener" than another. This trend is rapidly emerging in industry as well as a need for more curriculum content focused on safety, as dictated by our industrial advisory board and ABET. This course satisfies all of these needs while also improving students teamwork, critical thinking, communication, and creativity skills.

Textbook(s)

Allen, D. T., Shonnard, D. R.; Green Engineering: Environmentally Conscious Design of Chemical Processes. Prentice Hall, 2002

Learning Objectives

By the end of this course the student should be able to:• Apply metrics and design tools of Green Chemistry and Green Engineering to evaluate chemical processes and products in order to determine how "green" a process or product is and how to make a product or process more "green"• Understand risk assessment and how it applies to the chemical industry, including methods of assessing hazard and exposure.• Evaluate an industrial sustainability plan and assess how "green" a commercial process or product is. • Communicate effectively and knowledgably with students and professionals from other disciplines on current, historical, and future topics related to Green Chemistry, Green Engineering, and Sustainability.

Topical Outline

Week 1: Introduction; Principles of Green Chemistry and Engineering Week 2: Risk Assessment; Ethics, Policy, and Regulations; Role of Chemical Engineers Week 3: Exposure Evaluation: Chemical Properties, Environmental Fate, Occupational Hazard Week 4: Green Process Design; Mass and Energy Balances, Unit Operations Weeks 5-6 Green Chemistry Metrics Week 7 Life Cycle Assessment, Process Metrics Week 8 Industrial Ecology; Environmental Transport Weeks 9-10 Tools for Evaluating Green Processes Week 11 Green Product Design; Product Innovation Week 12 Renewable Resources; Alternative Energy Week 13 Policy, Ethics, and Sustainability of Globalization Week 14 Project Reports; Presentations; Case Studies

Duplication (if applicable)

Courses currently offered that have similat content include EES 4800 Env. Risk Assessment and EES 4860 Env. Sustainability. Kevin Finneran in EEES has been contacted to ensure that there is no duplication of courses.

Add course requirements for honors courses (if applicable)

NA

Add course requirements for 6000-level courses

The graduate section of this course will be required to perform a case study that presents an example of a company making an improvement in their methodologies (product development, alternative synthesis, process design improvement, etc.) that incorporates green engineering and sustainability concepts. The case studies will be presented in a written report and in a 15 minute oral presentation to the class during the last week of classes for the semester.

Learning Activities associated with General Education competencies (if applicable)

NA

Syllabus

Description: CHE Green Engineering SYL

Chair, Department Curriculum Committee — 10/7/15 (Date)

Department Chair — 10/7/15 (Date)

Chair, College Curriculum Committee — 10/19/15 (Date)

College Dean — 10/20/15 (Date)

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 (Date)

Chair, Graduate Curriculum Committee — Date

Robert H Jones — 2/11/16 (Date)

Provost — Date

President — Date

Change Undergraduate Course

.0.147

Change a Course

Subject: CH-Chemistry

Number: 1520

Effective Term: Fall 2016

Title: Chem Commun I

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
Currently, the 3 credit oral communications competency for chemistry majors is satisfied through 2 courses taught in the chemistry department: CH 1520 (Chem. Comm. 1, 2 credits) and CH 4520 (Chem. Comm. 2, 1 credit). To improve the delivery of the content, the chemistry department would like to absorb the content from CH 4520 into CH 1520. This will result in removing CH 4520 from the curriculum and making CH 1520 a 3 credit course.

Rationale for Changing a Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Title

From Chemistry Communication I

To Chemistry Communication

☑ Change Transcript Title

From Chem Commun I

To Chem Commun

☑ Change of Credit

From

Fixed Credit Course

Credit Hrs	Contact Hrs
2	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

To

Fixed Credit Course

Credit Hrs	Contact Hrs
3	3

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Learning Objectives

1. To develop familiarity with different modes of scientific professional communication with emphasis on those used in the chemical sciences. 2. To learn how to prepare and present a poster on a scientific topic, and to critically evaluate posters on scientific topics. 3. To learn how to prepare and present an oral presentation on a scientific topic, and to critically evaluate oral presentations on scientific topics 4. To develop familiarity with the structure of scientific articles and learn how to read and write such articles effectively, and to critically evaluate scientific articles. 5. To develop familiarity with scientific reports, abstracts, and research proposals, and other modes of scientific communication as may be deemed appropriate for discussion by the course instructor.

Topical Outline

Week 1 - Syllabus Review and Introduction to Scientific Communication Week 2 - Lecture and Discussion of Oral Presentations Week 3 - Lecture and Discussion of Poster Presentations Week 4 - Lecture and Discussion of Research Publications Week 5 - Lecture and Discussion of Electronic Resources for Literature Searches and Citation Managers Week 6 - Poster Presentations on Research Topic Week 7 - Poster Presentations on Research Topic Week 8

- Poster Presentations on Research Topic Week 9 - Lecture and Demonstration of Powerpoint using Animations Week 10 - Powerpoint Presentations on Research Topics Week 11 - Powerpoint Presentations on Research Topics Week 12 - Powerpoint Presentations on Research Topics Week 13 - Powerpoint Presentations on Research Topics Week 14 - Powerpoint Presentations on Research Topics Week 15 - Powerpoint Presentations on Research Topics

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Class Attendance - 10% In Class Poster Presentations - 25% Written Research Papers - 30% External Oral Presentation Critiques - 25% End of Class Oral Presentations - 10%

Syllabus

Upload File: New CH 1520-20151007144935.pdf

Description: Chem Comm Syllabus

Form

User ID: dominy **Name:** Brian Dominy

Date: 10/14/2015 **Number:** 12075

CH-152 Chemical Communication, Example Syllabus

Class meetings:	Wednesdays from 2:30 – 4:10
Meeting location	Daniel 100B
Instructor: Office:	Professor
Phone / email:	Biosystems Research Complex, Room 106
Office Hours:	Phone, 656-5011; Email, professor@clemson.edu By arrangement. I will meet with students individually or in groups. I also respond to email queries about the course.

Required texts:	There will be no *required* text for the class. It is HIGHLY recommended, though, that the chemistry majors purchase: **The ACS Style Guide. Effective Communication of Scientific Information, 3rd Edition Edited by Anne M. Coghill and Lorrin Garson. Oxford University Press, New York. 2006. xiv + 430 pp. 18 × 20.5 cm. ISBN 13: 978-0-8412-3999-9. $41.70.**

Course Description

Communication is a critical aspect of being a chemistry or science professional. This class will provide an introduction to some of the more common forms of communication within the chemical sciences including oral, written, and electronic formats. Special emphasis will be placed upon poster presentations, oral presentations with visual aids (e.g. "Powerpoint"), and the writing scientific research articles. A brief discussion of scientific reporting (e.g. lab reports), and research proposals will also be included.

Course Learning Objectives

1. To develop familiarity with different modes of scientific professional communication with emphasis on those used in the chemical sciences.
2. To learn how to prepare and present a poster on a scientific topic, and to critically evaluate posters on scientific topics.
3. To learn how to prepare and present an oral presentation on a scientific topic, and to critically evaluate oral presentations on scientific topics
4. To develop familiarity with the structure of scientific articles and learn how to read and write such articles effectively, and to critically evaluate scientific articles.
5. To develop familiarity with scientific reports, abstracts, and research proposals, and other modes of scientific communication as may be deemed appropriate for discussion by the course instructor.

Course Structure

In order to allow the respective students to concentrate on aspects of disseminating scientific information, and not on the acquisition of in-depth scientific expertise per se, students will focus each of their presentation formats on the same topic. Each student group (**3 people**) will choose one of the "classic" experiments or concepts described in the CH 101 textbook "Atoms First", e.g. Milikan oil drop, Rutherford scattering, speed of light, etc. Each individual student will also choose one of the "classic" experiments or concepts. Students may also use their undergraduate research projects as their *individual* scientific topic. In both cases, the students are expected to be able to describe the fundamental underpinnings, experimental design, and broader impacts (i.e., relevance) of the works. The idea is to have each student be able to present the materials in a rational way via each of the media.

Class Activities

A breakdown of the course requirements is presented below. In brief, the activities for which grades will be assigned are as follows:

Attendance and class participation. To be clear, this class will only meet for a dozen or so times. Students are expected to fully participate in class activities, assignments and discussions. The first half (or so) of the semester is designed to provide basic background and skills to students to allow them to perform well in the graded assignments. During student presentations, students serve as audience members and are expected to be attentive and provide constructive and insightful evaluations. **One absence is allowed without penalty.**

Poster presentations. Students will be required to create and present a typical "conference poster" on the central topic. In doing so, the students will master the skills of poster layout and the presentation of scientific content in a space-limited, highly visual format. Specific physical requirements will be provided at a later date.

Written research paper. The written word is still the benchmark in terms of presenting scientific data and theories. We will use the American Chemical Society Style Guide as the roadmap to the authoring of scientific manuscripts. Included in this process will be aspects of choosing specific journals, following the required formats and submission processes, layout of the manuscript, composition, editing, figure and table creation, and referencing.

In-class critiques. At several points during the semester we will have in-class activities that will culminate in written critiques, which are to be handed in for grading. Specifically, these are the oral presentations and posters presented by the students in the class.

External (outside of class) oral presentation critiques. Over the course of the semester, students will attend and evaluate presentations outside of the CH 1520 class meeting. Eight such critiques are required from all students. These presentations MUST include at least four departmental seminars (Thursdays at 4:00 p.m.) by "outside faculty", and one graduate (Tuesday and Friday afternoons at 4:00 p.m.). An outside seminar with a scientific focus may be used (contact instructor by email for pre-approval). **At least four (4) talks must be affiliated with the Chemistry department!** Talks

given at scientific meetings that are attended by the student are acceptable for critiques. **Critiques must be submitted by email within 7 calendar days of the seminar.** For example, the critique for a 4 pm Thursday seminar is due by 4 pm the following Wednesday.

End of course oral presentation. Toward the end the semester, each student group will make two brief (5 min!) oral presentations to the class on their two chosen topics. Presentations will be evaluated by the students in the class, who will also provide feedback for improvement. In all presentations, some aspect of animation must be included!

Grading:

The final grade will be assessed on a standard scale: 91-100 A, 81-90 B, etc.

The 1520 grades will be based on the following activities:

10 % - Class attendance (One absence is allowed without penalty)
25% - In-class poster presentation
30% - Written research papers
25% - External oral presentation critiques (Must complete 8)
10% - End of class oral presentations

TENTATIVE Class Schedule

January 7 – Introduction and syllabus review. How to present yourself (keeping your foot out of your own mouth, and that of your boss' out of your backside . . .)

January 14 – Oral presentations - Consider the audience and the setting. They can make a great idea look like garbage, and Play-Doh look like the next Nobel Prize in Physics. Examples of good and bad communication skills – R. B. Woodward vs. Richard Feynman and Sheldon vs. Leonard.

January 21 – Poster presentations. Taking advantage of one-on-one; up close and personal. Personality and poise are far more impressive than brains in a 10-minute interaction.

January 28 – Research publications: The process of putting ideas on paper. The power of the press in establishing scientific precedence and reputation.

February 4 – ISI Web of Science and EndNote Web. Bring laptops.

February 11 – Poster presentations

February 18 – Poster presentations

February 25 - Poster presentations

March 4 – PowerPoint with animation (Kat Snizaski, DCIT, bring laptops. Mac users install dual boot and Office 2007 or 2010 on their computers.

March 11 – Spring registration update, Ms. Meg Newton, CoES Academic Advisor

March 18 - Spring Break

March 25 – Research papers due. Oral presentations

April 1 - Oral presentations

April 8 – Oral presentations

April 15– Oral presentations !

April 22 – Oral presentations

April 30 – Exam scheduled at 3:00 pm (only required if oral presentations not completed)

Chair, Department Curriculum Committee — Date: 10/14/15

Department Chair — Date: 10-14-15

Chair, College Curriculum Committee — Date: 10/19/15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/16

President — Date

Add Undergraduate Course

G00154

Course Attributes

Subject Abbreviation:	CH-Chemistry	**Catalog Title:**	Introduction to Research
Course Number:	3410	**Transcript Title:**	Introduction to Research
Effective Term:	Fall 2016	**Cross-reference(s):**	
College:	Engineering and Science	**Grade Mode:**	Standard Letter
Department:	Chemistry		

☐ **Additional Fee?**

Justification

This course is being developed to prepare undergraduate students in chemistry for the required 2 semesters of research they will encounter in their senior year. The course will introduce important subjects including factors to consider when choosing a research project, Keeping and organizing a laboratory notebook, Maintaining lab safety, and ethical research practices.

Form

User ID: dominy **Name:** Brian Dominy

Date: 10/14/2015 **Number:** 12091

Hours

Fixed Credit Course

Credit Hrs	Contact Hrs
1	1

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	**Max**	**Min**	**Max**

Rationale for Add Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☑ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

Schedule Types

- ○ **Field Course**
- ○ **Independent Study**
- ○ **Internship**
- ○ **Lab No Fee**
- ○ **Lab With Fee**
- ◉ **Lecture**
- ○ **Other**
- ○ **Seminar**
- ○ **Studio**
- ○ **Tutorial**

Projected Enrollment

Year 1: 25
Year 2: 25
Year 3: 25
Year 4: 25

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Attendance - 10% Find and Summarize CU Chemistry Research Paper - 25% Attend and Critique Research Seminar - 25% SciFinder Structure Search Assignment - 20% Research Proposal - 20%

Catalog Description

Introduction to Research will introduce students to a variety of skills and topics related to the pursuit of independent research. The course will address choosing a research topic, planning a research project, discovering and organizing prior work, keeping research records, laboratory safety, and ethics in scientific research.

☑ **Prerequisite(s)** ☐ **Corequisite(s)**

ENGL 1030 and CH 1020

Required course for students in

Chemistry (BS)

Statement of need and justification based on assessment of student learning outcomes

This course is being developed to prepare undergraduate students in chemistry for the required 2 semesters of research they will encounter in their senior year. The course will introduce important subjects including factors to consider when choosing a research project, Keeping and organizing a laboratory notebook, Maintaining lab safety, and ethical research practices.

Textbook(s)

None

Learning Objectives

Following this course, students will be able to: • Make an informed choice regarding a research topic • Plan a research project, including managing their time, setting goals, and planning for reports • Find scientific information, particularly using online tools such as GoogleScholar, Web of Science, and SciFinder • Organize scientific information using computer tools such as RefWorks and EndNote • Demonstrate effective research record-keeping using paper and electronic laboratory notebooks • Communicate about their research • Incorporate safe, ethical and effective practices into their research

Topical Outline

Week 1 - Introduction. Role of research in the CU chemistry degree program Week 2 - Lab safety Week 3 - ChemDraw; a computer software platform for drawing chemical structures Week 4 - Choosing a research project Week 5 - Planning a research project; time management, goal setting, reporting Week 6 - Chemical Information and Data Sources; Google Scholar Week 7 - Web of Science; gaining access, simple searching, citation searching Week 8 - Scifinder; gaining access, simple keyword and structure searching Week 9 - Scifinder; advanced structure searching, reaction searching Week 10 - Bibliographic database management tools; EndNote, RefWorks, Mendelay Week 11 - Keeping research records; the laboratory notebook Week 12 - Language, Clarity and Expression in scientific writing Week 13 - Epistemology; facts, measurements, calculations and interpretations, discussed against a backdrop of the history of organic chemistry. Week 14 - Careers in chemistry by Earl Wagener Week 15 - Ethics in research

Syllabus

Upload File: New CH 1410-20151007151450.pdf

Description: New CH 3410 Syllabus

CH-3410 Introduction to Research, Clemson University
DRAFT Version

Class meetings:	XXXXX
Meeting location:	XXXXX
Instructor:	XXXXX
Office :	XXXXX
Phone / email:	XXXXX
Office Hours:	XXXXX

Required texts:	There is no required text for the class. Course materials will be provided periodically throughout the semester, either as handouts or by electronic distribution via email or the CU Blackboard site.

Course Description. CH 3410, Introduction to Research, will introduce students to a variety of skills and topics related to the pursuit of independent research. Course topics will include the following: choosing a research topic, planning a research project, discovering and organizing prior work, keeping research records, laboratory safety, and ethics in scientific research. The class will meet one day per week. Class meetings will be led by Clemson faculty with occasional visits from outside persons as guest lecturers.

Course Learning Objectives. After taking this class, students will have developed skills that will enable them to;

- Select a research topic
- Plan a research project, including managing their time, setting goals, and planning for reports
- Find scientific information, particularly using online tools such as GoogleScholar, Web of Science, and SciFinder
- Organize scientific information using computer tools such as RefWorks and EndNote
- Demonstrate effective research record-keeping using paper and electronic laboratory notebooks
- Communicate about their research
- Incorporate safe, ethical and effective practices into their research

Grading. Grades will be assigned based on attendance, and on four written assignments that will be handed in-class, in hard copy form. For the written assignments a template should be used to prepare the assignment; a representative template is given on the following page.

Percent	Assignment / work
10	Attendance
25	Find a bibliographic citation for a scientific paper by a CU chemistry faculty member. Read the paper and write a brief summary of it.
25	Attend a department seminar in chemistry or in another science department and write a brief critique about it.
20	Assignment on Scifinder, Structure editor searching (reactions, substances)
20	Research proposal; write a brief summary of a research project you would like to work on. Include a summary of time you will spend, and any special lab safety considerations. List two milestones you plan to meet for the project.
100	Total

Tentative schedule of class topics for CH 3410

	Date	Special notes	Instructor	Class topic	Activity / assignment / comment
1				Introduction. Role of research in the CU chemistry degree program	
2				Lab safety	
3				ChemDraw; a computer software platform for drawing chemical structures	
4				Choosing a research project	
5				Planning a research project; time management, goal setting, reporting	
6				Chemical Information and Data Sources; Google Scholar	
7				Web of Science; gaining access, simple searching, citation searching	
8				Scifinder; gaining access, simple keyword and structure searching	
9				Scifinder; advanced structure searching, reaction searching	
10				Bibliographic database management tools; EndNote, RefWorks, Mendelay	
11				Keeping research records; the laboratory notebook	
12				Language, Clarity and Expression in scientific writing	
13				Epistemology; facts, measurements, calculations and interpretations, discussed against a backdrop of the history of organic chemistry.	
14				Careers in chemistry by Earl Wagener	
15				Ethics in research	
				Finals week	

	10/14/15
Chair, Department Curriculum Committee	05159 Date
R. Karl Dieter	10-14-15
Department Chair	Date
	10/19/15
Chair, College Curriculum Committee	Date
	10/20/15
College Dean	Date
Director, Calhoun Honors College	Date
	11/6/2015
Chair, Undergraduate Curriculum Committee	Date
Chair, Graduate Curriculum Committee	Date
	2/11/16
Provost	Date
President	Date

000160

Change Major

Major Name: Chemistry

Degree: Bachelor of Science

Effective Catalog Year: 2016-2017

- [ ] Change Major Name to: CHEM
- [ ] Change Degree to: Bachelor of Science
- [x] Change Curriculum Requirements
- [ ] Change General Education Requirements
- [ ] Add, Change, or Delete Concentration(s)
- [ ] Add, Change, or Delete Emphasis Area(s)

Curriculum Map: BS_Curriculum_2015_Proposal-20151007153119.pdf

Description: Proposed BS Curriculum Map

Additional Information: BS_Curriculum_2015_Narrative-20151007153119.pdf

Description: Description of Changes

Summary/Explanation

The chemistry department is proposing changes to the BS curriculum map that address a number of areas of improvement suggested by chemistry faculty and chemistry students. The proposed changes are intended to: 1) Simplify the process of student transfers from outside the university as well as from (and to) other majors, and 2) Provide students more flexibility in designing their curriculum, within constraints that are common among chemistry programs at peer universities. Changes primarily involve moving, broadening, or removing some curricular requirements.

Rationale for Change Major

- [x] Strengthen Program Requirement(s)
- [x] Alignment of Student Learning Outcomes
- [x] Alternative Delivery of Content
- [ ] Improve Time to Degree
- [ ] Evolution of the Discipline
- [ ] Changing Prerequisites
- [ ] Address DWF Rates
- [ ] General Education Modifications
- [ ] Other (Please specify.)

Form

User ID: dominy **Name:** Brian Dominy

Date: 10/14/2015 **Number:**

Curriculum for the BS in Chemistry (Proposal Fall 2015) 000161

FRESHMAN YEAR
First Semester
4 – CH 1010/1011 General Chemistry
3 – ENGL 1030 Composition
4 – MATH 1060 Calculus of One Variable I
4 – Technical Elective

Total units: 15

Second Semester
4 – CH 1020/1021 General Chemistry
4 – MATH 1080 Calculus of One Variable II
3 – PHYS 1220 Physics with Calculus I
1 – PHYS 1240 Physics I Lab
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
Total units: 15

SOPHOMORE YEAR
First Semester
3 – CH 2230 Organic Chemistry
1 – CH 2270 Organic Chemistry Lab
4 – MATH 2060 Calculus of Sev. Var.
3 – PHYS 2210 Physics with Calculus II
1 – PHYS 2230 Physics Lab II
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
Total units: 15

Second Semester
3 – CH 2050 Intro. to Inorganic Chemistry
3 – CH 2240 Organic Chemistry
1 – CH 2280 Organic Chemistry Lab
3 – Advanced MATH/STAT Requirement*
3 – CH 1520 Chemistry Communication
3 – Arts and Humanities (Lit) requirement[1]

Total units: 16
121 Total Semester Hours

JUNIOR YEAR
First Semester
3 – CH 3130 Quantitative Analysis
2 – CH 3150 Quantitative Analysis Lab
3 – CH 3310 Physical Chemistry
1 – CH 3390 Physical Chemistry Lab
3 – Inorganic Chemistry Requirement ***
1 – CH 3410 Introduction to Research**
3 – Elective
Total units: 16

Second Semester
3 – CH 3320 Physical Chemistry
1 – CH 3400 Physical Chemistry Lab
3 – CH 3600 Chemical Biology[4]
3 – CH 4110 Instrumental Analysis
2 – CH 4120 Instrumental Analysis Lab
3 – Elective
Total units: 15

SENIOR YEAR
First Semester
3 – Elective
3 – CH 4430 Research Problems
3 – Chemistry Requirement[3]
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
3 – Elective

Total units: 15

Second Semester
2 – CH 4030 Advanced Synthetic Techniques
3 – CH 4440 Research Problems
3 – CH 4500 Chemistry Capstone
3 – Chemistry Requirement
3 - Elective

Total units: 14

* MATH 2080 (DiffEq) or STAT 2300 (Statistics) or MATH 3110 (Linear Algebra)
** CH 3410 "Introduction to Research" replaces CH 1410 "Chemistry Orientation"
*** The Inorganic chemistry requirement can be fulfilled by either CH 4010 (Organometallic chemistry) or CH 4020 (Inorganic Chemistry)

Narrative Description of Curricular Changes 000162

1) Extra AHSS requirement has been removed.
    a. Many students will not require this AHSS course to meet Gen Ed requirements IF they take courses that "double-dip" between two different humanities requirements.
    b. SOME students MAY still require this space in the curriculum to meet the Gen Ed requirements (if they don't take double-dipping courses.
    c. Consequently, the "extra" AHSS requirement in chemistry has been replaced with a free elective appearing in the 2nd semester of the junior year.
2) The foreign language requirement has been removed.
    a. NONE of the engineering BS degrees have a language requirement.
    b. Biochemistry, Biology, Computer Science, and Geology DO NOT have a language requirement.
    c. Math and Physics DO have a language requirement.
    d. The foreign language requirement in the BS curriculum has been replaced by another free elective appearing in the 2nd semester of the senior year.
3) CH 1410 Chemistry Orientation has been moved to the 1st semester junior year and designated as an "Introduction to Research" course.
    a. This course will teach students basic skills required for undergraduate including the use of literature databases and research ethics.
    b. It will also be used as a platform for informing students about the CH 4430 research projects available to them DIRECTLY BEFORE they register for their first semester of undergraduate research.
    c. The "Introduction to Research" course was moved from 2nd semester to 1st semester junior year upon the request of faculty at the chemistry department retreat 2015.
4) A "Technical Elective" requirement has been added to the 1st semester freshman year
    a. A list of courses fulfilling this requirement will be generated for the purposes of advising incoming freshmen.
    b. Tentatively, this list could include:
        i. BIOL 1100 (5 credits, Principles of Biology 1)
        ii. CPSC 1010 (4 credits, Computer Science 1)
        iii. GEOL 1010+1030 (4 credits, Physical Geology w/ Lab)
        iv. ENGR 1050+1060+1070+1080 (4 credits, Gen Eng. Coursework)
    c. This will make it much easier for students to change major to Chemistry after 1 year in Math, Geology, Computer Science, Physics, Biochemistry, or any engineering field.
    d. This will also make it easier for students to transfer in to Clemson chemistry from another university, since programs at these universities will likely require some physical science instead of (or in addition to) Chemistry.
    e. This will also make the BS Chemistry degree more favorable for pre-med majors, since biology can now fit naturally into the 1st semester freshman year
    f. This will ALSO make it easier for chemistry majors to get a head start by AP'ing out of the "Technical Elective" requirement through AP Biology or AP Computer Science.
    g. To make room for this technical elective, the Arts and Humanities / Social Science Requirement was moved to 1st semester sophomore year.
5) The CH 1520 Chemistry Communications course has been moved to 2nd semester sophomore year.

   a. This move will make it easier for students from other majors to transfer in to chemistry after the freshman year without falling behind
   b. It will also make it easier for Bridge students to transfer into chemistry without falling behind.
6) The CH 1520 Chemistry Communications course has been designated as a 3 credit course, and the CH 4520 course has been eliminated
   a. This change was suggested by chemistry faculty at the chemistry department retreat in 2015.
   b. Senior chemistry majors were concerned that CH 4520 was significantly less valuable than CH 1520. They felt they were repeating much of the material in CH 1520.
7) Physics III and its lab have been removed from the required curriculum (formerly appeared in the 2nd semester of the sophomore year).
   a. NONE of our peers require 3 semesters of physics
   b. Unfortunately, topics associated with Clemson's Physics III include Waves, Optics, and Atomic Structure and are relevant to chemists
      i. Other universities teach these topics between the 1st and 2nd semesters of physics (as well as Mechanics and Electricity/Magnetism)
   c. One option would be to recommend (as a part of advising) that prepared students take physics III to fulfill the free elective in the 1st semester of the junior year.
   d. Another option would be to work with Physics to see if they would entertain the idea of a Chemistry section of Physics II that would cover E&M, waves, and optics (for example) rather than just E&M.
   e. Physics III and its lab have been replaced with the chemistry communications course (CH 1520) AND an AHSS literature university requirement.
      i. This also takes an ALL math and science semester (currently the 2nd semester of the sophomore year) and lessens the burden on the students
8) Physics I lab has been added to the curriculum
   a. With the removal of Physics III and its lab, including the physics 1 lab was necessary to meet ACS certification requirements described in section 5.7 (Cognate courses) of the ACS guidelines.
   b. This was added to the 2nd semester of the freshman year to coincide with Physics I.
9) The second semester of inorganic chemistry was moved to 1st semester junior year
   a. This change was done in response to concerns of chemistry majors who strongly preferred 2 semester course sequences to be contiguous.
   b. The first semester of inorganic (CH 2050) continues to be taught in the 2nd semester of the sophomore year and the second semester of inorganic will be taught in the 1st semester of the junior year.
   c. The 2nd semester inorganic requirement has been EXPANDED to include either CH 4010 Organometallic Chemistry OR the CH 4020 Inorganic Chemistry course.
      i. Since CH 4020 is no longer a strict REQUIREMENT in the undergraduate curriculum, this may allow graduate students to take CH 6020 for graduate credit.
10) The MATH 2080 (Differential Equations) requirement has been EXPANDED into an advanced MATH requirement.
   a. This brings us into alignment with the majority of our peers who require some math course beyond Calc III.
   b. Most of our peers DO NOT require differential equations specifically.
   c. CH 3320 Physical Chemistry (2) does not explicitly require differential equations as a prerequisite, and this is also consistent with most of our peers.

11) The Technical Writing course (ENGL 3140) has been removed and replaced with an elective in the 1st semester senior year. 00164
    a. The Technical Writing course seems to focus more on business oriented communications (professional emails, memos, technical manuals, etc…)
    b. Students indicated that they would prefer a course that instructs them on the basics of putting together a scientific manuscript.
    c. It has been suggested that such material could be taught in the introduction to research course (CH 3410)
12) This leaves the senior year with 9 elective credits in the 1st semester (3 of which MUST be chemistry or a closely related field) and 6 elective credits in the 2nd semester (3 of which, again, MUST be chemistry or a closely related field).
    a. One possible advantage of this outcome is that it MAY facilitate the addition of tracks in the near future (we will discuss it over the next academic year).
    b. The chemistry elective courses that we offer are generally 4000 level courses that are intended for the senior year (some but not all of which do require a 3000/4000 level prereq).
13) If these changes constitute 19 credits or more of changes to our major, then it requires state approval. What have we changed, rather than simply moved in our curriculum?
    a. (1 credit change) Chemistry orientation has been removed and replaced with "Introduction to Research"
    b. (4 credit change) A Technical Elective has been added to the 1st semester replacing the Physics III requirement.
    c. (0 credit change) Physics I lab replaces Physics III lab
    d. (0 credit change) CH 4520 has been absorbed by CH 1520
    e. (4 credit change) Foreign language requirement has been removed and replaced with an elective
    f. (3 credit change) Technical Writing requirement is removed and replaced with an elective
    g. (0 credit change) Differential equations requirement has been broadened to an Advanced Math Requirement
    h. (0 credit change) CH 4020 requirement has been broadened to an Inorganic Chemistry requirement
    i. (3 credit change) Extra AHSS requirement has been changed to an elective
    j. Total changes: 15 credits
        i. The 0 credit assignments above were based on a determination that these changes were **not significant** changes to the curriculum.

Chair, Department Curriculum Committee — Date: 10/14/15

R. Karl Dueter — 10-14-15

Department Chair — Date

Chair, College Curriculum Committee — 10/19/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

John D. Griffin — 11/6/2015

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Robert W Jones — 2/11/2016

Provost — Date

President — Date

Add Major

Major Name: Chemistry
Degree: Bachelor of Arts
Effective Catalog Year: 2016-2017
Curriculum Map: BA_Curriculum_2015_Proposal-20151007153958.pdf
Description: Proposed BA Curriculum Map
Additional Information: BA_Curriculum_2015_Narrative-20151007153958.pdf
Description: Description of Changes to BA Curr. Map

Summary/Explanation

A small number of changes proposed for the BS curriculum will also impact the BA curriculum in chemistry. Consequently, this proposal addresses a small number of changes intended to improve the delivery of course content, make it easier for students to transfer to and from the BA program, and generally provide more flexibility for BA chemistry students to design their curriculum (within appropriate constraints).

Rationale for Add New Major

- [x] Strengthen Program Requirement(s)
- [x] Alignment of Student Learning Outcomes
- [x] Alternative Delivery of Content
- [ ] Improve Time to Degree
- [ ] Evolution of the Discipline
- [ ] Changing Prerequisites
- [ ] Address DWF Rates
- [ ] General Education Modifications
- [ ] Other (Please specify.)

Form

User ID: dominy **Name:** Brian Dominy
Date: 10/14/2015 **Number:**

Department of Chemistry (Proposal Fall ~~2015~~ 2016)
Curriculum for the Bachelor of Arts Degree in Chemistry

000167

FRESHMAN YEAR
First Semester
4 – CH 1010 General Chemistry
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
3 – ENGL 1030 Composition
4 – MTHSC 1060 Calculus of One Variable I
1 – Elective
Total units: 15

Second Semester
4 – CH 1020 General Chemistry
4 – MTHSC 1080 Calculus of One Variable II
3 – PHYS 1220 Physics with Calculus I
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
1 – Elective
Total units: 15

SOPHOMORE YEAR
First Semester
3 – CH 2230 Organic Chemistry
1 – CH 2270 Organic Chemistry Lab
4 – MTHSC 2060 Calculus of Sev. Var.
3 – PHYS 2210 Physics with Calculus II
4 – Foreign language requirement[2]
Total units: 15

Second Semester
3 – CH 224 Organic Chemistry
1 – CH 228 Organic Chemistry Lab
3 – CH 1520 Chemistry Communication
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
4 – Foreign Language Requirement[2]
3 – CH 205 Intro. to Inorganic Chemistry
Total units: 17

Total Units in B.A. Degree: 124

JUNIOR YEAR
First Semester
3 – CH 3130 Quantitative Analysis
2 – CH 3170 Quantitative Analysis Lab
3 – Minor Requirement
3 – Foreign Language Requirement[2]
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
3 – CH 3310 Physical Chemistry
Total units: 17

Second Semester
3 – Arts and Humanities (Lit.) Requirement
3 – ENGL 3140 Technical Writing
3 – Minor Requirement
3 – CH 3320 Physical Chemistry
3 – Foreign Language Requirement[2]
Total units: 15

SENIOR YEAR
First Semester
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
3 – Minor Requirement
3 – Chemistry Requirement
6 – Elective
Total units: 15

Second Semester
3 – Chemistry Requirement
3 – CH 4500 Chemistry Capstone
3 – Arts and Humanities Requirement[1] or
3 – Social Science Requirement[1]
6 – Minor Requirement
Total units: 15

1) CH 1410 Chemistry Orientation has been eliminated from the BA curriculum
2) The CH 1520 Chemistry Communications course has been moved to 2nd semester sophomore year.
    a. This move will make it easier for students from other majors to transfer in to chemistry after the freshman year without falling behind
    b. It will also make it easier for Bridge students to transfer into chemistry without falling behind.
3) The CH 1520 Chemistry Communications course has been designated as a 3 credit course, and the CH 4520 course has been eliminated
    a. This change was suggested by chemistry faculty at the chemistry department retreat in 2015.
    b. Senior chemistry majors were concerned that CH 4520 was significantly less valuable than CH 1520. They felt they were repeating much of the material in CH 1520.
4) 3 credits of the AHSS requirement were moved to 2nd semester senior year to accommodate the communications course in the 2nd semester sophomore year.
5) Removing the orientation course (CH 1410) **and** Moving the communications course (CH 1520) from the 1st and second semesters of the freshman year left both of these semesters with 14 credits each. Since students require 30 credits per year for the first 3 years to maintain scholarships, 1 credit free electives were added to these semesters to fill in the gap.
    a. This may not be an optimal approach, but it was the approach that the committee felt minimized impact on the BA curriculum
    b. It is also consistent with the BA curricula of both Computer Science and Mathematics. Also, with Physics who have a 1 credit elective in the sophomore year of their BA curriculum.
    c. Next year, as we more fully consider revisions to the BA curriculum beyond the minimum changes here required for compatibility with the proposed BS curriculum, we may consider removing these 1 credit electives.

00169

	10/14/15
Chair, Department Curriculum Committee	Date
R. Karl Dieter	10-14-15
Department Chair	Date
	10/19/15
Chair, College Curriculum Committee	Date
Karen A. Hall	10/20/15
College Dean	Date
Director, Calhoun Honors College	Date
John D. Griffin	11/06/2015
Chair, Undergraduate Curriculum Committee	Date
Chair, Graduate Curriculum Committee	Date
Robert W. Jones	2/11/2016
Provost	Date
President	Date

Change Major

Major Name: Chemical Engineering
Degree: Bachelor of Science
Effective Catalog Year: 2016-2017

- [ ] Change Major Name to: CHEN
- [ ] Change Degree to: Bachelor of Science
- [x] Change Curriculum Requirements
- [ ] Change General Education Requirements
- [x] Add, Change, or Delete Concentration(s)
- [ ] Add, Change, or Delete Emphasis Area(s)

Curriculum Map:
Description: Changes to Announcements

Additional Information:
Description:

Summary/Explanation

The changes to the Curriculum Map and Announcements are detailed on the attached curriculum map as listed in the Undergraduate Announcements. The major changes for the curriculum and Biomolecular Concentration are as follows. CHE 1300 Intro to Chemical Engineering is changed from 2 hours to 3 hours with course name change. CHE 2110 has a name change. CHE 3210 and CHE 3300 will now take place in the first semester Junior year. CHE 3190 and CHE 3070 will now take place in the second semester Junior year. CHE 4430 is now 2 hours and has a name change to Safety Environmental and Professional Practice I CHE 4440 has a name change to Safety Environmental and Professional Practice II Changes specific to the main curriculum are as follows: BMOL 4250 Biomolecular Engineering will replace the Biochemistry Option. BMOL 4290 Bioprocess Engineering will replace MICRO 4130. The total required semester hours will increase to 131 hours. Changes specific to the Biomolecular Concentration will include: MATH 2080 will displace the Biochemistry option and BIOL 4340 Lab in the second semester Sophomore year. The Biochemistry option and BIOL 4340 Lab are moved to the first semester Junior year. BIOE 3020 Biomaterials will be moved to second semester Junior year. PHYS 2210 and STAT 4110 will be moved into the first semester Junior year. BCHM 4310 will be moved into the first semester senior year. BMOL 4290 Bioprocess Engineering will be required and will replace an Engineering Elective requirement. The total semester hours for the Biomolecular Concentration will be 133 hours.

Rationale for Change Major

- [x] Strengthen Program Requirement(s)
- [ ] Alignment of Student Learning Outcomes
- [ ] Alternative Delivery of Content
- [ ] Improve Time to Degree
- [x] Evolution of the Discipline
- [ ] Changing Prerequisites
- [ ] Address DWF Rates
- [ ] General Education Modifications
- [ ] Other (Please specify.)

Form

User ID: ckitche **Name:** Christopher Kitchens
Date: 10/07/2015 **Number:**

Chair, Department Curriculum Committee — Date: 10/7/15

Department Chair — Date: 10/7/15

Chair, College Curriculum Committee — Date: 10/9/15

College Dean — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/16

President — Date

test

CHEMICAL ENGINEERING CURRICULUM (PROPOSED)
with BIOMOLECULAR ENGINEERING CONCENTRATION

Freshman Year

ENGR 1050 Engr Disciplines & Skills I	1	**CHE 1300 Chemical Engineering Tools**	3
ENGR 1060 Engr Disciples & Skills II	1	CH 1020 General Chemistry	4
CH 1010 General Chemistry	4	MATH 1080 Calc of One Variable II	4
ENGL 1030 English Composition	3	PHYS 1220 Physics with Calculus I	3
MATH 1060 Calculus of One Variable I	4	Arts and Humanities/Social Science[1]	3
Arts and Humanities/Social Science[1]	3		
Semester Totals:	*16*		*17*

Sophomore Year

CHE 2110 Intro to Chem Engineering	4	CHE 2200 Chem Engr Thermodynamics I	3
CH 2230 Organic Chemistry	3	CHE 2300 Fluids/Heat Transfer	4
MATH 2060 Calc of Several Variables	4	CH 2240 Organic Chemistry	3
BIOL 1100 Prncpls of Biology (w/Lab)	5	CH 2290 Organic Chemistry Lab	1
Arts and Humanities/Social Science[1]	3	**MATH 2080 Intro Ordinary Diff Eqns**	4
Semester Totals:	*19*		*15*

Junior Year

CHE 3210 Chem Eng Thermodynamics II	3	**CHE 3070 Unit Operations Lab I**	3
CHE 3300 Mass Transfer/Separations	4	**CHE 3190 Engineering Materials**	3
PHYS 2210 Physics with Calculus II	3	**BIOL 4340 Biochemistry Lab**	2
Biochemistry requirement[2]	3	BMOL 4250 Biomolecular Engr	3
STAT 4110 Statistical Methods	3	**BIOE 3020 Biomaterials**	3
		Arts and Humanities/Social Science[1]	3
Semester Totals:	*16*		*17*

Senior Year

CHE 4070 Unit Operations Lab II	3	CHE 3530 Process Dynamics/Control	3
CHE 4310 Chemical Process Design I	3	CHE 4330 Process Design II	3
CHE 4430 Safety, Env. & Prof. Prac. I	2	**CHE 4440 Safety, Env. & Prof. Prac. II**	1
CHE 4500 Chemical Reaction Engr	3	**BMOL 4260 Biochemical Processing**	3
BCHM 4310 Physical Biochemistry	3	Arts and Humanities/Social Science[1]	3
Arts and Humanities/Social Science[1]	3	Engineering Requirement[3]	3
Semester Totals:	*17*		*16*

Total = 133 hrs.

Notes

[1] See Policy on Social Sciences and Humanities for Engineering Curricula. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

[2] Select from BCHM 3010, BCHM 3050, BCHM 4230, or CH 3600.

[3] Select from CHE 4010 or BMOL 4030, BMOL 4270, BE 4280, BE 4350, BIOE 4400, BIOE 4490, BIOE 4760, MICR 4130

Note: No student may exceed two attempts, including a *W*, to complete successfully any CHE course.

CHEMICAL ENGINEERING CURRICULUM (PROPOSED)

Freshman Year

ENGR 1050 Engr Disciplines & Skills I	1	**CHE 1300 Chemical Engineering Tools**	3
ENGR 1060 Engr Disciplines & Skills II	1	CH 1020 General Chemistry	4
CH 1010 General Chemistry	4	MATH 1080 Calc of One Variable II	4
ENGL 1030 Accelerated Composition	3	PHYS 1220 Physics with Calculus I	3
MATH 1060 Calculus of One Variable I	4	Arts and Humanities/Social Science[1]	3
Arts and Humanities/Social Science[1]	3		
Semester Totals:	*16*		*17*

Sophomore Year

CHE 2110 Intro to Chem Engineering	4	CHE 2200 Chem Engr Thermodynamics I	3
CH 2230 Organic Chemistry	3	CHE 2300 Fluids/Heat Transfer	4
MATH 2060 Calc of Several Variables	4	CH 2240 Organic Chemistry	3
PHYS 2210 Physics with Calculus II	3	CH 2290 Organic Chemistry Lab	1
Arts and Humanities/Social Science[1]	3	MATH 2080 Intro to Ord Diff Eqns	4
Semester Totals:	*17*		*15*

Junior Year

CHE 3210 Chem Eng Thermodynamics II	3	**CHE 3070 Unit Operations Lab I**	3
CHE 3300 Mass Transfer/Separations	4	**CHE 3190 Engineering Materials**	3
STAT 4110 Statistical Methods	3	CH 3320 Physical Chemistry	3
CH 3390 Physical Chemistry Lab	1	CH 3400 Physical Chemistry Lab	1
ECE 2070 Basic Electrical Engr	2	**BMOL 4250 Biomolecular Engr**	3
ECE 2080 Electrical Engr Lab I	1	Arts and Humanities/Social Science[1]	3
Emphasis Area[2]	3		
Semester Totals:	*17*		*16*

Senior Year

CHE 4070 Unit Operations Lab II	3	CHE 3530 Process Dynamics/Control	3
CHE 4310 Chemical Process Design I	3	CHE 4330 Process Design II	3
CHE 4430 Safety, Env. & Prof. Prac. I	2	**CHE 4440 Safety, Env. & Prof. Prac. II**	1
CHE 4500 Chemical Reaction Engr	3	**BMOL 4260 Biochemical Processing**	3
Arts and Humanities/Social Science[1]	3	Arts and Humanities/Social Science[1]	3
Emphasis Area[2]	3	Emphasis Area[2]	3
Semester Totals:	*17*		*16*

Total = 131 hrs.

Notes

[1] See Policy on Social Sciences and Humanities for Engineering Curricula. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

[2] See advisor for details. Nine credit hours devoted to completion of an emphasis area or approved minor is required. Emphasis areas are these: Applied Engineering, Mathematics & Science; Biomolecular Science & Engineering; Polymeric Materials; Energy Studies; Environmental Engineering & Science; Business Management.

Note: No student may exceed two attempts, including a *W*, to complete successfully any CHE course.

Summary of Changes to the CHE Curriculum – October 2015

- Change CHE 1990 and 2990 Creative Inquiry from graded to Pass / No Pass
- Increase CHE 1300 to 3 hours of lecture and change name from Chemical Engineering Tools to Introduction to Chemical Engineering
- Remove CHE 1301 Chemical Engineering Tools Laboratory because CHE 1300 is now 3 hours of lecture and no lab.
- Change name of CHE 2110 from Introduction to Chemical Engineering to Mass and Energy Balances
- Change name of CHE 2111 from Introduction to Chemical Engineering Laboratory to Mass and Energy Balances Laboratory
- Convert CHE 4430 Senior Seminar I (1) and CHE 4440 Senior Seminar II (1) to CHE 4430 Safety, Environment and Professional Practice I (2) and CHE 4440 Safety, Environment and Professional Practice II (1)
- Replace Biochemistry Option with BMOL 4250 for students in the main curriculum
- Create BMOL 4290 Biochemical Processing as a new course for all students, replacing MICRO 4130 (main curriculum) or Engineering Requirements (Biomolecular concentration) with BMOL 4290 Biochemical Processing
- Create CHE 4140 Green Engineering as a new course
- Create CHE 4150 Alternative Energy as a new course
- Move CHE 3210 Thermo II and CHE 3300 Mass Transfer and Separation Processes from Spring Jr. Year to Fall Jr. Year
- Move CHE 3070 Unit Operations Lab I and CHE 3190 Engineering Materials from Fall Jr. Year to Spring Jr. Year
- Changes to sequence of courses in the Biomolecular Concentration are as follows:
    - Move MATH 2080 Intro Ordinary Diff Eqns to Spring So. Yr because or Prereq requirements.
    - Move PHYS 2210 Physics with Calculus II, Biochemistry requirement, and STAT 4110 Statistical Methods to Fall Jr. Yr. to make room for MATH 2080 and get PHYS and STAT before CHE 3070 Unit Operations Lab.
    - Move BIOL 4340 Biochemistry Lab and BIOE 3020 Biomaterials into Spring Jr. Yr.
    - Move BCHM 4310 Physical Biochemistry to Fall Sr. Yr.

Changes to the Curriculum Map are shown below with the current curriculum and proposed curriculum changes for both the main curriculum and the Biomolecular concentration. Changes are in **Bold** and red color.

000172

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 2070

Effective Term: Spring 2016

Title: Basic Electrical Engineering

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
We have always emphasized complex power calculations, power factors, and maximum power transfer over power distribution in this class. The change reflects the course as it has been taught.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☑ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Description

From A first course in electrical engineering to provide non-Electrical Engineering majors with a knowledge of DC and AC circuit theory, AC power distribution, and numerous electrical devices, apparatus, and digital systems. Credit may not be received for both ECE 2070 and ECE 3080.

To A first course in electrical engineering to provide non-Electrical Engineering majors with a knowledge of DC and AC circuit theory, AC power, and numerous electrical devices, apparatus, and digital systems. Credit may not be received for both ECE 2070 and ECE 3080.

Learning Objectives

The goal of this course is to provide non-Electrical Engineering majors with understanding of a few of the major topics within electrical engineering that you might need in your future career. The knowledge you acquire should enable you to then teach yourself or intelligently converse and interact with EE's on projects in the future. This class is an overview of the basics of electrical engineering including DC and AC circuit theory, AC power, and numerous electrical devices, apparatus, and digital systems.

Topical Outline

Topics Covered Hours 1. Electrical quantities and circuit elements 3 2. DC circuits, Kirchoff's laws, network theorems 5 3. AC circuit analysis 4 4. Steady-state AC circuits, reactive power, polyphase 3 5. Ideal transformers 1 6. AC and DC motors 1 7. Signal processing circuits, op-amps, rectifiers (if time permits) 3 8. Logic devices and digital circuits and methods 3 9. Tests 5 Total Hours: 28

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

5 Tests: 16% each Final Exam: 20%

Syllabus

Upload File: ECE 2070 Fall 15-20150908110336.pdf

Form

User ID: cstrimp **Name:** Courtney Honeycutt
Date: 09/25/2015 **Number:** 9701

000173

000174

Chair, Department Curriculum Committee — Date 9/25/15

Department Chair — Daniel L. Noneaker — Date 9/30/15

Chair, College Curriculum Committee — Date 10/19/15

College Dean — Date 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Robert W Jones — Date 2/11/16

President — Date

000175

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 2080

Effective Term: Spring 2016

Title: Electrical Engineering Lab I

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
We have another course with the same title, ECE 2110! This is confusing. ECE 2080 is the lab that goes with the service course ECE 2070. The new name makes this clear.

Rationale for Changing a Course

☐ **Strengthen Program Requirement(s)**

☐ **Alignment of Student Learning Outcomes**

☐ **Alternative Delivery of Content**

☐ **Improve Time to Degree**

☐ **Evolution of the Discipline**

☐ **Changing Prerequisites**

☐ **Address DWF Rates**

☐ **General Education Modifications**

☑ **Other (Please specify.)**

Clarification of course title.

☑ Change Catalog Title

From Electrical Engineering Laboratory I

To Basic Electrical Engineering Laboratory

Learning Objectives

Objectives 1. To gain proficiency in the proper use of common measuring instruments. 2. To learn about lab safety. 3. To develop communication skills through: a. Maintenance of lab notebooks containing clear and concise descriptions of procedures, results, and analyses b. Verbal interchanges with lab partners, other students, and instructor, and c. Preparation of lab reports 4. To learn to compare theoretical predictions with experimental observations and to resolve and explain any apparent deviations and differences.

Topical Outline

Lab# Week beginning Description 1 Aug 31 Laboratory #1: Course Description and Introduction 2 Sep 7 Laboratory #2: Measurement of DC Voltage and Current (Report) 3 Sep 14 Laboratory #3: Computer Analysis 4 Sep 21 Laboratory #4: Instrument Characteristics (Report) 5 Sep 28 Laboratory #5: Oscilloscope 6 Oct 19 Laboratory #6: Problems: Circuit Analysis Methods 7 Oct 26 Laboratory #7: Network Theorems 8 Nov 2 Laboratory #8: Problems: Phasors (Report) 9 Nov 9 Laboratory #9: Problems: AC Power Calculations 10 Nov 16 Laboratory #10: AC Measurements 11 Nov 23 Laboratory #11: Problems: Operational Amplifiers and Digital Logic 12 Nov 30 Final Exam

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

60% Participation 30% Lab Reports (3) 10% Final Exam

Syllabus

Upload File: ECE 2080 Fall 15-20150908111938.pdf

Form

User ID: cstrimp **Name:** Courtney Honeycutt
Date: 09/25/2015 **Number:** 9711

000176

000177

Carl Baum — 9/25/15

Chair, Department Curriculum Committee — Date

Daniel L. Noneaker — 9/30/15

Department Chair — Date

B.M.R — 10/19/15

Chair, College Curriculum Committee — Date

[signature] — 10/20/15

College Dean — Date

Director, Calhoun Honors College — Date

John D. Wiffin — 11/6/2015

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Robert M. Geraci — 2/11/16

Provost — Date

President — Date

000178

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr
Number: 2620
Effective Term: Spring 2016
Title: Elec Circuits II
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
This change reflects the course as it is currently being taught.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☑ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Description

From Continuation of the study of electric circuits, including three-phase circuits, complex frequency and network functions, frequency response, two-port parameters, magnetically-coupled circuits, Laplace transforms, and introduction to Fourier series and transforms.

To Continuation of the study of electric circuits, including three-phase circuits, complex frequency and network functions, frequency response, two-port parameters, magnetically-coupled circuits, Laplace transforms, and ideal op amps.

Learning Objectives

The goals for this course are to provide the student with an understanding of, and a proficiency in the analysis of, electrical circuits containing both active and passive components under both steady state and dynamic (time varying) conditions. These goals will be accomplished by studying and applying the topics found in the topical outline below.

Topical Outline

1. Sinusoidal Steady-State Analysis (chap. 9) (5 lectures) 2. Sinusoidal Steady-State Power Calculation (chap. 10) (3 lectures) 3. Balanced Three-phase Circuit (chap.11) (2 lectures) 4. Introduction to Laplace Transform (chap. 12) (5 lectures) 5. Laplace Transform in Circuit Analysis (chap. 13) (3 lectures) 6. Introduction to Frequency-Selective Circuits, (chap. 14) (4 lectures) 7. Two-Port Circuits (chap. 18) (2 lectures) 8. Tests (5 lectures) 9. Total (29 lectures)

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Homework (10+10 credit point) % ECE2620 - Syllabus 3/5 Midterm Exams (15% each) 60% Final Exam 30%

Syllabus

Upload File: ECE 2620 Fall 15-20150908111141.pdf

Form

User ID: cstrimp **Name:** Courtney Honeycutt
Date: 09/25/2015 **Number:** 9712

Chair, Department Curriculum Committee — 9/25/15

Department Chair — 9/30/15

Chair, College Curriculum Committee — 10/19/15

College Dean — 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16

President — Date

000180

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 3210

Effective Term: Spring 2016

Title: Electronics II

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
These minor changes have been provided by Stephen Hubbard (who teaches the course) to reflect the course as it is currently being taught.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☑ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Description

From Analysis and design of discrete amplifier circuits at low and high frequencies; operational amplifiers, distortion in amplifiers, oscillator design, and circuit analysis of active digital devices.

To Analysis and design of discrete amplifier circuits at low and high frequencies; operational amplifiers, frequency response, feedback, stability, and applications of analog integrated circuits.

Learning Objectives

The goal of this course is to build upon the material covered in ECE 3200 and to introduce more complex analog electronic circuits, both integrated and discrete. Upon completion of this course, students should be familiar with the basic design of operational amplifiers and other circuits containing multiple active devices. Students also should be familiar with basic applications of analog integrated circuits and the concepts of frequency response, feedback, and stability.

Topical Outline

1. Operational Amplifiers 2. Integrated Circuits 3. Frequency Response 4. Feedback and Stability 5. Integrated Circuit Applications 6. Power Amplifiers

Evaluation

Undergraduate

A	90	-	100
B	80	-	90
C	70	-	80
D	60	-	70
F	<		60

Test Average: 60% Final Examination: 40%

Syllabus

Upload File: ECE 3210 Fall 15-20150908111757.pdf

Form

User ID: cstrimp **Name:** Courtney Honeycutt

Date: 09/25/2015 **Number:** 9713

Carl Bann 9/25/15
Chair, Department Curriculum Committee Date

Daniel L. Noneaker 9/30/15
Department Chair Date

BM. D 10/19/15
Chair, College Curriculum Committee Date

Lun a 10/20/15
College Dean Date

Director, Calhoun Honors College Date

John D. Wiffin 11/6/2015
Chair, Undergraduate Curriculum Committee Date

Chair, Graduate Curriculum Committee Date

Robert W Jones 2/11/16
Provost Date

President Date

000182

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 3270

Effective Term: Spring 2016

Title: Dig Comp Design

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
These changes have been provided by Melissa Smith (who teaches the course) to reflect the course as it is currently being taught. The topic of the course dictates the necessity of regular updates in accordance with advances in technology and practice.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☑ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Description

From Design of high-speed ALUs, control and timing circuitry, memory systems and I/O circuitry; mi-croprogrammed computer design using bit-slice microprocessors; current hardware topics related to computer design; hands-on design experience; and use of logic analyzer for system debugging.

To Design of high-speed ALUs, control and timing circuitry, and asynchronous systems; hands-on system prototyping with HDLs for FPGA devices; current hardware topics related to computer design using modern design methodologies and CAD tools; and principles of system design for testability.

Learning Objectives

• Understand modern design methodologies (CAD and HDL) • Understand design for FPGA devices • Understand design of control and timing circuitry • Understand design of high-speed ALUs • Understand principles of Asynchronous Design • Understand principles of Design for Testability

Topical Outline

• Introduction to CAD tools and simulation (~1 week) 1. CAD workflow 2. Technologies 3. Simulation 1. Logic vs. electrical simulation 2. Time vs. event simulation 3. Special problems in simulation 4. Schematic capture vs. HDLs • VHDL Introduction (1 to 2 weeks) 1. Entity, architecture, process 2. Signals, nets, variables 3. Concurrent statements 5. Testbenches • Device Technologies (~1 week) 1. ROM, PLA, PAL 2. CPLDs, FPGAs 3. Altera 5. CMOS logic 6. Standard cell designs 7. Board level designs • Synchronous Sequential Design (5 weeks) o State Machines 1. More and Mealy Models 2. Algorithmic state machines 3. VHDL specification 4. Register Transfer Level Design o ALU Design 1. Shift-add multipliers 2. Bit-pair recoding 4. Array multipliers 5. General arithmetic logic units o Design for FPGAs • Floating Point (2 weeks) 1. Formats 2. Addition/Subtraction 3. Multiplication 4. Hardware organization 5. Rounding, special values • Asynchronous Sequential Design (2 weeks) 1. Fundamental mode circuit analysis 2. Synthesis from flow tables 3. Asynchronous state diagram and primitive flow tables 4. State reduction 5. State assignment 6. Races and hazards • Logic Minimization (1 week) 1. Quine-McClusky tabular method • Circuit Testing (1 week) 1. Faults 2. Test sets 3. Random Testing 4. Controllability and Observability 5. Design for testability 1. LFSR, test generator, signature checking 2. Scan-path design 3. BILIBOs 4. JTAG

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Homework and Quizzes: 15% • Exams: DO NOT use a pen on exams!!!!! Points will be deducted. o Midterm Exam: 20% o Final Exam: 30% (Wednesday 3-530pm) • Projects: 35% o Report 50% + Demo 40% o Proper Assign Server Code Submission 10% à unless otherwise indicated in the assignment

Syllabus

Upload File: ECE 3270 Fall 15-20150908112427.pdf

Form

User ID:	cstrimp	**Name:**	Courtney Honeycutt
Date:	09/25/2015	**Number:**	9717

Carl Baum 9/29/15
Chair, Department Curriculum Committee Date

Daniel L. Monarch 9/30/15
Department Chair Date

B.H.D 10/19/15
Chair, College Curriculum Committee Date

Laura A. Hill 10/20/15
College Dean Date

Director, Calhoun Honors College Date

John D. Kelly 11/6/2015
Chair, Undergraduate Curriculum Committee Date

Chair, Graduate Curriculum Committee Date

Robert H. Jones 2/11/16
Provost Date

President Date

000185

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 3520

Effective Term: Spring 2016

Title: Programming Systems

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
These changes have been provided by Bob Schalkoff (who teaches the course) to reflect the course as it is currently being taught. The topic of the course dictates the necessity of regular updates in accordance with advances in technology and practice.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☑ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Description

From Second course in programming languages and systems. Topics include assemblers, compilers, and syntactical methods; string manipulation and list processing; concepts of executive programs and operating systems; introduction to time-sharing systems. May also be offered as CPSC 3520.

To A more advanced course in programming languages and systems for computer engineering/science majors. The objective of this course is to enable a more complete understanding of programming topics and related supporting tools, including philosophy, methodology, formal syntax and semantics, and examples of programming paradigms, languages, and development approaches.

Learning Objectives

The objective of this course is to enable a more complete understanding of programming topics and related supporting tools, including philosophy, methodology, formal syntax and semantics, and examples of programming paradigms, languages and development approaches

Topical Outline

1. Programming: the Concept, History and Trends (a) (How) did you learn to program? (b) There's Lots More Than c... (c) How do you Convey Aspects of a Programming Language? (d) Taxonomy and History of Programming Languages and Approaches 2. Specifying and Enforcing Syntax (a) Grammars (b) BNF Notation and Alternatives (c) Parsing (d) "mini-c" (e) Scanning/parsing using flex and bison 3. Prolog, Applications and Parsing in Prolog 4. Functional Programming Approaches (a) The Lambda Calculus (b) LISP (c) ML (SML/NJ) (d) CAML 5. "OO" Paradigms (a) Why, What, How? (b) CLOS/c++/Windows examples 6. Specifying Semantics (a) Why? (b) Relationship to "Correctness" (c) Translational Semantics (d) Operational Semantics (e) Denotational Semantics (f) Axiomatic Semantics (g) Algebraic Semantics 7. Event-driven Programming (a) Palm computers (b) X-Windows (c) MS Windows with MFC (d) wxWidgets 8. Programming for Parallel Processing

Duplication (if applicable)

May also be offered as CPSC 3520.

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Your final grade is solely based upon 3 quizzes and 3 Software Development Exercises (SDEs). No re-tests are given. All scores are used and they are equally weighted.

006186

Syllabus
Upload File: ECE 3520 Fall 15-20150908113352.pdf

Form

User ID:	cstrimp	**Name:**	Courtney Honeycutt
Date:	09/25/2015	**Number:**	9722

Carl Burn 9/29/15

Chair, Department Curriculum Committee Date

Daniel L. Noneaker 9/30/15

Department Chair Date

B N. D 10/19/15

Chair, College Curriculum Committee Date

Laura A Hill 10/20/15

College Dean Date

Director, Calhoun Honors College Date

John D. Kniffin 11/4/2015

Chair, Undergraduate Curriculum Committee Date

Chair, Graduate Curriculum Committee Date

Robert W Jones 2/11/16

Provost Date

President Date

000188

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 3600

Effective Term: Spring 2016

Title: Elect Power Engr

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
These minor changes have been provided by Randy Collins (who teaches the course) to reflect the course as it is currently being taught.

Rationale for Changing a Course

☐ **Strengthen Program Requirement(s)**

☑ **Alignment of Student Learning Outcomes**

☐ **Alternative Delivery of Content**

☐ **Improve Time to Degree**

☐ **Evolution of the Discipline**

☐ **Changing Prerequisites**

☐ **Address DWF Rates**

☐ **General Education Modifications**

☐ **Other (Please specify.)**

☑ Change Catalog Description

From Presents the basic principles of electromagnetic induction and electromagnetic forces developed. Topics include synchronous machines, power transformers, electric power transmission, and distribution systems, DC motors, and induction motors.

To Presents the basic principles of power systems, energy conversion, electromagnetic induction and developed forces. Topics include power and energy concepts and analysis; the basics of electric power generation, transmission, and distribution; synchronous machines, induction motors, and DC motors.

Learning Objectives

This class is intended to provide experience working with single and three phase power. Power generation, transmission, and distribution are fundamental aspects of electrical engineering as these govern how power is provided to many devices that need it to operate. After taking this course, students will be able to explain the operation of electric machines, analyze and solve problems involving electric power, and have an understanding of how electric power and machinery are used in real world applications.

Topical Outline

Chapter 1: Mechanical and Electromagnetic Fundamentals Chapter 2: Three Phase Circuits Chapter 3: Transformers Chapter 4: AC Machinery Fundamentals Chapter 5: Synchronous Machines Chapter 7: Induction Motors Chapter 8: DC Motors Chapter 9: Transmission Lines

Learning Activities associated with General Education competencies (if applicable)

Pursuant to page 38 of the 2014-2015 Clemson University Undergraduate Announcements, Specific General Education competencies that apply to this course as found below. Mathematics: Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically, and applying mathematical or statistical methods, using multiple representations where applicable. Example: Include samples of solving problems throughout the course including, but not limited to, homework and tests. Natural Sciences: Demonstrate scientific literacy by explaining the process of scientific reasoning and applying scientific principles inside and outside of the laboratory or field setting. Example: Include samples of lab reports from ECE 4120. Ethical Judgment: Demonstrate an ability to identify, comprehend, and deal with ethical problems and their ramifications in a systematic, thorough, and responsible way. Example: Examine the ethical arguments behind an issue in the electric power industry and discuss in a report.

Evaluation

Undergraduate

A	90	-	100
B	80	-	90
C	70	-	80
D	60	-	70
F	<		60

Homework: 20% Two Tests Exams: 50% Final Exam: 30%

000189

Syllabus
Upload File: ECE 3600 Fall 15-20150908115225.pdf

Form

User ID:	cstrimp	**Name:**	Courtney Honeycutt
Date:	09/25/2015	**Number:**	9730

Chair, Department Curriculum Committee — Date

Department Chair — 9/30/15 — Date

Chair, College Curriculum Committee — 10/19/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 — Date

President — Date

000191

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 3720

Effective Term: Spring 2016

Title: Micro Int Lab

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
These minor changes have been provided by Carl Baum and approved by Rod Harrell to specifically describe the content of the lab (not the corresponding course) as it is currently being taught.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☑ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Catalog Description

From Discusses the programming and interfacing of microcontrollers in order to control their integrated devices and external peripherals. Topics include memory and I/O; interrupts, counters and timers; ADCs and DACs; PWMs; and parallel and serial communication.

To Emphasizes microcontroller programming and interfacing for controlling various types of hardware. Topics include reading and writing to RAM, applications of a digital latch, keypad interfacing, interrupts, clock pulse generation, pulse width modulation, serial interfaces, and A-to-D and D-to-A conversion.

Learning Objectives

To enable the student to: • Gain a better understanding of the C programming language • Learn how to interface with different types of devices on a microcontroller

Topical Outline

Lab 1 - Introduction & C Programming Examples Lab 2 - Reading and Writing Using Ram Lab 3 - Applications of a Digital Latch Lab 5 - Keypad Interfacing Lab 4 - Interrupts Lab 7 - Rotary Pulse Generator Lab 8 - Clock Pulse Generator (ECT) Lab 11 - Pulse Width Modulator Lab 6 - Serial Communications (SCI) Lab 9 - Serial Communications, Part 2 (SPI) Lab 10 - Analog-to-Digital and Digital-to-Analog Conversions Design Projects

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Post-Lab Reports 40% Attendance and Lab Performance 30% Design Project 30%

Syllabus

Upload File: ECE 3720 Fall 15-20150908123845.pdf

Form

User ID: cstrimp **Name:** Courtney Honeycutt

Date: 09/25/2015 **Number:** 9731

Chair, Department Curriculum Committee — 9/29/15 — Date

Department Chair — 9/30/15 — Date

Chair, College Curriculum Committee — 10/19/15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 — Date

President — Date

000193

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 3800

Effective Term: Spring 2016

Title: Electromagnetics

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
These changes have been provided by Anthony Martin (who teaches the course) to reflect the course as it is currently being taught.

Rationale for Changing a Course

☐ **Strengthen Program Requirement(s)**

☑ **Alignment of Student Learning Outcomes**

☐ **Alternative Delivery of Content**

☐ **Improve Time to Degree**

☐ **Evolution of the Discipline**

☐ **Changing Prerequisites**

☐ **Address DWF Rates**

☐ **General Education Modifications**

☐ **Other (Please specify.)**

☑ Change Catalog Description

From Introduction to electric fields and potentials, dielectrics, capacitance, resistance, magnetic field, forces, work and energy, inductance, time-varying fields, and Maxwell's equations.

To Topics in electrostatics include static electric charge, force, field (Coulomb's and Gauss's laws), flux, potential, energy, dielectrics, boundary conditions, and capacitance. Topics in magnetostatics include steady electric current, magnetic field (Biot-Savart and Ampere's law), force, flux, energy, boundary conditions, and inductance.

Learning Objectives

To assist students in obtaining a solid understanding of the time invariant electromagnetic phenomena that provides the basis for application in engineering.

Topical Outline

1. Vector Math 4 2. Vector Calculus 3 3. Electric Charge & Electrostatic Fields 6 5. Capacitance 1 5. Static Currents & Magnetostatic Fields 3 6. Inductance 1 Total 18

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

3 Tests 75% Final exam 25% The grade on the cumulative final exam, if higher, will replace the lower of the three test scores

Syllabus

Upload File: ECE 3800 Fall 15-20150908121349.pdf

Form

User ID: cstrimp **Name:** Courtney Honeycutt

Date: 09/25/2015 **Number:** 9732

Carl Brum 09/21/15
Chair, Department Curriculum Committee Date

Daniel L. Noneaker 9/30/15
Department Chair Date

B.N.D 10/19/15
Chair, College Curriculum Committee Date

Laura A Gil 10/20/15
College Dean Date

Director, Calhoun Honors College Date

John D. Kieffer 11/6/2015
Chair, Undergraduate Curriculum Committee Date

Chair, Graduate Curriculum Committee Date

Robert M Jones 2/11/16
Provost Date

President Date

000195

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 3810

Effective Term: Spring 2016

Title: Field Waves & Ckts

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
These changes have been provided by Anthony Martin (who teaches the course) to reflect the course as it is currently being taught.

Rationale for Changing a Course

☐ **Strengthen Program Requirement(s)**

☑ **Alignment of Student Learning Outcomes**

☐ **Alternative Delivery of Content**

☐ **Improve Time to Degree**

☐ **Evolution of the Discipline**

☐ **Changing Prerequisites**

☐ **Address DWF Rates**

☐ **General Education Modifications**

☐ **Other (Please specify.)**

☑ Change Catalog Description

From Covers foundation of circuit theory, transmission lines and circuits, plane-wave propagation, fiber optics, radiation and antennas, and coupled circuits.

To Covers foundation of circuit theory, transmission lines and circuits, plane-wave propagation, radiation, and antennas.

Learning Objectives

To introduce the student to time-variant electromagnetic phenomena such as wave propagation in various media, transmission and guided-wave systems, and propagation and radiation by way of antennas.

Topical Outline

1. Time-varying EM (Chap. 9) 2.5 2. Wave-propagation in Media (Chap. 10) 7.5 3. Transmission Lines Analysis (Chap. 11) 9.0 4. Antennas & Arrays (Chap. 13) 5.0 Total 24.0

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

3 Tests 75 % Design Assignments 5 % Final 20 %

Syllabus

Upload File: ECE 3810 Fall 15-20150908124300.pdf

Form

User ID: cstrimp **Name:** Courtney Honeycutt

Date: 09/25/2015 **Number:** 9736

Chair, Department Curriculum Committee — Date: ~~9/29/15~~ 000186

Department Chair — Date: 9/30/15

Chair, College Curriculum Committee — Date: 10/19/15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/16

President — Date

000197

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 4090

Effective Term: Spring 2016

Title: Cont & Discrete Sys

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
The course is a controls course. The current title is vague, and potential employers/grad schools may be confused by what looks like a lack of a controls course on a student's undergraduate transcript. The use of "Introduction" in the title is to distinguish it from our graduate courses. Note that there is no corresponding ECE 6090 for this course.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

Clarification of course title.

☑ **Change Catalog Title**

From Continuous and Discrete Signal Design

To Introduction to Linear Control Systems

☑ **Change Transcript Title**

From Cont & Discrete Sys

To Intro to Linear Control Sys

Learning Objectives

The goals for this course are to provide the student with an understanding of, and a proficiency in the analysis of, continuous time systems. The students will: 1) Learn how to apply mathematics to the analysis of control systems for continuous time systems, 2) Learn how to apply MATLAB for analyzing and designing control systems for continuous time systems, and 3) Learn how to design time-domain and frequency-domain controllers systems to meet needs.

Topical Outline

1. Laplace Transform a. Properties b. Partial Fraction Expansion c. Solving Differential Equations 2. System modeling in the time domain a. Block Diagram Simplification b. Mason's Rule 3. Dynamic response a. 2nd Order Systems b. 2nd Order Time Domain Specifications 4. Basic properties of feedback 5. Root-locus analysis a. Construction b. Relationships to Time Domain Specifications 6. Root-locus design a. Lead Compensation b. Lead-Lag Compensation 7. Frequency-response analysis a. Bode Plot Construction b. Nyquist Plot Construction 8. Frequency-response design a. Bode Analysis b. Nyquist Analysis 9. State-space models/controllers a. Matrix and Linear Algebra Review b. State Space Realizations c. State Space Solution d. Frequency Domain Calculations e. State Feedback Control f. State Observers g. State Space Regulators h. Similarity Transformations 10. Advanced Topics a. Polynomial Regulation b. Nonlinear Systems

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Homework 10% 3 Exams 60% (20% each) Final Exam 30% ---------- ---------- Course Grade 100%

Syllabus

Upload File: ECE 4090 Fall 15-20150908124751.pdf

000198

Form

User ID: cstrimp **Name:** Courtney Honeycutt
Date: 09/25/2015 **Number:** 9737

Chair, Department Curriculum Committee — Date 9/29/15

Department Chair — Date 9/30/15

Chair, College Curriculum Committee — Date 10/19/15

College Dean — Date 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date 2/4/16

President — Date

000200

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 4400

Effective Term: Spring 2016

Title: Local Computer Nets

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201401

Brief Statement of Change Based on Assessment Results:
These changes have been provided by K.C. Wang (who teaches the course) to reflect the course as it is currently being taught.

Rationale for Changing a Course

☐ **Strengthen Program Requirement(s)**

☑ **Alignment of Student Learning Outcomes**

☐ **Alternative Delivery of Content**

☐ **Improve Time to Degree**

☐ **Evolution of the Discipline**

☐ **Changing Prerequisites**

☐ **Address DWF Rates**

☐ **General Education Modifications**

☐ **Other (Please specify.)**

☑ Change Catalog Description

From Introduction to the design and performance analysis of local computer networks. Emphasizes performance analysis of representative multi-access procedures. Three common types of networks are considered in detail.

To Introduction to methods of modeling and performance analysis of local computer networks. Topics include basic queueing models based on probability theory and random processes, performance driven network design, and software defined networking methods.

Learning Objectives

By the end of the course, students are expected to be able to: • Identify standard architectures and protocols of local computer networks. • Utilize standard network models and probabilistic traffic models to analyze local computer networks. • Carry out mathematical calculations required in statistical analyses, including calculus, probability functions, logical and numerical algebra. • Determine suitable models, performance measures, and design factors of local computer networks. • Utilize software defined networking tools to compose and study network protocols and performance.

Topical Outline

1. Review of probability (notes, 0.5 weeks) 2. Introduction to Networks (Chap.1, 0.5 weeks) 3. Protocols and network architecture (Chap.10, 1 week) 4. Introduction to local area networks (Chap.5, 1 week) 5. Data flow in networks and queues (Chap.3, 2.5 weeks) 6. Principles of medium access control (Chap.6 and notes, 2 weeks) 7. Token passing methods (Chap.7 and 8, 1.5 weeks) 8. Random access techniques (Chap.9, 1.5weeks) 9. Recent developments in LAN technology (notes, 3.5 week) 10. Exams (1 week)

Duplication (if applicable)

Also offered as ECE 6400.

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Probability review quiz 2% Homework 8% Programming assignments 20% First exam 20% Second exam 20% Final project 30% ECE 640 students will have additional homework, exam questions, and reading assignments beyond those given to ECE 440 students.

Syllabus

Upload File: ECE 4400,6400 Fall 15-20150908125017.pdf

000201

Form

User ID: cstrimp **Name:** Courtney Honeycutt
Date: 09/25/2015 **Number:** 9739

Carl Bare 000202 9/21/15
Chair, Department Curriculum Committee Date

Daniel L. Noneaker 9/30/15
Department Chair Date

B.N.D 10/19/15
Chair, College Curriculum Committee Date

Susan A. Hill 10/20/15
College Dean Date

Director, Calhoun Honors College Date

John D. Kniffin 11/16/2015
Chair, Undergraduate Curriculum Committee Date

Chair, Graduate Curriculum Committee Date

Robert H. Jones 2/11/16
Provost Date

President Date

000203

Change Undergraduate Course

Change a Course

Subject: ECE-Electrical and Comp Engr

Number: 4950

Effective Term: Spring 2016

Title: Int Sys Design I

Honors Course:

☐ Add Honors Course:

Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
ECE 4090 content is used in the later projects in ECE 4950. In fact, the course syllabus that Kapadia uses (taken from Tim Berg) states that ECE 4090 was a co-requisite. We need the course syllabus and the IROAR/Catalog information to agree.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☑ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Prerequisite(s) / Corequisite(s)

From Preq: Electrical Engineering major and ECE 3200 and ECE 3300 and ECE 3600 and ECE 3800, each with a C or better; or Computer Engineering major and ECE 3200 and ECE 3220 and ECE 3300 and ECE 3520 and ECE 3710, each with a C or better. Coreq: ECE 4951.

To Preq: Electrical Engineering major and ECE 3200 and ECE 3300 and ECE 3600 and ECE 3800, each with a C or better; or Computer Engineering major and ECE 3200 and ECE 3220 and ECE 3300 and ECE 3520 and ECE 3710, each with a C or better. Coreq: ECE 4951. Preq or concurrent enrollment: ECE 4090.

Learning Objectives

The goal of this course is to introduce to you a professional methodology of project definition, planning, scheduling, and execution. This methodology will be applied in two ways: 1) by practicing applying your technical skills in a team with your colleagues to complete various projects throughout the semester and 2) by communicating your results clearly and concisely in report form.

Topical Outline

Project 1 CATME Survey completion: Thursday 8/20/2015 by 11:59 PM, online Software installation check: Wednesday 8/26/2015, in class/lab, 200 Olin Hall/B-29 Riggs Hall Teams announced no later than 8/24/2015 Loopback tests **Updated**: Monday 8/31/2015, 3-5 PM Drop In, B-29 Riggs Hall Project 1 reports by team due 9/4/2015 3-5 PM, 335 EIB (My office) Laser Cut piece due 9/4/2015 along with Project 1 reports Project 2 and 3 Sensor and actuator demonstration, Monday 9/21/2015, 3-5 PM Drop In, B-29 Riggs Hall Project 2 and 3 reports by team due 9/23/2015 in class Actuator cannot be a motor. Arduino cannot be used as an intermediary device. Sensor cannot be on/off discrete Life-sized mock-up also to be presented along with the sensor/actuator demonstration Project 4 and 5 Image processing and motor control demonstration, Friday 10/16/2015, 3-5 PM Drop In, B-29 Riggs Hall Projects 4 and 5 reports by team due Wednesday 10/21/2015 in class Project 6 - Final Project Milestone 1: Final physical system design decisions, Friday 10/30/2015, 3-5 PM Drop In, B-29 Riggs Hall Milestone 2: E-Stop incorporation, Friday 11/6/2015, 3-5 PM Drop In, B-29 Riggs Hall Milestone 3: Full System Integration (gain tuning/logic testing yet to be completed), Friday 11/13/2015, 3-5 PM Drop In, B-29 Riggs Hall Final project IEEE demonstration, Wednesday 12/2/2015, B-29 Riggs Hall, 6-8 PM Final Project Competition: Friday 12/4/2015, 5 PM until finish. Final reports due: Wednesday, 12/9/2015, by 4 PM, in my office (335 Fluor Daniel)

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Item (percent of total grade) Weighting Project 1 ..... 5 % Project 2 ..... 15 % Presented together Project 3 ..... 10 % Project 4 ..... 10 % Presented together Project 5 ..... 10 % Project 6 ..... 20 % Team Website ..... 5% Individual Assignments (~10 items) 10% Teamwork 15%

Syllabus

Upload File: ECE 4950 Fall 15-20150908125654.pdf

Form

User ID:	cstrimp	**Name:**	Courtney Honeycutt
Date:	09/25/2015	**Number:**	9741

000205

Carl Bowman — 9/25/15

Chair, Department Curriculum Committee — Date

Daniel L. Noneaker — 9/30/15

Department Chair — Date

B V. D — 10/19/15

Chair, College Curriculum Committee — Date

Steven A Hall — 10/20/15

College Dean — Date

Director, Calhoun Honors College — Date

John D. Wiffin — 11/4/2015

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Robert H Jones — 2/11/16

Provost — Date

President — Date

000206

Delete Undergraduate Course

Delete a Course

Subject: IE-Industrial Engineering

Number: 2000

Effective Term: Fall 2017

Title: Soph Seminar in I E

☐ Delete Honors Course:

Last Term Course was taught: 201408

Brief Statement of Change Based on Assessment Results:
A big part of this course was to orient and advise incoming students to IE. With the changes that took place in the IE advising procedures IE 2000 is no longer critical to acclimating the new students to IE.

Rationale for Delete Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

Changes to the IE advising procedures replaces the need for IE 2000.

Form

User ID: burak **Name:** Burak Eksioglu

Date: 10/06/2015 **Number:** 11979

Chair, Department Curriculum Committee — Date

Department Chair — Date

Chair, College Curriculum Committee — 10-19-15 Date

College Dean — 10/20/15 Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 Date

President — Date

Change Undergraduate Course

000208

Change a Course

Subject: IE-Industrial Engineering
Number: 2100
Effective Term: Spring 2018
Title: Des Analysis Wrk Sys
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
The new faculty teaching the course wants to change the emphasis to build on statics.

Rationale for Changing a Course

- ☐ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☑ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Prerequisite(s) / Corequisite(s)

From ENGR 1060 and ENGL 1030 (both C or better)
To ENGL 1030 (C or better) and CE 2010 ~~(D or better)~~

Form

User ID: burak **Name:** Burak Eksioglu
Date: 09/25/2015 **Number:** 11092

Chair, Department Curriculum Committee — Date

Department Chair — Date

Chair, College Curriculum Committee — 10-19-15 Date

College Dean — 10/20/16 Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 Date

President — Date

000210

Change Undergraduate Course

Change a Course

Subject: IE-Industrial Engineering
Number: 2800
Effective Term: Spring 2018
Title: Deterministic Operations Rsrch
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
Based on recent teaching experience students did not seem to have the necessary background in linear algebra. Also, the time dedicated to linear algebra in the course is insufficient. Therefore, we are changing the prerequisite from MATH 1060 to MATH 3110. Since this change will result in a 3000 level prerequisite we are also changing the course number to 3800. The topics are adjusted as shown.

Rationale for Changing a Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☑ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☐ **Other (Please specify.)**

☑ Change Number

To 3800

☑ Change Prerequisite(s) / Corequisite(s)

From MATH 1060
To MATH 3110

Learning Objectives

This course seeks to provide experience in modeling such systems and experience in applying fundamental optimization algorithms.

Topical Outline

1. Introduction and linear algebra review (1 week) 2. Formulating linear programs (4 weeks) 3. Graphical solution and the Simplex Method (2 weeks) 4. Formulating Integer Programs (1.5 weeks) 5. Sensitivity Analysis (2 weeks) 6. Transportation and assignment (1.5 weeks) 7. Network flows (1 week) 8. Use of software for solving LPs and IPs (1 week) 9. Examinations (1 week)

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Exam 1 - 25% Exam 2 - 25% HW - 25% Final exam - 25%

Syllabus

Upload File: IE 3800 ABET syllabus-20150925143738.docx

Description: IE3800Syllabus

Form

User ID: burak **Name:** Burak Eksioglu
Date: 09/25/2015 **Number:** 11083

Chair, Department Curriculum Committee — Date

Department Chair — Date

Chair, College Curriculum Committee — Date

College Dean — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date

Chair, Graduate Curriculum Committee — Date

Provost — Date

President — Date

000212

Add Undergraduate Course

Course Attributes

Subject Abbreviation:	IE-Industrial Engineering	**Catalog Title:**	Seminar in Industrial Engineering
Course Number:	3140	**Transcript Title:**	Seminar in IE
Effective Term:	Fall 2017	**Cross-reference(s):**	
College:	Engineering and Science	**Grade Mode:**	Pass/No Pass
Department:	Industrial Engineering		

☐ **Additional Fee?**

Justification
To address the challenge of assigning a letter grade to a seminar experience (similar to voluntary graduate level seminars). IE 3140 will replace IE 3680.

Form

User ID: burak **Name:** Burak Eksioglu
Date: 10/06/2015 **Number:** 11972

Hours

Fixed Credit Course
Credit Hrs Contact Hrs
1 1

Variable Credit Course
Credit Hrs Contact Hrs
Min Max Min Max

Rationale for Add Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

IE 3140 will replace IE 3680

Schedule Types

- ○ **Field Course**
- ○ **Independent Study**
- ○ **Internship**
- ○ **Lab No Fee**
- ○ **Lab With Fee**
- ○ **Lecture**
- ○ **Other**
- ◉ **Seminar**
- ○ **Studio**
- ○ **Tutorial**

Projected Enrollment

Year 1: 0
Year 2: 0
Year 3: 0
Year 4: 0

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Attendance - 50% Written reports - 50%

Catalog Description
Seminar to orient students to issues of professional development and professional practice of industrial engineering.

Required course for students in
Industrial Engineering

Statement of need and justification based on assessment of student learning outcomes
This course is added to the curriculum to address the challenge of assigning a letter grade to a seminar experience (similar to voluntary graduate level seminars). IE 3140 will replace IE 3680.

Textbook(s)
No textbook required.

Learning Objectives
Students will be able to explain some of the issues of professional practice as an industrial engineer.

Topical Outline
1. ABET, Licensure (FE exam) & the IE Curriculum (1 hour) 2. Professional and ethical responsibility (1 hour) 3. The impact of engineering solutions in a global, economic, environmental, and societal context (1 hours) 4. The need for life-long learning (1 hour) 5. Contemporary issues (1 hours) 6. Other topics which vary from semester to semester (10 hours)

Syllabus

Upload File: IE 3140 ABET syllabus-20151006172703.docx

000213

Chair, Department Curriculum Committee — Date 10/9/15

Department Chair — Date

Chair, College Curriculum Committee — Date 10-19-15

College Dean — Date 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 11/16/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date 2/11/16

President — Date

Delete Undergraduate Course

000215

Delete a Course

Subject: IE-Industrial Engineering

Number: 3680

Effective Term: Fall 2017

Title: Prof Practice in I E

☐ Delete Honors Course:

Last Term Course was taught: 201408

Brief Statement of Change Based on Assessment Results:
To address the challenge of assigning a letter grade to a seminar experience (similar to voluntary graduate level seminars). A new P/NP version will be added to the curriculum.

Rationale for Delete Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

Replacing with P/NP seminar course.

Form

User ID: burak **Name:** Burak Eksioglu

Date: 10/06/2015 **Number:** 11977

Chair, Department Curriculum Committee — Date 10/19/15

Department Chair — Date

Chair, College Curriculum Committee — Date 10-19-15

College Dean — Date 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date 2/11/16

President — Date

Change Undergraduate Course

000220

Change a Course

Subject: IE-Industrial Engineering
Number: 3810
Effective Term: Fall 2018
Title: Probabilistic Operations Rsrch
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201505

Brief Statement of Change Based on Assessment Results:
We are changing the prerequisite to reflect the inclusion of Linear Algebra (MATH 3110) as a required course in the 1617 curriculum.

Rationale for Changing a Course

- ☐ Strengthen Program Requirement(s)
- ☐ Alignment of Student Learning Outcomes
- ☐ Alternative Delivery of Content
- ☐ Improve Time to Degree
- ☐ Evolution of the Discipline
- ☑ Changing Prerequisites
- ☐ Address DWF Rates
- ☐ General Education Modifications
- ☐ Other (Please specify.)

☑ Change Prerequisite(s) / Corequisite(s)

From IE 2800
To MATH 3110

Form

User ID: burak **Name:** Burak Eksioglu
Date: 09/25/2015 **Number:** 11091

Chair, Department Curriculum Committee — 10/07/15 — Date

Department Chair — Date

Chair, College Curriculum Committee — 10-19-15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 — Date

President — Date

Delete Undergraduate Course

000222

Delete a Course

Subject: IE-Industrial Engineering
Number: 4020
Effective Term: Fall 2016
Title: Creative Inq Res
☐ Delete Honors Course:
Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
To address the challenge of assigning a letter grade to an unstructured research experience (similar to master's thesis). A new P/NP version will be introduced.

Rationale for Delete Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

Replacing with P/NP creative inquiry course.

Form

User ID: burak **Name:** Burak Eksioglu
Date: 10/07/2015 **Number:** 11440

Chair, Department Curriculum Committee — 10-19-15 — Date

000223

Department Chair — Date

Chair, College Curriculum Committee — 10-19-15 — Date

College Dean — 10/20/15 — Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 — Date

Chair, Graduate Curriculum Committee — Date

Provost — Robert H Jones — 2/11/16 — Date

President — Date

000224

Delete Undergraduate Course

Delete a Course

Subject: IE-Industrial Engineering

Number: 4030

Effective Term: Fall 2016

Title: Creative Inq Project

☐ Delete Honors Course:

Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
To address the challenge of assigning a letter grade to an unstructured research experience (similar to master's thesis). A new P/NP version will be introduced.

Rationale for Delete Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

Replacing with P/NP creative inquiry course.

Form

User ID: burak **Name:** Burak Eksioglu

Date: 10/07/2015 **Number:** 11456

Chair, Department Curriculum Committee — Date 000225

Department Chair — Date

Chair, College Curriculum Committee — Date 10-19-15

College Dean — Date 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date 2/11/16

President — Date

000226

Add Undergraduate Course

Course Attributes

Subject Abbreviation:	IE-Industrial Engineering	**Catalog Title:**	Creative Inquiry Research
Course Number:	4040	**Transcript Title:**	Creative Inquiry Research
Effective Term:	Fall 2016	**Cross-reference(s):**	
College:	Engineering and Science	**Grade Mode:**	Pass/No Pass
Department:	Industrial Engineering		

☐ **Additional Fee?**

Justification
To address the challenge of assigning a letter grade to an unstructured research experience (similar to master's thesis). This course is replacing the graded versions (IE 4020 and IE 4030).

Form

User ID: burak **Name:** Burak Eksioglu
Date: 10/06/2015 **Number:** 11967

Hours

Fixed Credit Course
Credit Hrs Contact Hrs

Variable Credit Course
Credit Hrs Contact Hrs
Min Max Min Max
1 6 1 6

Rationale for Add Course

- ☑ **Strengthen Program Requirement(s)**
- ☐ **Alignment of Student Learning Outcomes**
- ☐ **Alternative Delivery of Content**
- ☐ **Improve Time to Degree**
- ☐ **Evolution of the Discipline**
- ☐ **Changing Prerequisites**
- ☐ **Address DWF Rates**
- ☐ **General Education Modifications**
- ☑ **Other (Please specify.)**

Replacing graded creative inquiry courses.

Projected Enrollment

Year 1: 0
Year 2: 0
Year 3: 0
Year 4: 0

Evaluation

Undergraduate

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Research report - 100%

Catalog Description

Research experience promoting reasoning, critical thinking, ethical judgment, communication skills, and an understanding of the scientific method and engineering design. These applied/basic research experiences are usually undertaken with a team under the mentorship of a faculty member or advanced graduate student.

Statement of need and justification based on assessment of student learning outcomes

To address the challenge of assigning a letter grade to an unstructured research experience (similar to master's thesis). This course is replacing the graded versions (IE 4020 and IE 4030).

Textbook(s)

No required textbook.

Learning Objectives

The students will learn how to carry out a research project from conceptualization, data collection, experimental design to data analysis and presentation of results.

Topical Outline

This will vary by instructor.

Lecture Course

Syllabus

Upload File: IE_4040_Syllabus-20151006174758.docx

Chair, Department Curriculum Committee — Date

Department Chair — Date

Chair, College Curriculum Committee — 10-19-15 Date

College Dean — 10/20/15 Date

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — 11/6/2015 Date

Chair, Graduate Curriculum Committee — Date

Provost — 2/11/16 Date

President — Date

000228

Change Undergraduate Course

Change a Course

Subject: IE-Industrial Engineering
Number: 4670
Effective Term: Fall 2016
Title: System Design II
Honors Course:
☐ Add Honors Course:
Last Term Course was taught: 201501

Brief Statement of Change Based on Assessment Results:
Based on assessment results it was determined that the students need additional help in writing. Therefore, a lab is being added to this capstone design class.

Rationale for Changing a Course

☑ **Strengthen Program Requirement(s)**
☐ **Alignment of Student Learning Outcomes**
☐ **Alternative Delivery of Content**
☐ **Improve Time to Degree**
☐ **Evolution of the Discipline**
☐ **Changing Prerequisites**
☐ **Address DWF Rates**
☐ **General Education Modifications**
☑ **Other (Please specify.)**
Based on assessment results it was determined that the students need additional help in writing. Therefore, a lab is being added to this capstone design class.

☑ Change of Credit

From
Fixed Credit Course

Credit Hrs	Contact Hrs
3	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

To
Fixed Credit Course

Credit Hrs	Contact Hrs
4	2

Variable Credit Course

Credit Hrs		Contact Hrs	
Min	Max	Min	Max

Learning Objectives

The course provides students with the opportunity to experience various aspects of a team-project design process from development of a mission statement and selection of appropriate design methodologies to project management and economic decision making.

Topical Outline

1. Mission statement (1) 2. Project plan (1) 3. Customer needs analysis (1) 4. Product specifications (1) 5. System losses (1) 6. Root Cause Analyses (3) 7. Performance evaluation (1) 8. Engineering ethics and Contemporary Issues (1) 9. Student presentation (8) 10. Student project work (30)

Evaluation

Undergraduate

000229

A	90	-	100
B	80	-	89
C	70	-	79
D	60	-	69
F	<		60

Written project reports - 50% Oral presentations - 50%

Syllabus

Upload File: IE 4670 ABET Syllabus-20151006174331.docx

Form

User ID: burak **Name:** Burak Eksioglu
Date: 10/06/2015 **Number:** 11982

Chair, Department Curriculum Committee — Date: 10-19-15 000230

Department Chair — Date

Chair, College Curriculum Committee — Date: 10-19-15

College Dean — Date: 10/20/15

Director, Calhoun Honors College — Date

Chair, Undergraduate Curriculum Committee — Date: 11/6/2015

Chair, Graduate Curriculum Committee — Date

Provost — Date: 2/11/16

President — Date