

**DEGREE/PROGRAM CHANGE
FORM C
Form Number: C1545**

Fields marked with * are required

Name of Initiator: Abhaya Datye **Email:** datye@unm.edu **Phone Number:** 505 277-0477 **Date:** 11-02-2014

Associated Forms exist? Yes
Initiator's Title Chair of Chemical & Biological Engineering
Faculty Contact Abhaya Datye Administrative Contact Annette Torres
Department Chemical & Biological Engineering Admin Email Chemical & Biological Engineering
Branch Main Admin Phone Main

Proposed effective term

Semester Fall Year 2015

Course Information

Select Appropriate Program Undergraduate Degree Program
Name of New or Existing Program BS Chemical Engineering
Select Category Degree Degree Type BS
Select Action Revision

Exact Title and Requirements as they should appear in the catalog. If there is a change, upload current and proposed requirements.

See current catalog for format within the respective college (upload a doc/pdf file)

[Chemical and Biological Engineering - Form C - revised.docx](#)

Does this change affect other departmental program/branch campuses? If yes, indicate below.

Reason(s) for Request (enter text below or upload a doc/pdf file)

[REGISTRAR'S NOTE: THIS FORM PROPOSES CHANGES TO THE MAJOR AND TO THE CONCENTRATIONS.] The Provost office would like all degree programs to reduce the credit hour requirements. In accordance with this request, the faculty in CBE have revised our curriculum to bring the credit hours to 123 hrs from the current 132 hours.

Upload a document that includes justification for the program, impact on long-range planning, detailed budget analysis and faculty workload implications.(upload a doc/pdf file)

[Budgetary and Faculty Load Implications - Form C.docx](#)

Are you proposing a new undergraduate degree or new undergraduate certificate? If yes, upload the following documents.

Upload a two-page Executive Summary authorized by Associate Provost. (upload a doc/pdf file)

Upload memo from Associate Provost authorizing go-ahead to full proposal. (upload a doc/pdf file)

Form C for revisions to the undergraduate BS degree in Chemical Engineering

This document updates personnel listed in our catalog copy, and the undergraduate and graduate advisors. No other changes are requested in the text of the catalog copy. However, the curriculum and the concentrations have changed and the revised versions of our curriculum and concentrations are included on separate pages in this document. Also included is a list of approved technical electives. Since each of these were separate documents, we have tried our best to include them in the single document that can be uploaded to the curriculum website.

Chemical and Biological Engineering

Abhaya K. Datye, Chairperson

Department of Chemical and Nuclear Engineering

Farris Engineering Center 209

MSC01 1120

1 University of New Mexico

Albuquerque, NM 87131-0001

(505) 277-5431

Professors

Plamen Atanassov, Ph.D., Bulgarian Academy of Science

C. Jeffrey Brinker, Ph.D., Rutgers University

Joseph L. Cecchi, Ph.D., Harvard University

Vittorio Cristini, Ph.D., Yale University

Abhaya K. Datye, Ph.D., University of Michigan

Fernando Garzon, Ph.D., University of Pennsylvania

Sang. M. Han, Ph.D., University of California-Santa Barbara

Andrew P. Shreve, Ph.D., Cornell University

David Whitten, Ph.D., Johns Hopkins University

Associate Professors

Heather Canavan, Ph.D., George Washington University

Eva Y. Chi, Ph.D., University of Colorado - Boulder

Steven W. Graves, Ph.D., Pennsylvania State University

Jeremy S. Edwards, Ph.D., University of California, San Diego

Dimiter N. Petsev, Ph.D., University of Sofia

Assistant Professors

Elizabeth L. Dirk, Ph.D., Rice University

Sang Eon Han, Ph.D., University of Minnesota

Professors Emeriti

Harold M. Anderson, Ph.D., Wayne State University

David Kauffman, Ph.D., University of Colorado*

Ronald E. Loehman, Ph.D., Purdue University

Richard W. Mead, Ph.D., University of Arizona*

Timothy L. Ward, Ph.D., University of Washington*

Lecturer III

Jamie Gomez, Ph.D., Florida A&M University

The University of New Mexico National Laboratory Professors

Gary Grest, Ph.D., Louisiana State University

Peter Randall Schunk, Ph.D., University of Minnesota

Research Professors

Hongyou Fan, Ph.D., University of New Mexico

James P. Freyer, Ph.D., University of Rochester

Gabriel P. Lopez, Ph.D., University of Washington

Scott S. Sibbett, Ph.D., Oregon Health & Science University

Research Associate Professors

Kateryna Artyushkova, Ph.D., Kent State University

Boris Kiefer, Ph.D., University of Michigan

Alexey Serov, Ph.D., University of Bern

Yixiang Xie, Ph.D., Missouri University of Science and Technology

Research Assistant Professors

Eric Carnes, Ph.D., University of New Mexico

Sivakumar Challa, Ph.D, University of Pittsburgh

Darren Dunphy, Ph.D., University of Arizona

Barr Halevi, Ph.D., University of Pennsylvania

Linnea Ista, Ph.D., University of New Mexico

Bryan Kaehr, Ph.D., University of Texas Austin

Hien Pham, Ph.D., University of New Mexico

Eric Spoerke, Ph.D., Northwestern University

Affiliated Faculty

Christopher A Aplett, Ph.D., Rensselaer Polytechnic Institute

Frank van Swol, Ph.D., University of Amsterdam

* Registered Professional Engineer in New Mexico.

Undergraduate Program

Undergraduate advisor

Heather E. Canavan.

Graduate Program

Graduate Advisor

Dimiter Petsev

UNIVERSITY OF NEW MEXICO--SCHOOL OF ENGINEERING

CURRICULUM FOR BACHELOR OF SCIENCE DEGREE IN CHEMICAL ENGINEERING- effective Fall 2015

Hours required for graduation: 123^{1,2}

Freshman Year

	Fall Semester			Spring Semester	
	Cr	Contact Hrs. Lect-Lab		Cr	Contact Hrs. Lect-Lab
CBE 101 Intr Che & Biol Engr	1	(1-0)	<i>Math 163 Calculus II</i>	4	(4-0)
<i>Math 162 Calculus I</i>	4	(4-0)	<i>Phyc 160 Gen Physics</i>	3	(3-0)
Chem 121 Gen Chemistry I	3	(3-0)	Chem 122 Gen Chemistry II	3	(3-0)
Chem 123L Gen Chem I Lab	1	(0-3)	Chem 124L Gen Chem II Lab	1	(0-3)
Engl 101 Comp I: Exposition	3	(3-0)	Engl 102 Comp II: Analy & Arg	3	(3-0)
Core Humanities Elective ³	3	(3-0)	Core Social/Behavior Science Elec ³	3	(3-0)
	<hr/> 15	(14-3)		<hr/> 17	(16-3)

Sophomore Year

<i>CBE 251 Chem Proc Calc</i>	3	(3-0)	<i>CBE 252 Chem & Biol Eng Computing</i>	3	(3-0)
<i>Math 264 Calculus III</i>	4	(4-0)	<i>CBE 302 ChE Thermodynamics</i>	3	(3-0)
<i>Phyc 161 Gen Physics</i>	3	(3-0)	<i>Math 316 App Ord Diff Eq</i>	3	(3-0)
Chem 301 Organic Chem	3	(3-0)	Econ 105 Intro to Macroeconomics ⁴	3	(3-0)
Chem 303L Organic Chem Lab	1	(0-3)	Adv Chem Concentration ⁵	3	(3-0)
	<hr/> 14	(16-3)		<hr/> 15	(15-1)

Junior Year

<i>CBE 311 Intro Transport Phenomena</i>	3	(3-0)	<i>CBE 312 Unit Operations</i>	3	(3-0)
<i>CBE 317 Num Meth for Chem & Bio</i>	2	(2-0)	<i>CBE 321 Mass Transfer</i>	3	(3-0)
<i>CBE 318L Chem Engr Lab I</i>	1	(0-3)	<i>CBE 319L Chem Engr Lab II</i>	1	(0-3)
Engl 219 Tech Writing	3	(3-0)	ENG 301 Fund. Engr. Dynamics	1	(1-0)
CBE 361 Biomolecular Engr	3	(3-0)	ENG 302 Electronics for Non Majors	1	(1-0)
Adv Chem Concentration ⁵	3	(3-0)	Adv Chem Concentration ⁵	3	(3-0)
			CBE 371 Intro Materials Engr	3	(3-0)
	<hr/> 15	(14-3)		<hr/> 15	(14-3)

Senior Year⁷

<i>CBE 418L Chem Engr Lab III</i>	1	(0-3)	<i>CBE 419L Chem Engr Lab IV</i>	1	(0-3)
<i>CBE 454 Proc Dynamics & Control</i>	3	(3-0)	<i>CBE 451 Seminar</i>	1	(1-0)

<i>CBE 461 Chem Reactor Engr</i>	3	(3-0)	<i>CBE 494L Adv ChE Design</i>	3	(2-3)
<i>CBE 486 Intr Statistics & Des of Exp</i>	2	(2-0)	Technical Elective ⁶	3	(3-0)
<i>CBE 493L Chem Engr Design</i>	3	(2-3)	Core Fine Art Elective ³	3	(3-0)
Technical Elective ⁶	3	(3-0)	Core Second Language Elective ³	3	(3-0)
			Core Humanities Elective ³	3	(3-0)
<hr/>			<hr/>		
15 (13-6)			17 (15-6)		

1. Only courses with grades of C- or better may be applied toward the Bachelor of Science degree in Chemical Engineering. Classes listed in italics are prerequisites for other classes, and must be taken in the sequence listed. CBE classes are generally only offered in the semester listed, hence skipping a core CBE class could delay graduation by one year. Students are encouraged to sign up for independent study, CBE 491/492 which provide academic credit for doing research under the supervision of a CBE faculty member.
2. Students must file an application for the B.S. degree prior to the completion of 95 semester hours of applicable courses.
3. Students should consult with advisors to obtain a list of acceptable core humanities, social/behavioral science, fine arts and second language electives. *These courses may be taken whenever convenient.* Grade must be C or better.
4. Econ 105 may also be taken in the sophomore or junior year.
5. A minimum of 9 credit hours of advanced chemistry and/or biology courses. Physical Chemistry II (Chem 312) is required for all concentrations. For the other classes, select from among Chem 302, 311, 431, Chemistry & Physics at the Nanoscale, BIOL 201 or other approved courses, depending upon the student's area of concentration. The courses chosen must represent a logical sequence of courses for the concentration and must be approved by your academic advisor.
6. Technical electives are chosen from upper division courses approved by the chemical engineering program advisors. A list of approved technical electives is available on the Departmental website. One of these electives must be a class taught within the Engineering school the other can come from Engineering or A&S. The department requires that these courses be part of an approved concentration. The chairperson may allow up to 6 hours of technical electives for students taking required ROTC courses in aerospace or naval science. One Technical Elective can be replaced by a research project done under the supervision of a CBE faculty member but it requires advance approval by the undergraduate advisor.
7. Students are encouraged to take the Fundamentals of Engineering (FE) Examination during their senior year. This is the first formal step toward professional registration.

Persons having special needs and requiring auxiliary aid or service should contact the Department of Chemical and Biological Engineering (ADA and Rehabilitation Act of 1973)

Nov. 1 2014

CONCENTRATIONS-CHEMICAL ENGINEERING – Effective Fall 2015

Future chemical engineers will conceive and solve problems on a range of scales (nano, micro and macro). They will bring new tools and insights from research and practice in other disciplines: molecular biology, chemistry, solid-state physics, materials science, and electrical engineering. They will also make increasing use of computers, artificial intelligence and expert systems in problem solving, in product and process design, and in manufacturing. Chemical engineering can be viewed as the engineering discipline with the strongest tie to the molecular sciences and therefore is an integral part of multidisciplinary research efforts. To allow students an opportunity to gain in-depth knowledge in specialized areas and to prepare them for diverse career opportunities, we provide five concentrations:

1. Chemical Process Engineering
2. Bioengineering
3. Materials Engineering
4. Semiconductor Manufacturing
5. Environmental Engineering

Students choose 3 advanced chemistry courses and two technical electives. In addition to these courses, the projects in the last design course (494L) and the last laboratory course (419L) provide opportunities to gain experience in the chosen concentration.

ADVANCED CHEMISTRY AND SCIENCE ELECTIVES

A minimum of 9 credit hours of advanced chemistry and/or biology, selected from among CHEM 302, 311, 312, 421, 431, 471, BIOL 201 or other approved courses depending upon the student's area of concentration. One semester of Physical Chemistry (Chem 312) is required for all concentrations.

TECHNICAL ELECTIVES

Students have the opportunity to take 6 credit hours of technical electives. Three hours must be engineering courses within the department or the school. The other three hours may be taken outside of the school but must be a logical part of the concentration.

CHEMICAL PROCESS ENGINEERING CONCENTRATION

Advanced Chemistry and Science Electives

Chem 302	Organic II	3
Chem 311	Physical Chemistry I	3
Chem 312	Physics Chemistry II	3

Technical Electives

Technical Elective	3
Technical Elective (Engr)	3

BIOENGINEERING CONCENTRATION

Advanced Chemistry and Science Electives

Biol 201	Cell Biology	4
Chem 302	Organic II	3
Chem 312	Physical Chemistry	3

Technical Electives

Technical Elective	3
Technical Elective (Engr)	3

MATERIALS ENGINEERING CONCENTRATION

Advanced Chemistry and Science Electives

Chem 311	Physical Chemistry I	3
Chem 312	Physical Chemistry II	3
One of the following classes		3
Chem 431	Adv Inorganic Chem or	
Chem 471	Polymer Science or	
Chem 471	Chem & Phys at Nano	

Technical Electives

Technical Elective	3
Technical Elective (Engr)	3

SEMICONDUCTOR MANUFACTURING CONCENTRATION

Advanced Chemistry and Science Electives

Chem 311	Physical Chemistry I	3
Chem 312	Physical Chemistry II	3
Chem 431	Adv Inorganic Chem	3

Technical Electives

ECE 371L	Materials and Devices	3
Technical Elective		3

ENVIRONMENTAL ENGINEERING CONCENTRATION

Advanced Chemistry and Science Electives

Biol 201	Cell Biology	4
Chem 302	Organic II	3
Chem 312	Physical Chemistry	3

Technical Electives

Technical Elective		3
Technical Elective (Engr)		3

Budgetary and Faculty Load Implications

Change in Chemical Engineering Curriculum from 132 to 123 credit hours

The reduction in credit hours (9 hours) was achieved by dropping two courses outside the department (CS 151 and one science course – Phys 162), two Chemical Engineering courses will drop from 4 credits to 3, and by reducing the credit hours for the Basic Engineering elective from 3 to 2 hours by introducing modular courses to meet this requirement.

The change from 132 credit hours to 123 credit hours was therefore accomplished without eliminating any courses in the core program taught by our faculty and will have no impact on the work load of the chemical engineering faculty.

The changes have budgetary implications to UNM as a whole. Students will be paying for fewer credit hours. This will lighten their course load and could improve graduation rates. We understand that the improvements in graduation rates could offset the decrease in the formula-based revenue to UNM (caused by the reduced credit hours). If this is true, then this change should have no negative impact on the overall budget.

Overall, the reduced credit hours make us more efficient in delivering the curriculum and opening up time in the student's schedule for other activities such as research, service-based learning, personal enrichment as well as allowing our non-traditional students to work and continue their education. Hence, this could have a positive impact on UNM as a whole.