

# Cover Sheet: Request 11594

## Bachelor of Science in Chemical Engineering

### Info

Process	Major Curriculum Modify Ugrad/Pro
Status	Pending
Submitter	Sain,Cynthia L csain@ufl.edu
Created	3/28/2017 4:59:02 PM
Updated	4/20/2017 10:24:30 AM
Description of request	<p>1. Improve our Safety Class</p> <p>2. Improve program flexibility and obtain a 1-credit reduction by replacing the requirement of CHM 4411: Physical Chemistry (4 credits) by 3 credits of Physical Chemistry Topics that can be satisfied by either PHY 3513: Thermal Physics (3 credits) or by CHM 4411. In the latter case, the extra credit would count as a technical elective.</p> <p>3. Improve program flexibility and increase the students' experiential education by raising the maximum number of technical elective credits earned from experiential education from 3 to 5 (with no more than 3 coming from industry work and no more than 3 coming from academic research).</p>

### Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	ENG - Chemical Engineering 011903000	Dickinson, Richard Bernhart		3/28/2017
Added Overview ChE Changes vrs 2.docx					3/28/2017
Deleted ChE Major Ugrad Catalog.edits.docx					3/28/2017
Added PHY3513Seats.docx					3/28/2017
College	Comment	ENG - College of Engineering	van Oostrom, Hans	This request needs an edited copy of the catalog. 1) go to the catalog page on the web, 2) cut and paste into Word, 3) edit the catalog with Review Changes turned on, 4) submit the Word file with revisions shown and a copy with the changes accepted.	3/28/2017
No document changes					
College	Approved	ENG - College of Engineering	Dublin, Heidi Dickerson		4/20/2017
Added BSChE Catalog Desc v2.docx					3/29/2017
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			4/20/2017
No document changes					
Office of the Registrar					
No document changes					

<b>Step</b>	<b>Status</b>	<b>Group</b>	<b>User</b>	<b>Comment</b>	<b>Updated</b>
Student Academic Support System					
No document changes					
Catalog					
No document changes					
Academic Assessment Committee Notified					
No document changes					
College Notified					
No document changes					

# Major|Modify\_Curriculum for request 11594

## Info

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**Form version:** 1

## Responses

**Major Name**Chemical Engineering

**Major Code**ECH

**Degree Program Name** BSChE

**Effective Term** Fall

**Effective Year** 2018

**Proposed Changes** 1. In addition to changes submitted by UCC2 for ECH 4714L: it is unwise to allow our students to graduate with the minimum grade for passing according to UF rules (D-), and therefore it was also unanimously decided to increase this minimum to a C for the safety class.

2. Improve program flexibility and obtain a 1-credit reduction by replacing the requirement of CHM 4411: Physical Chemistry (4 credits) by 3 credits of Physical Chemistry Topics that can be satisfied by either PHY 3513: Thermal Physics (3 credits) or by CHM 4411. In the latter case, the extra credit would count as a technical elective.

3. Improve program flexibility and increase the students' experiential education by raising the maximum number of technical elective credits earned from experiential education from 3 to 5 (with no more than 3 coming from industry work and no more than 3 coming from academic research).

**Pedagogical Rationale/Justification**1. Chemical process safety has been emphasized in the new ABET requirements for chemical engineering curricula. Given the industrial importance of safety, we believe it is essential that our graduates demonstrate proficiency of this material before joining the industrial workforce.

2. As our program cannot increase the total number of credits, the credit increase in the safety class requires a one-credit reduction from somewhere else. This was part of the motivation for the second and third objectives.

3. A chemical engineering student seeking permanent employment after graduation is at a significant disadvantage if he/she does not have co-op or internship experience. And the more the experience, the better the job prospects. Research experience is also highly valuable, particularly for students who will be pursuing graduate studies.

**Impact on Enrollment, Retention, Graduation**No anticipated impact. Any student impacted by the increase in Chemical Process Safety credit will be able to use the extra credit as a Technical Elective, thus keeping the total credits at 134.

**Assessment Data Review**1. An explosion in the T2 Laboratories of Jacksonville 10 years ago killed 4 people, including the co-owner who was a prominent alumnus and an active advisory board member of our department. The explosion was partially due to inadequate safety precautions. This, as well as increased emphasis on safety training by ABET, has motivated our department to strive to continually improve the safety training of our students.

2. The idea of replacing CHM 4411 by PHY 3513 came from a group of our students who had taken both of these classes (the Physics class because they were pursuing a minor in Physics). They proposed it in a meeting with the Undergraduate Coordinator, who had requested ideas for improving our program. The Chemical Engineering faculty examined the syllabi from both classes, talked to several students, and finally decided that the two classes were equally desirable. The Physics class provides background in statistical thermodynamics that the Chemistry class does not (it is covered in P. Chem 2), and the Chemistry class covers kinetic theory that the Physics class does not. Although coverage of kinetic theory is beneficial, the topic is fully covered in the Chemical Engineering class ECH 4504: Chemical Kinetics and Reactor Design.

3. The proposal stems from the faculty's desire to encourage our students to seek experiential education. It also serves a second purpose. If students elect to take CHM 4411 to satisfy the Physical Chemistry Topics requirement, they would need to earn 11 credits of technical electives. Almost all courses that qualify as technical electives are for 3 credits, and therefore a student may be unable to find a qualifying 2-credit course and be forced to take a 3-credit course instead. With the proposed change that student could earn these 2 credits from experiential education.

**Academic Learning Compact and Academic Assessment Plan**No changes.

## OVERVIEW OF PROPOSED CHANGES IN THE CHEMICAL ENGINEERING UNDERGRADUATE PROGRAM

There are three interconnected objectives in the proposed changes:

### 1. Improve our Safety Class

An explosion in the T2 Laboratories of Jacksonville 10 years ago killed 4 people, including the co-owner who was a prominent alumnus and an active advisory board member of our department. The explosion was partially due to inadequate safety precautions. This, as well as increased emphasis on safety training by ABET, has motivated our department to strive to continually improve the safety training of our students.

- a. The present 2-credit course does not allow coverage of all topics that our faculty deem necessary, so it was unanimously decided to expand the course to 3 credits.
- b. In addition, it is unwise to allow our students to graduate with the minimum grade for passing according to UF rules (D-), and therefore it was also unanimously decided to increase this minimum to a C for the safety class.

The course previously was incorrectly designated as a laboratory course. Although there is some connection with our Unit Operations laboratory (hazard analysis) the connection only involves a small fraction of class time. Two proposed changes to better reflect what the course does are:

- c. To change the name from "Safety and Experimental Evaluation" to "Chemical Process Safety"
- d. To change the number designation from ECH4714L to ECH4714.
  - i. Pre-requisite change: from ENC 3254 to ENC 3246 Professional Communications for Engineers.

As our program cannot increase the total number of credits, the credit increase in the safety class requires a one-credit reduction from somewhere else. This was part of the motivation for the second and third objectives.

### 2. Improve program flexibility and obtain a 1-credit reduction by replacing the requirement of CHM 4411: Physical Chemistry (4 credits) by 3 credits of Physical Chemistry Topics that can be satisfied by either PHY 3513: Thermal Physics (3 credits) or by CHM 4411. In the latter case, the extra credit would count as a technical elective.

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**From:** Kevin Ingersent [<mailto:ingersent@ufl.edu>]

**Sent:** Wednesday, March 22, 2017 9:43 PM

**To:** Svoronos,Spyros A <[svoronos@ufl.edu](mailto:svoronos@ufl.edu)>

**Cc:** Matcheva,Katia I <[katia@phys.ufl.edu](mailto:katia@phys.ufl.edu)>

**Subject:** Re: Fw: Thermal Physics PHY3513

Dear Spyros:

Physics will guarantee 10 places in PHY 3513 in each of Fall 2017 and Spring 2018 for Chemical Engineering students who are allowed by petition to take the course toward the major. As we discussed by phone this afternoon, once PHY 3513 is approved for the major by your college's curriculum committee, we will figure out a mechanism to set aside the 10 seats.

In Spring 2018, we will attempt to make available more seats by creating a second section of PHY 3513 with an enrollment cap of at least 45.

In Fall 2018 and beyond, we will work with your department to try to schedule up to two sections per semester to accommodate those of your majors who elect to take PHY 3513 in place of CHM 4411.

All the best,

Kevin Ingersent  
Professor and Chair

3. Improve program flexibility and increase the students' experiential education by raising the maximum number of technical elective credits earned from experiential education from 3 to 5 (with no more than 3 coming from industry work and no more than 3 coming from academic research).

These days, a chemical engineering student seeking permanent employment after graduation is at a significant disadvantage if he/she does not have co-op or internship experience. And the more the experience, the better the job prospects. Research experience is also highly valuable, particularly for students who will be pursuing graduate studies. And students who are undecided (or wish to graduate Summa or Magna Cum Laude) wish to do both. It is not unusual for our department to have students graduating with 3 or even 4 semesters of industry experiential education and several semesters of research experience. The proposal stems from the faculty's desire to encourage our students to seek experiential education. It also serves a second purpose. If students elect to take CHM 4411 to satisfy the Physical Chemistry Topics requirement, they would need to earn 11 credits of technical electives. Almost all courses that qualify as technical electives are for 3 credits, and therefore a student may be unable to find a qualifying 2-credit course and be forced to take a 3-credit course instead. With the proposed change that student could earn these 2 credits from experiential education.

# Chemical Engineering

Although chemical engineering has existed for only 100 years, its name is no longer completely descriptive of this dynamic profession. The work of the chemical engineer is not restricted to the chemical industry, chemical changes or chemistry. Instead, modern chemical engineers are concerned with all the physical, chemical and biological changes of matter that can produce an economic product or result that is useful to mankind.

## About this Major

- **College:** [Herbert Wertheim College of Engineering](#)
  - **Degree:** Bachelor of Science in Chemical Engineering
  - **Credits for Degree:** 134
  - [Academic Learning Compact](#)
  - [Additional Information](#)
- 
- [Related Chemical Engineering Programs](#)

*To graduate with this major, students must complete all university, college, and major requirements.*

### [Critical Tracking Model Semester Plan](#)

The education of the chemical engineer is based on the fundamental sciences of physics, chemistry and biology, on mathematical and computer techniques, and on basic engineering principles. This background makes the chemical engineer extremely versatile and capable of working in a variety of industries: chemical, biochemical, petroleum, materials, microelectronics, environmental, food processing, consumer products, consulting and project management. It is also good preparation for law and medical schools.

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## Department Requirements

Successful applicants must have earned a minimum 2.5 grade point average in the better of two attempts of the eight preprofessional courses and have earned a minimum grade point average in the better of two attempts of 2.5 in the preprofessional calculus course sequence.

For the purposes of determining admission to or retention in the department, grade point averages will be based on no more than two attempts for each course. Students must maintain

satisfactory progress (minimum GPA of 2.0) in chemical engineering courses and in their overall record.

To proceed to succeeding courses, minimum grades of C are required in ECH 3023, ECH 3101, ECH 3203, ECH 3223, ECH 3264 and COT 3502 within two enrollments (including drops and/or withdrawals) for each course.

[A minimum grade of C is required in ECH 4714.](#)

Any course taken to satisfy a degree requirement (general education, required course or technical elective) with the exception of ECH4912, ECH 4948, and ECH 4949, cannot be taken S-U.

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## Educational Objectives

Within a few years of obtaining a bachelor's degree in chemical engineering from the University of Florida, the recent graduate will achieve one or more of the following:

- Graduates will demonstrate professional engineering competence via promotions and/or positions of increasing responsibility.
- Graduates will be successful in pursuing advanced degrees in chemical engineering or in other disciplines.
- Graduates will be able to work in diverse professional environments as demonstrated in their pursuit of continuing education, professional certification/registration and/or career path into business, government, education, etc.

The chemical industry alone provides an opportunity for the chemical engineer to participate in the research, development, design or operation of plants for the production of new synthetic fibers, plastics, chemical fertilizers, vitamins, antibiotics, rocket fuels, nuclear fuels, paper pulp, photographic products, paints, fuel cells, semiconductors and the thousands of chemicals that are used as intermediates in the manufacture of these products.

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## Goal

To prepare students for lifelong careers in chemical engineering.

## Mission

To offer high-quality undergraduate and graduate degree programs in chemical engineering and to conduct research that helps educate graduate students and serves the needs of Florida and the nation.



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## Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida [Common Course Prerequisites](#) may be used for transfer students.

### Semester 1

- 2.5 GPA in MAC 2311, MAC 2312 and MAC 2313 sequence based on the best of two attempts
- Complete 1 of 8 critical-tracking courses with a minimum grade of C within two attempts: CHM 2045 or CHM 2095, CHM 2046 or CHM 2096, MAC 2311, MAC 2312, MAC 2313, MAP 2302, PHY 2048, PHY 2049
- 2.5 GPA required for all critical-tracking courses based on the best of two attempts
- 2.0 UF GPA required

### Semester 2

- Complete 1 additional critical-tracking course with a minimum grade of C within two attempts
- 2.5 GPA required for all critical-tracking courses based on the best of two attempts
- 2.5 GPA in MAC 2311, MAC 2312 and MAC 2313 sequence based on the best of two attempts
- 2.0 UF GPA required

### Semester 3

- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 2.5 GPA required for all critical-tracking courses based on the best of two attempts
- 2.5 GPA in MAC 2311, MAC 2312 and MAC 2313 sequence based on the best of two attempts
- 2.0 UF GPA required

### Semester 4

- Complete 2 additional critical-tracking courses with minimum grades of C within two attempts
- 2.5 GPA in MAC 2311, MAC 2312 and MAC 2313 sequence based on the best of two attempts
- 2.5 GPA required for all critical-tracking courses based on the best of two attempts

- 2.0 UF GPA required

## Semester 5

- Complete all 8 critical-tracking courses with minimum grades of C in each course within two attempts and a 2.5 GPA on all critical-tracking courses based on the best of two attempts.
- 2.5 GPA in MAC 2311, MAC 2312 and MAC 2313 sequence based on the best of two attempts
- 2.5 GPA required for all critical-tracking courses based on the best of two attempts
- 2.0 UF GPA required

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## Model Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold.

*This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.*

Semester 1	Credits
ABE 2062 Biology for Engineers <i>or</i> BSC 2010 Integrated Principles of Biology 1	3
<b>CHM 2045 General Chemistry 1 <i>or</i></b> <b>CHM 2095 Chemistry for Engineers 1</b> <i>State Core GE-P</i>	<b>3</b>
CHM 2045L General Chemistry 1 Laboratory <i>GE-P</i>	1
IUF 1000 What is the Good Life <i>GE-H</i>	3
<b>MAC 2311 Analytic Geometry and Calculus 1</b> <a href="#"><i>State Core GE-M</i></a>	<b>4</b>
Total	14
Semester 2	Credits
<b>CHM 2046 General Chemistry 2 <i>or</i></b> <b>CHM 2096 Chemistry for Engineers 2</b> <a href="#"><i>State Core GE-B/P</i></a>	<b>3</b>
CHM 2046L General Chemistry 2 Laboratory <i>GE-P</i>	1

ENC 1101 Expository and Argumentative Writing 3  
[State Core GE-C](#)

**MAC 2312 Analytic Geometry and Calculus 2** 4  
*GE-M*

**PHY 2048 Physics with Calculus 1** 3  
*GE-P*

PHY 2048L Physics with Calculus 1 Laboratory 1  
*GE-P*

Total 15

**Semester 3 Credits**

ECH 3023 Material and Energy Balances 4  
*Minimum grade of C required*

**MAC 2313 Analytic Geometry and Calculus 3** 4

**MAP 2302 Elementary Differential Equations** 3

**PHY 2049 Physics with Calculus 2** 3  
*GE-P*

PHY 2049L Laboratory for Physics with Calculus 2 1  
*GE-P*

Total 15

**Semester 4 Credits**

PHY 3513 Thermal Physics (3cr.) or CHM 4411 Physical Chemistry (4 cr.)\*\*CHM 4411 Physical Chemistry 4-3 or 4

COT 3502 Computer Model Formulation 4  
*Minimum grade of C required*

ECH 3264 Elementary Transport Phenomena 3  
*Minimum grade of C required*

ECH 4934 Professional Seminar 1

STA 3032 Engineering Statistics 3

Total 15 or 16

**Semester 5 Credits**

CHM 2210 Organic Chemistry 1 3

ENC 3246 Professional Communication for Engineers 3  
*GE-C*

Humanities ♦ 3  
[State Core GE-H](#)

Social and Behavioral Sciences ♦ 3  
[State Core GE-S](#)

Total 12

**Semester 6 Credits**

CHM 2211 Organic Chemistry 2 3

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CHM 2211L Organic Chemistry 2 Laboratory 2  
 ECH 3101 Process Thermodynamics 3  
*Minimum grade of C required*  
 ECH 3203 Fluid and Solids Operations 3  
*Minimum grade of C required*  
 ECH 3223 Energy Transfer Operations 3  
*Minimum grade of C required*

Total 14

**Semester 7**

**Credits**

~~ECH 4123 Phase and Chemical Equilibria~~ ~~CGN 3710 Experimentation and Instrumentation in Civil Engineering or~~ ~~EEL 3003 Elements of Electrical Engineering~~ ~~ECH 4224L Fluid and Energy Transfer Operations Laboratory \*\*\*~~ ~~ECH 4123 Phase and Chemical Equilibria~~ ~~ECH 4403 Separation and Mass Transfer Operations~~ ~~ECH 4224L Fluid and Energy Transfer Operations Laboratory \*\*~~ ~~ECH 4714 Chemical Process Safety~~ ~~ECH 4403 Separation and Mass Transfer Operations~~ ~~Social and Behavioral Sciences \*~~ ~~GE-SECH 4714L Safety and Experimental Evaluation~~ ~~Technical electives~~ ~~Social and Behavioral Sciences \*~~ ~~GE-S~~

~~3~~ ~~3~~

~~2~~ ~~3~~

~~3~~ ~~2~~

~~3~~ ~~3~~

~~3~~ ~~2~~

~~2 or 3~~ ~~3~~

Total ~~16 or~~ ~~17~~

**Semester 8**

**Credits**

ECH 4404L Separation and Mass Transfer Operations Laboratory 2  
 ECH 4504 Chemical Kinetics and Reactor Design 4  
 ECH 4604 Process Economics and Optimization 3  
 ECH 4824 Materials of Chemical Engineering 2  
CGN 3710 Experimentation and Instrumentation in Civil Engineering or EEL 3003 Elements of Electrical Engineering Technical electives

3

3 6

Total 17

**Semester 9**

**Credits**

CHM 3120 Introduction to Analytical Chemistry 3  
 ECH 4323 Process Control Theory 3  
 ECH 4323L Chemical Engineering Laboratory 1  
 ECH 4644 Process Design \*\*\* 3  
 Chemical engineering [technical elective](#) 3

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[Technical elective](#)

3

Total 16

♦ Students are also expected to complete the general education international (GE-N) and diversity (GE-D) requirements. This is often done concurrently with another general education requirement (typically, GE-C, H or S).

♦If the Physical Chemistry Topics 3 credit requirement is satisfied by a 4 credit class, the additional credit satisfies 1 credit of the Technical elective requirement.

Most student will have credit for research or industry experiential education during the previous summer.

♦♦ Register for ECH 4224L Fluid and Energy Transfer Operations Laboratory immediately following completion of ECH 3101, ECH 3203 and ECH 3223.

♦♦♦ The Integrated Product and Process Design program (ECH 4912 and ECH 4913) requires six credits of coursework and is offered as a sequence of two three-credit courses during fall and spring of the senior year. These two courses are pre-approved substitutes for three credits of technical electives and for ECH 4644 Process Design.

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## Technical Electives

Technical electives are defined as department-approved, upper-division courses with significant technical science, engineering, and/or math content. Provision is made to receive up to ~~three~~ five credits of approved co-op, internship and/or research experience with no more than three credits coming from industry work and no more than three coming from academic research. Military courses cannot be used for technical electives.

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## Related Chemical Engineering Programs

- [Combined Degree](#)

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**Sent:** Wednesday, March 22, 2017 9:43 PM  
**To:** Svoronos, Spyros A <[svoronos@ufl.edu](mailto:svoronos@ufl.edu)>  
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