

Campus Box 7105 211A Park Shops Raleigh, NC 27695-7105 P: 919.515.9769

University Courses & Curricula Committee 2017-2018

January 10, 2018 Talley Student Union 4140 12:45pm-2:45pm

Call to Order 12:45pm

- Welcome from Chair Helmut Hergeth ۶
- Remarks and Updates from OUCCAS/DASA Approval of UCCC November 29th 2017 Minutes ۶
- ۶
- ≻ Course and Curricular Business

New Business

Consent Agenda				
Action	Туре	Notes		
BIO 424 Endocrinology	Minor	Updating requisites		
BIO 434 Hormones and Behavior	Minor	Updating requisites		
BIO 488 Neurobiology	Minor	Updating requisites		
GPH 425 Global Health and Physiology	Minor	Updating requisites		
ISE 495 Project Work in Industrial Engineering	Minor	Adjusting Credit Hour Range for Independent Study Course		
ST 361 Introduction to Statistics for Engineers	Dropping	Course being dropped		
ZO 317 Primate Ecology and Evolution	Minor	Updating requisites		
ZO 350 Animal Phylogeny and Diversity	Minor	Updating requisites		
ZO 402 Invertebrate Biology	Minor	Updating requisites		

College of Design				
Presenter	Reviewers	Action	Туре	
Rieder	Robinson, Podurgal, Despain	GD 492 Special Topics in Graphic Design	Revising grading to provide letter grading option.	
Rieder	Orphanides, Hessling, Bruce	BA Design Studies (12DSBA)	Revisions to 8 semester display	

College of Humanities and Social Sciences				
Presenter	Reviewers	Action	Туре	
Despain	Ferguson, Lindsay, Kotek	COM 292 Language, Communication, and Culture	New Course	
Despain	Seracino, Carlson Welch, Fath	ENG/AFS 248 Survey of African-American Literature	Revising SLOs, objective	
Cherry	Seracino, Rieder, Krause	HI 217 Caribbean History	New Course	

	College of Natural Resources				
Presenter	Reviewers	Action	Туре		
Lindsay	Ferguson, Cherry, Griffin Hillis	FOR/NR 491 Special Topics in Forestry and Related Natural Resources	Revising grading to provide letter grading option.		

	College of Agriculture and Life Sciences					
Presenter	Reviewers	Action	Туре			
Bruce	Seracino, Nadvi, Ferguson	AEE 495 Special Topics in Agricultural and Extension Education	Adding letter grade and S/U option to grading method.			
Trivedi	Ferguson, Podurgal, Klesath	New CSSC Prefix	New prefix for merging Crop Science and Soil Science Departments			

	College of Engineering				
Presenter	Reviewers	Action	Туре		
Seracino	Trivedi, Rieder, Orphanides	MAE 420/(520) Dynamic Analysis of Human Movement	New Course		
Seracino	Hessling, Rieder, Trivadi	Biomedical Engineering (BS) (14BMEBS)	Revisions to 8 semester display		
Ferguson	Bruce, Cherry, Robinson	Chemical Engineering (BS) (14CHEBS)	Revisions to 8 semester display		
	Klesath, Griffin Hillis, Lindsay	Chemical Engineering (BS) Biomanufacturing Sciences (14CHEBS-14CHEBMF)	to include the new required IP course E 102.		
	Lindsay, Klesath, Orphanides	Chemical Engineering (BS) Biomolecular (14CHEBS-14CHEBIO)			
	Hessling, Nadvi, Bruce	Chemical Engineering (BS) Honors Program (14CHEBS-14CHEHON)			
	Carlson Welch, Robinson, Fath	Chemical Engineering (BS) Nanoscience (14CHEBS-14CHENAN)			
	Krause, Klesath, Kotek Chemical Engineering (BS) & Textile Engineering (BS) (14CHEBS-14CHETE)				
	Griffin Hillis, Krause, Bruce	Chemical Engineering (BS) Sustainable Engineering, Energy & the Environment (14CHEBS-14CHESEE)			
	Hessling, Despain, Nadvi	Civil Engineering (14CEBS)]		
	Robinson, Cherry, Podurgal	Computer Engineering (BS) (14CPEBS)	1		
	Lindsay, Trivedi, Despain	Environmental Engineering (BS) (14ENEBS)	1		
	Klesath, Cherry, Griffin Hillis	Electrical Engineering (BS) (14EEBS)	1		
	Rieder, Fath, Podurgal	Industrial Engineering (BS) (14IEBS)			
	Lindsay, Robinson, Orphanides	Materials Science & Engineering (BS) (14MSEBS)	1		
	Kotek, Fath, Carlson Welch	Mechanical Engineering (BS) (14MEBS)	1		
	Krause, Klesath, Cherry	Nuclear Engineering (BS) (14NEBS)	1		

Discussion: Process Mapping

Notes:

- All linked course actions are viewable in CIM.
- To view actions, please click on the hyperlink. You may need to use your Unity ID to log in.
- If you experience issues logging in, please go to https://next-catalog.ncsu.edu/courseadmin/ and type the course prefix and number into the search bar.

SLO = Student Learning Outcomes



Division of Academic and Student Affairs Office of Undergraduate Courses & Curricula oucc.dasa.ncsu.edu courses-curricula@ncsu.edu

Campus Box 7105 211A Park Shops Raleigh, NC 27695-7105 P: 919.515.9769

University Courses and Curricula Committee

November 29, 2017 Tallev Student Union 4140 Call to Order: 12:46 pm

Members Present: Chair Helmut Hergeth, Chair Elect Marta Klesath, Amanda Beller, Elizabeth Fath, Andreas Orphanides, Kathleen Rieder, Richard Podurgal, Scott Ferguson, Edwin Lindsay, Walter Robinson, Peter Hessling, Jackie Bruce, Scott Despain, Wendy Krause, Rudi Seracino, Jackie Bruce, Berkley Griffin Hillis, Shweta Trivedi, Erin Peterson, Zeenat Nadvi, **Richard Kotek**

Members Absent: Megan Cherry

Guest: Tom Koch, Hatice Ozturk, Tim Petty, Lianne Cartee, Kanton Reynolds, Annie Carlson Welch

Ex-Officio Members Present: Lexi Hergeth, Li Marcus, Rebecca Swanson, Kyle Pysher, Charles Clift, Jordan Luzander, John Harrington

WELCOME AND INTRODUCTIONS

- > Lunch was served during the meeting beginning at 12 noon.
- Remarks from Chair Welcomed the committee members introduced guests.
- Remarks and Updates from OUCCAS/DASA- Dr. Bret Smith thanked the committee on Dr. Mullen's behafe as Dr. Mullen is sick. Li Marcus informed the committee we will be sending Google Calendar invitations will be sent out next week. > Approval of the Minutes from November 8th 2017 – <u>Approved Unanimously</u>
- - Discussion: Member Scott Despain moved to approve. Minutes from the previous meeting were presented and Ο approved without further discussion.

NEW BUSINESS

Consent Agenda - Approved Unanimously \geq

Discussion: Member Walter Robinson moved to approve.

ARC 292 Special Topics in Architecture - Approved Unanimously with friendly suggestions

Discussion: Member Kathleen Rieder presented the course. Member indicated a grading scale of an A+ to F, there is grading criteria, however it would be beneficial to have the scale. In the SLOs "learn how to construct" should just read "construct". Member indicated under objectives dropping the word "understand" and just using "translate". Member also pointed out the incomplete grading statement is not included in the syllabus. The presenter agreed to these friendly suggestions.

\geq MUS 116 African American Choral Ensemble - Approved Unanimously with Friendly Suggestions.

Discussion: Member Beth Fath presented the course. A member indicated the syllabus indicated there would be a nominal charge for concert dress and would like to know what nominal is. Guest Tom Koch said certain ensembles will need specific choir attire and predicted that the charge will be under \$100 and one outfit would be needed per course. A friendly suggestion is made to provide a range of how much an ensemble attire would cost. Member also asked if the performance schedule would be provided at the beginning of the semester. Member indicated there is a grading portion for music markups, however there is a fee that would be applied if the course materials were damaged. Another member indicated music is generally marked with a pencil and able to be erased. Member asked about the indicated activities in the syllabus and said this should be described so students would know what is expected. The guest indicated the activity may be walking or swaying while singing. Member suggested making a statement that accommodations would be made if a student had a disability. Member suggested making the A+ portion of the grading scale range from 98-100 instead of 99-100. Member indicated a course schedule should be included in the syllabus. Guest indicated they do not have a set schedule and members suggested making a "subject to change" for rehearsals. Guest indicated the topic schedule would be subject to change based on what each ensemble needs. Member suggested not making a schedule, but suggested a statement that indicates how often rehearsals would be scheduled each week for the semester and showing how the 2 contact hours to 1 credit hour ratio is being met.

- MUS 190 Preparatory Applied Music Lessons –<u>Approved Unanimously</u> Discussion: Member Amanda Beller presented the course.
- PB 495 Special Topics in Botany –<u>Approved Unanimously</u> Discussion: Member Jackie Bruce presented the course.
- HI 317 Cuba Today: Historical and Sociopolitical Perspectives -<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Scott Despain presented the course. Member asked about the attendance policy and asked if the attendance policy should have the Li Marcus indicated the required attendance policy has been included. Member pointed out in the requirements there is a specific Member pointed out that the enrollment total for DELTA reads zero and asked if this should be clarified, another member indicated there could be an administrative cap that we will get clarification on after the meeting. Member said the syllabus was difficult to follow because of the wording and language is laid out in a way that flowed better and suggested the instructor use the syllabus tool. Member said there are 5 assignments in the grading list but there is only an outline for one assignment, in CIM the "written assignment" would be preparation and critical reflections and how this would be grading. Member made the friendly suggestion to include a rounding statement for the grading scale
- HI 318 Environmental History of Cuba: Prehistory to the Present-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Scott Despain presented the course. Member made the friendly suggestion to use the syllabus tool to make the syllabus more user friendly. Member asked if there is a plan in place if the experience is canceled for reasons outside of the course. Guest Kanton Reynolds indicated the funds are generally refunded to the students.

> HSS 120 Introduction to Humanities & Social Sciences Approved Pending

Discussion: Member Scott Despain presented the course. Member found a slight discrepancy in the contact hour components seem to be written one for the Fall and one for the Spring, recitation should be 400 to match the lecture. Member brought attention to the common reading saying this is required for the course and asked if there should be Member asked for clarity on the repercussions of missing a course, how many points will be deducted. Member complimented the assignment breakdown but suggested including the grading scale. Member motioned to change the motion to Approve Pending the addition of a grading scale and clarifying the points for attendance, committee voted to approve pending.

- Ethics (16ETHM) Minor –<u>All Approved Unanimously</u> Discussion: Member Scott Despain presented the curricular action. Motion to bundle all of the Humanities and Social Sciences curricula actions. Motion approved. All actions approved unanimously
- BA Foreign Languages & Literature 16FLLBA-16FLLASIAN
- History BA (16HISTBA) and History BS (16HISTBS)
- History Minor (16HIM)
- > 16PHILBA, and 16PHILBA-16PHILLAW, and 16PHILBA-16PHILETH
- > 16PHILBS and 16PHILBS-16PHILLOG

BME 205 Introduction to Biomedical Mechanics-<u>Approved Unanimously</u>

Discussion: Member Rudi Seracino presented the course. Member said the attendance policy in the syllabus indicates "regular attendance policy is expected". Li Marcus reminded the committee that the Provost has indicated the policy is to have a record of the attendance but does not require repercussions. Members concluded the syllabus indicates this effectively. Member asked if the title of the course and outcomes should somehow indicate that most the course is based on solid mechanics and if it is necessary to have this separate course for this. Member responded the lab component of this course makes this course specifically a biomechanical course and the guest Hatice Ozturk confirmed. Guest Lianne Cartee stated that the course will be taught from a Biomechanical view point, member made the friendly suggestion to emphasize that this course is different than a standard mechanics class. Member asked if there is a companion course that goes with the fluid mechanics, guest Lianne Cartee there are required courses that

- BME 209 Introduction to the Materials Science of Biomaterials-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Rudi Seracino presented the course. Outcome #2 starts with "understand" suggestion to remove this word and correct the typo of the word "mechanical" in CIM. Member indicated the number of weeks in the course schedule should equal 16 and it currently reads 15, members agreed the final exam week in the syllabus counts as the 16th week.
- BME 215 Biomedical Mechanics Laboratory-<u>Approved Unanimously</u> Discussion: Member Rudi Seracino presented the course.
- BME 219 Materials Science of Biomaterials Lab-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Rudi Seracino presented the course. Member said there are no details about the lab reports and

when they are due, guest Hatice Ozturk indicated these details are provided in the topic schedule and said lab reports will usually be every three weeks. Guest indicated the labs are written in class (as a self-containing lab) and said they will included the due date for the lab reports. Members and Guest discussed the grading scale and how it has been agreed upon by the partnering institution. Member suggested combining the recommended sanctions, guests indicated they will remove the line indicating individual possession of past lab materials is not permitted.

- BME 295 Research in Biomedical Engineering for Undergraduates-<u>Approved Unanimously</u> Discussion: Member Rudi Seracino presented the course.
- BME 298 Biomedical Engineering Design and Manufacturing I-<u>Approved Unanimously</u> Discussion: Member Rudi Seracino presented the course.
- BME 299 BME Design and Manufacturing I Lab-<u>Approved Unanimously</u> Discussion: Member Rudi Seracino presented the course.
- BME 301 Human Physiology: Electrical Analysis-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Scott Ferguson presented the course. Member brought attention to a typo in the catalog description and suggested adjusting. Member also suggested removing the blank page from the syllabus as well. Guests also agreed to adjust the integrity statement in the same way as the BME 219 for this course and BME 302.
- BME 302 Human Physiology: Mechanical Analysis-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Scott Ferguson presented the course. Member made a friendly suggested embellish the statement from the course structure clarifying how many lectures and labs per week.
- BME 325 Biochemistry for Biomedical Engineers-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Scott Ferguson presented the course. Member suggested stating how a new course will not require any additional resources (ie: existing faculty will teach course). Member made the friendly suggestion under the grading components "periodl" should be "period.".
- BME 335 Biomaterials-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Scott Ferguson presented the course. Member suggested the same clarification for additional resources. Member suggested fixing typos in the student learning outcomes.
- BME 345 Biomedical Solid Mechanics-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Scott Ferguson presented the course. Member suggested eliminating the book reading at the bottom of the syllabus to avoid student confusion. Member suggested they would like to see overlap why a standard mechanics class would not be sufficient, possibly include this in the justification field in CIM. Chair and members agreed that as these is within the same college, it would have been addressed at the college level if it were an issue.
- CSC 412/(512) Compiler Construction-<u>Approved Unanimously with Friendly Suggestions</u> Discussion: Member Scott Ferguson presented the course. Member suggested the course schedule is very terse and suggested that the schedule should be more detailed. Member indicated generally the dual level courses have one syllabus and the distinction between the graduate and undergraduate levels are indicated.

Discussion:

Meeting adjourned at 2:08 pm

Respectfully submitted by Lexi Hergeth

MEMORANDUM

To: University Course and Curriculum Committee From: Chandra D. Cox, Head, Department of Art +Design November 15, 2017

RE: Art + Design | Design Studies Revision

The Department has decided to update the 2009 curriculum required courses for Design Studies. These revisions include the Design Studies; foundational courses, the required math and the elective options available in various subject areas. Many of the courses are no longer available and/or the numbers have changed. Design Studies has introduced new courses with permanent numbers.

We believe the revisions will help provide a clearer understanding of the eightsemester curriculum display. A record of these revisions is provided as a tracked version of the curriculum display.

11.15.17

Chandra D. Cox, Head Department of Art +Design

Art Rice, Associate Dean, College of Design/

GEP FORMAT A (SEMESTER-BY-SEMESTER CURRICULUM DISPLAY)

Current: Pro

Proposed: X Proposed Effective Semester: 11/2017

DEGREE TITLE: Bachelor of Arts Degree in Design Studies

CONCENTRATION TITLE: N/A

	FRESHM	AN YEAR	
FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDITS
ENG 101 Acad Writing & Research ^H	4	GEP PE/Healthy Living course ^E	1
MA 111 Precalculus Algebra and Trigonometry ^{12, A}	3	GEP Mathematical Sciences requirement ^{12, A}	3
D100 Design Thinking I ¹	3	DS 100 Design, Culture and Context ¹	3
Art History Survey ⁸	3	Art History Survey ⁸	3
ADN 281 Basic Drawing ³	3	COM 110 Public Speaking	3
		ADN 219 Digital Imaging ⁴	3
	Total:16		Total:16
	SOPHOM	ORE YEAR	
FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDITS
GEP PE/Healthy Living course ^E	1	GEP Interdisciplinary Perspectives requirement ^G	3
GEP Social Science requirement ^D	3	Design History ⁹	3
DS 200 Survey of Design Studies ²	3	FL - Foreign Language ¹¹	3
Advanced Writing ¹³	3	GEP Humanities requirement ^C	3
History elective ^{10,C}	3	Design Foundations ³	3
FL - Foreign Language ¹¹	3	-	
	Total:16		Total:15
	JUNIO	R YEAR	
FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDITS
Design History ⁹	3	GEP Natural Sciences requirement (w/lab) ^B	4
GEP Natural Sciences requirement ^B	3	GEP Additional Breadth requirement ^F	3
GEP Social Science requirement ^D	3	Design Studies Elective ¹⁵	3
ADN418 Contemporary Issues ¹⁴	3	Design Studies Elective ¹⁵	3
Art History Survey ⁸	3		
	Total:15		Total:13
	SUM	MER	
ADN 490 Inter	national Stud	io / Experience ⁴	CREDITS
			Total:6
	SENIO	R YEAR	
FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDITS
DS 481 Design Studies Senior Research Seminar ⁶	3	DS 483 Capstone Seminar ⁷	3
Design History ⁹	3	Design Studies Elective ¹⁵	3
Design Studies Elective ¹⁵	3	Design Studies Elective ¹⁵	3
Design Studies Elective ¹⁵ 3 Design Studies Elective ¹⁵		3	
Design Studies Elective ¹⁵	3	_	****
	Total:15		Total:12
Minimum Cr	edit Hours Re	quired for Graduation: 124*	

Major/Program Footnotes:

- 1. D 100 and DS 100 are required in the first year of Design Studies. and part of the critical path.
- 2. DS 200 Survey of Design Studies is required and part of the critical path.
- 3. Basic Drawing ADN 281 is required fall semester first year. In addition one more course (3 credit hours) in Design Foundations is required and may be selected from the following: ADN 111, ADN 112, ADN 414
- 4. Digital Imaging ADN 219 Spring semester first year
- 5. International Experience (6 credit hours) is required. This may be a Design Studio worth 6 credit hours (when available), or two 3-credit-hour advised electives.
- 6. Design Studies Senior Research Seminar is required. DS 481 3 hours.
- 7. Design Studies Capstone Seminar is required. DS 483 3 hours.
- Two survey courses (6 credit hours) in Art History are required and may be selected from the following: HA 202, 203,298,310,395; Art 221, 222 from Meredith College; or Art 151, 152 with Recitation Sections from UNC-CH.
- 9. Three courses (9 credit hours) in Design History are required and may be selected from the following: ADN 475, ARC 242, D 231, GD 331, LAR 444, ID 444, ADN 492.
- 10. Choose a History course (HI) from the GEP Humanities course list.
- 11. Design Studies requires 6 credit hours of FL beyond FL 102 and may be selected from different language courses at the 200 level or above.
- 12. MA 111 is required. Choose an additional MA course from the GEP Mathematical Sciences course list.
- 13. Advanced Writing (3 credit hours) select one: ENG 201,214, 215, 287, 288, 292, 301, 316, 323,325
- 14. ADN 418 Contemporary Issues in Art and Design is required in the junior year.

Major Advised electives:

15. A total number of 24 credit hours of advised electives are required when pursuing the Design Studies curriculum. The Advised electives are divided into three units: Application, History and Theory. From each of these units a minimum of two courses (6 credit hours) and a maximum of three courses (9 credit hours) can be selected. 6 credit hours must be at the 300 level or higher.

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied beyond the major requirements listed above. University approved GEP course lists for each of the following units can be found at https://oucc.dasa.ncsu.edu/general-education-program-gep/gep-category-requirements/

- A. Mathematical Sciences (6 credit hours Includes MA 111 and one course from the University approved GEP Mathematical Sciences course list).
- <u>B.</u> <u>Natural Sciences</u> (7 credit hours include one laboratory course or course with a lab) Choose from the University approved GEP Natural Sciences course list.
- C. <u>Humanities</u> (6 credit hours selected from two different disciplines/course prefixes)
- Choose from the University approved GEP Humanities course list. The History elective in the major requirements fulfills 3 hours of this requirement. <u>**D.**</u> Social Sciences (6 credit hours selected from two different disciplines/course prefixes)
- Choose from the University approved GEP Social Sciences course list.
 <u>Physical Education/Healthy Living</u> (2 credit hours at least one 100-level Fitness and Wellness Course) Choose from the University approved GEP Physical Education/Healthy Living course list.
- F. <u>Additional Breadth</u> (3 credit hours to be selected from the following University approved GEP course lists) Choose a course from the GEP Mathematical Sciences or Natural Sciences course list.
- <u>G.</u> <u>Interdisciplinary Perspectives</u> (3 credit hours) Choose from the University approved GEP Interdisciplinary Perspectives course list.
- H. <u>Introduction to Writing</u> (4 credit hours satisfied by completing ENG 101 with a C- or better)

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

L U.S. Diversity (USD) Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite. Only one course that satisfies this co-requisite is required.

<u>L</u> <u>Global Knowledge</u> (GK) Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite. Only one course that satisfies this co-requisite is required.

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation. Design Studies requires 6 credit hours of FL beyond FL 102.

Major/Program CORE Courses Required

D100	3
DS100 Culture/DN Context	
DS 200 Survey of Design Studies	
Art History: HA 202, 203,298,310 or 395	
Design History: ARC 241, LAR 444, GD 331, ADN 475 or D 231	9
Design Foundations: ADN 111 2D, ADN 112 3D or ADN 414 Color & Light	6
ADN 281 Basic Drawing	3
ADN 219 Digital Imaging	3
ADN 490 International Studio/Experience	6
ADN418 Contemporary Issues	3
DS 481 Design Studies Capstone Seminar	3
DS 483 Design Studies Capstone Research Paper	3
FL Foreign Language	6
COM 110 Public Speaking	3
Humanities: 3 credit hours must be (HI) History (fulfills GEP requirement)	
Advanced Writing: ENG 201,214, 215, 287, 288, 292, 301, 316, 323, 325,	3
	66 total credit hours

*GEP Requirements

Humanities	3
Mathematical Science	6
Natural Sciences	7
Social Sciences	6
Additional Breadth (ADB)	3
Interdisciplinary Perspective (IDP)	5
English 101 Intro to Writing	4
Health and Exercise Studies	2
	36 total credit hours

(DS) DESIGN STUDIES ADVISED ELECTIVES: 24 CREDIT HOURS (3 credit hours per course)

From each of the three units select a minimum of two courses (6 credit hours) and a maximum of three courses (9 credit hours). 6 credit hours must be at the 300 level or higher.

Application Unit

ADN	111	2D Design Process & Methods	ADN	386	Basic Sculpture
ADN	112	3D Design Process & Methods	ADN	411	Visual Laboratory II
ADN	212	Basic Photography	ADN	414	Color and Light
ADN	219	Digital Imaging	ADN	415	Visualizing Narrative
ARC	232	Structure & Materials	ADN	419	Multimedia & Digital Imaging
ADN	272	Intro to Printing & Surface Design	ADN	481	Intermediate Drawing
ADN	273	Fibers, Materials & Processes	ADN	486	Intermediate Sculpture
ADN	292	Special Topics in Art+Design	ID	492	Special Topics in Industrial Design
ADN	311	Basic Visual Laboratories	DS	494	Design Studies Internship
ADN	312	Intermediate Photography			

Theory Unit

GD	200	Graphic Design Theory & Practice	ADN	571	Fibers & Surface Design Seminar
LAR	221	Intro to Environment & Behavior for	LAR	579	Human Use of Urban Landscape
		Designers	D	592	Special Topics in Design
ID	262	Professional Practice in Industrial Design	ADN	492	Special Topics in Art + Design
D	292	Special Topics in Design	DS	481	Design Studies Senior Research Seminar
ID	445	Human-Centered Design	DS	483	Design Studies Senior Capstone
D	492	Special Topics in Design			
LAR	511	Community Design Policy			

History Unit

ARC	241	Introduction to World Architecture	D	492	Special Topics in Design
ARC	242	History of Western Architecture	ID	492	Special Topics in Industrial Design
D	292	Special Topics in Design	ADN	561	Animation Seminar
GD	342	History of Graphic Design	HI	591	Intro to Museology
ARC	441	History of Cont. Architecture (ARC 241 ADN	D	592	Special Topics in Design
		ARC 242 Pre-Reqs)	HI	Any H	istory Course from GEP Humanities List
LAR	444	History of Landscape Architecture	ID	444	History of Industrial Design
ADN	475	Pre-Industrial World Textiles	12		Thistory of mausular Dosign

GEP FORMAT A (SEMESTER-BY-SEMESTER CURRICULUM DISPLAY)

Current:

Proposed: X Proposed Effective Semester: 7/200911/2017

DEGREE TITLE: Bachelor of Arts Degree in Design Studies

CONCENTRATION TITLE: N/A

FALL SEMESTER		IAN YEAR	
	CREDITS	SPRING SEMESTER	CREDITS
ENG 101 Acad Writing & Research ^{H;11,12}	4	HES_*** Health & Exercise StudiesGEP	1
Mathematics ^{9,A}	3	PE/Healthy Living course ^E	3
MA 111 Precalculus Algebra and Trigonometry ^{12, A}	2	GEP Mathematical Sciences Req.requirement ^{12, A}	2
D100 Design Thinking I ^{1,41,12}	3	D101DS 100 Design Thinking II	3
D102 Design Culture/Context 1 2.11,12	3	D103 Design, Culture/Context-II ^{2,11,12} and Context ¹	3
Art History Survey ⁸	3	Art History Survey ^{5,11,12} Survey ⁸	3
ADN 281 Basic Drawing ³		COM 110 Public Speaking	3
Survey ⁵		ADN 219 Digital Imaging ⁴	-
ourvey	Total:1516	ADN 219 Digital Imaging	
		ORE YEAR	Total: 1516
FALL SEMESTER	CREDITS	SPRING SEMESTER	CDEDITO
HES_*** Health & Exercise StudiesGEP	1	Free Elective	CREDITS
PE/Healthy Living course ^E	3	DS History ^{6,11,12}	2-3
GEP Social Science Req. ^D requirement ^D	3		3
		GEP Interdisciplinary Perspectives requirement ^G	3
DS 200 Survey of Design Foundations ^{3,11,12} Studies ²	3	Design History ⁹	3
Advanced Writing ¹⁰ Writing ¹³	3	ADN 281 Basic Drawing ^{3,11,12}	3
History elective ⁷ elective ^{10,C}	3	FL - Foreign Language ^{8,11,12} Language ¹¹	
FL - Foreign Language ^{8,11,12} Language ¹¹		GEP Humanities requirement ^C	
Language Language		Design Foundations ³	
	Total:16		Total:14-1
		R YEAR	10101.17-1.
FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDITS
DS History ^{6,11,12}	3	Free Elective	3
Design History ⁹	3	GEP Natural Sciences Req.requirement (w/lab) ^B	
GEP Natural Sciences Req. ^B requirement ^B	3		4
	3	GEP Additional Breadth Req. ^F requirement ^F	3
GEP Social Science Req. ^D requirement ^D	1.12.5	DS Elective ⁴³	3
ADN 418 ADN 418 Contemporary Issues in ¹⁴	3	DS Elective ¹³ Design Studies Elective ¹⁵	3
Art & Design		Design Studies Elective ¹⁵	5
Design Foundations ^{3,11,12} History Survey ⁸			
	Total:15		Total: 1613
	THE CONTRACTOR OF	IMER	
ADN 490 Internation	nal Studio/Ex	:p. ^{4,11,12} / Experience ⁴	CREDITS
			Total:6
FALL SEMESTER		R YEAR	
DS 481 Design Studies Senior Research	CREDITS	SPRING SEMESTER	CREDITS
Seminar Seminar ⁶	3	DS 483 Capstone Research PaperSeminar ⁷	3
	3	DS Elective ¹³	3
Design History ^{6,11,12} History ⁹	3	DS Elective ¹³	3
DS Elective ⁴³	3	DS Elective ¹³ Design Studies Elective ¹⁵	3
DS-Elective ⁴³	3	Design Studies Elective ¹⁵	
DS Elective ¹³ Design Studies Elective ¹⁵		Design Studies Elective ¹⁵	
Design Studies Elective ¹⁵			
Design Studies Elective ¹⁵			
	Total:15		T-1-1-12
	interest in the second s	quired for Graduation: 124*	Total:12

Major/Program Footnotes:

1. D 100 and D 101 DS 100 are required in the first year of Design Studies.

1. D 102 and D 103 are required in part of the first year critical path.

4.2. DS 200 Survey of Design Studies is required and part of the critical path.

- Basic Drawing ADN 281 is required: fall semester first year. In addition two one more COURSES (6 course (3 credit hours) in Design Foundations are is
 - required and may be selected from the following: ADN 111, ADN 112, ADN 414-
- 4. Digital Imaging ADN 219 Spring semester first year
- 3.5. International Experience (6 credit hours) is required. This may be taken at the Prague Institute or some other approved international program to fulfill the department's International Experience requirement. In addition, a summer international studio in Art & Design or other design discipline may also fulfill this requirement. Please consult with your advisorStudio worth 6 credit hours (when available), or two 3-credit-hour advised electives.
- Design Studies Senior Research Seminar is required. DS 481 3 hours.
- 7. Design Studies Capstone Seminar is required. DS 483 3 hours.
- 5.9. Three courses (9 credit hours) in Design History are required and may be selected from the following: ADN 475, ARC 242, D 231, GD 342331, LAR 444, ID 444, ADN 492.
- 6.10. Choose a History (HI) course (HI) from the GEP Humanities course list.
- 7.11. Design Studies FCQUIFEd requires 6 credit hours of FL beyond FL 102 and may be selected from different language courses at the 200 level or above.
- 8.12. Mathematics requirement: MA 111 is required. Choose an additional MA course from: MA 114, 121, 131, 141, 231 or equivalent the GEP Mathematical Sciences course list.
- 9.13. Advanced Writing requirement to be chosen from (3 credit hours) select one: ENG 201,214, 215, 422.287, 288, 292, 301, 316, 323,325

2. Minimum grade of C-required.

3. Cannot be taken pass/fail.

14. Design (ADN 418 Contemporary Issues in Art and Design is required in the junior year.

Major Advised) electives:

10:15. A total number of 24 credit hours of advised electives are required when pursuing the Design Studies curriculum. The Advised electives are divided into three

units: Application, History and Theory. From each of these units a minimum of two courses (6 credit hours) and a maximum of three courses (9 credit hours) can be selected. (6 creditScredit hours must be at the 300 level or higher).

Select 3 credit hours from each unit. Check the course lists for each unit in the SIS degree audit for this program for the most up to date course lists.

Application Unit:

ADN 111 2D Design ADN 112 3D Design ADN 212 Basic Photography ADN 219 Digital Imaging ADN 271 Intro to Printing & Surface Design ADN 273 Fibers, Materials & Processes ADN 292 Special Topics in Design ADN 311 Basic Visual Laboratories ADN 312 Intermediate Photography ADN 384 Basic Painting ADN 386 Basic Sculpture ADN 411 Visual Laboratory II ADN 414 Color and Light ADN 419 Multimedia & Digital Imaging ADN 472 Advanced Surface Design ADN 481 Intermediate Drawing **ADN 484 Intermediate Painting** ADN 486 Intermediate Sculpture ADN 492 Special Topics in Design ARC 232 Structure & Materials 494 Design Internship DS

ID 255 Contemporary Mfg. Process I

256 Contemporary Mfg. Process II

ID 492 Digital Rendering

Theory Unit:

ADN 418 Contemporary Issues in Art & Design ADN 571 Fibers & Surface Design Seminar DS 244 Material Culture & Industrial Design DS 492 Museum Theory & Practice GD 200 Graphic Design Theory & Practice LAR 221 Intro to Environment & Behavior for Designers LAR 511 Community Design Policy LAR 579 Human Use of Urban Landscape 1D-262 Professional Practice in Industrial Design 1D 445 Human-Centered Design

History Unit:

ADN 475 Pre-Industrial World Textiles ARC 241 Intro. to World Architecture ARC 242 History of Western Architecture ARC 441 Hist Cont ARC (ARC 241, ARC 242 pre-regs) ARC 442 History of NC Architecture D 492A Iconography DS 251 History of Aesthetics GD 342 History of Graphic Design HA 203 History of American Art HA 202 History of Art / Renaissance-20th Century HA 310 History of Art & Photography HI Any History Course from GEP Humanities List HI 592 Advanced Museology ID 492F / ID 582F History of Industrial Design

LAR 444 History of Landscape Architecture

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied- beyond the major requirements listed above. University approved GEP course lists for each of the following units can be found at https://oucc.dasa.ncsu.edu/general-education-programgep/gep-category-requirements/

University approved GEP course lists for each of the following units can be found at http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html

- Mathematical Sciences (6 credit hours Includes MA 111 and one course with MA or ST prefix) Choose a course from the University approved GEP Mathematical Sciences course list. The Math requirement in the major fulfills 3-hours of this requirement.) В.
- Natural Sciences (7 credit hours include one laboratory course or course with a lab) Choose from the University approved GEP Natural Sciences course list .
- <u>C.</u> Humanities (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Humanities course list. The History elective in the major requirements fulfills 3 hours of this requirement.
- D. Social Sciences (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Social Sciences course list .
- E. Physical Education/Healthy Living (2 credit hours - at least one 100-level Fitness and Wellness Course) Choose from the University approved GEP Physical Education/Healthy Living course list.
- <u>F.</u> Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists)
- Choose a course from the GEP Mathematical Sciences or Natural Sciences course list.
- G. Interdisciplinary Perspectives (5-63 credit hours) Choose from the University approved GEP Interdisciplinary Perspectives course list.
- <u>H.</u> Introduction to Writing (4 credit hours satisfied by completing ENG 101 with a C- or better)
- The following Co-Requisites must be satisfied to complete the General Education Program requirements:
- L U.S. Diversity (USD) Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite. Only one course that satisfies this co-requisite is required.
- <u>J.</u> Global Knowledge (GK) Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite. Only one course that satisfies this co-requisite is required.
- K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation. Design Studies requires 6 credit hours of FL beyond FL 102.

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Major/Program CORE Courses Required

D100	3
DS100 Culture/DN Context	3
DS 200 Survey of Design Studies	3
Art History: HA 202, 203,298,310 or 395	6
Design History: ARC 241, LAR 444, GD 331, ADN 475 or D 231	9
Design Foundations: ADN 111 2D, ADN 112 3D or ADN 414 Color & Light	6
ADN 281 Basic Drawing	3
ADN 219 Digital Imaging	
ADN 490 International Studio/Experience	6
ADN418 Contemporary Issues	
DS 481 Design Studies Capstone Seminar	3
DS 483 Design Studies Capstone Research Paper	
FL Foreign Language	
COM 110 Public Speaking	3
Humanities: 3 credit hours must be (HI) History (fulfills GEP requirement)	.3
Advanced Writing: ENG 201,214, 215, 287, 288, 292, 301, 316, 323, 325,	3

66 total credit hours

*GEP Requirements

Humanities	3
Mathematical Science	6
Natural Sciences	7
Social Sciences	6
Additional Breadth (ADB)	3
Interdisciplinary Perspective (IDP)	
English 101 Intro to Writing	
Health and Exercise Studies	
	36 total credit hours

(DS) DESIGN STUDIES ADVISED ELECTIVES: 24 CREDIT HOURS (3 credit hours per course)

From each of the three units select a minimum of two courses (6 credit hours) and a maximum of three courses (9 credit hours). 6 credit hours must be at the 300 level or higher.

Application Unit

ADN	111	2D Design Process & Methods	ADN	386	Basic Sculpture
ADN	112	3D Design Process & Methods	ADN	411	Visual Laboratory II
ADN	212	Basic Photography	ADN	414	Color and Light
ADN	219	Digital Imaging	ADN	415	Visualizing Narrative
ARC	232	Structure & Materials	ADN	419	Multimedia & Digital Imaging
ADN	272	Intro to Printing & Surface Design	ADN	481	Intermediate Drawing
ADN	273	Fibers, Materials & Processes	ADN	486	Intermediate Sculpture
ADN	292	Special Topics in Art+Design	ID	492	Special Topics in Industrial Design
ADN	311	Basic Visual Laboratories	DS	494	Design Studies Internship
ADN	312	Intermediate Photography			

Theory Unit

GD	200	Graphic Design Theory & Practice	ADN	571	Fibers & Surface Design Seminar
LAR	221	Intro to Environment & Behavior for	LAR	579	Human Use of Urban Landscape
		Designers	D	592	Special Topics in Design
ID	262	Professional Practice in Industrial Design	ADN	492	Special Topics in Art + Design
D	292	Special Topics in Design	DS	481	Design Studies Senior Research Seminar
ID	445	Human-Centered Design	DS	483	Design Studies Senior Capstone
D	492	Special Topics in Design			

LAR 511

Community Design Policy

History Unit

ARC	241	Introduction to World Architecture	D	492	Special Topics in Design
ARC	242	History of Western Architecture	ID	492	Special Topics in Industrial Design
D	292	Special Topics in Design	ADN	561	Animation Seminar
GD	342	History of Graphic Design	HI	591	Intro to Museology
ARC	441	History of Cont. Architecture (ARC 241 ADN	D	592	Special Topics in Design
		ARC 242 Pre-Reqs)	HI	Any H	istory Course from GEP Humanities List
LAR	444	History of Landscape Architecture	ID	444	History of Industrial Design
ADN	475	Pre-Industrial World Textiles			

GEP FORMAT A (SEMESTER-BY-SEMESTER CURRICULUM DISPLAY)

Current:

Proposed: X Proposed Effective Semester: 11/2017

DEGREE TITLE: Bachelor of Arts Degree in Design Studies

CONCENTRATION TITLE: N/A

FALL SEMESTER	CREDITS	AN YEAR SPRING SEMESTER	CREDITS
	4	GEP PE/Healthy Living course ^E	1
ENG 101 Acad Writing & Research ^H	3	GEP Mathematical Sciences requirement ^{12 A}	3
MA 111 Precalculus Algebra and Trigonometry ^{12, A}	3	DS 100 Design, Culture and Context	3
Art History Survey ⁸	3	Art History Survey ⁸	3
ADN 281 Basic Drawing ³	3	COM 110 Public Speaking	3
ADIN 281 Basic Drawing	2	ADN 219 Digital Imaging	3
	Total:16	ADA 219 Digital Inaging	Total:16
		ORE YEAR	Tomageo
FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDITS
GEP PE/Healthy Living course ^E	1	GEP Interdisciplinary Perspectives requirement ^o	
TEP Social Science requirement ^D	3	Design History	3
FEP Social Science requirement	3	FL - Foreign Language ¹¹	3
DS 200 Survey of Design Studies ²	3	GEP Humanities requirement ^C	3
Advanced Writing ¹³	3	Design Foundations ³	3
listory elective ^{10,C}	3	Design Foundations	3
L - Foreign Language ¹¹	-		Tetel 15
	Total:16	D VEAD	Total:15
	and the second se	R YEAR	COPEDIT
FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDITS
Design History ⁹	3	GEP Natural Sciences requirement (w/lab) ^B	4
3EP Natural Sciences requirement ^B	3	GEP Additional Breadth requirement	3
GEP Social Science requirement ^D	3	Design Studies Elective ¹⁵	3
ADN418 Contemporary Issues	3	Design Studies Elective ¹⁵	3
Art History Survey ⁸	3		
	Total:15		Total:13
		IMER	1
ADN 490 Inter	national Stud	io,/ Experience ⁴	CREDITS
			Total:6
	SENIO	R YEAR	
FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDITS
OS 481 Design Studies Senior Research Seminar"	3	DS 483 Capstone Seminar	3
Design History ⁹	3	Design Studies Elective ¹⁵	3
Design Studies Elective ¹⁵	3	Design Studies Elective ¹⁵	3
Design Studies Elective ¹⁵	3	Design Studies Elective ¹⁵	3
Design Studies Elective ¹⁵	3		-
	Total:15		Total:12
Minimum C	redit Hours Re	equired for Graduation: 124*	
ajor/Program Footnotes:			
1. D 100 and DS 100 are required in the first year of Design	n Studies_and_nau	t of the critical math	

from the following: ADN 111, ADN 112, ADN 414,

The interviewing ADN 219 Spring senset first year of the ADN and t

College; or Art 151, 152 with Recitation Sections from UNC₄CH. Three courses (9 credit hours) in Design History are required and may be selected from the following: ADN 475, ARC 242, D 231, GD 331, LAR 444, ID 444,

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- ADN 492. Choose a History course (HI) from the GEP Humanities course list. Design Studies required. Choose an additional MA course from the GEP Mathematical Sciences course list. Advanced Writing (3 credit hours) select one: ENG 201,214, 215,287, 288, 292, 301, 316, 323,325 ADN 418 Contemporary Issues in Art and Design is required in the juntor year. 11.
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Major Advised, electives:

15. A total number of 24 credit hours of advised electives are required when pursuing the Design Studies curriculum. The Advised electives are divided into three units: Application, History and Theory: From each of these units a minimum of two courses (6 credit hours) and a maximum of three courses (9 credit hours) can be selected. <u>6 credit hours</u> must be at the 300 level or higher.

*General Education Program (GEP) requirements and GEP Footnotes:

"General Education Program (GEP) requirements and GEP rootnotes: To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied, beyond the major requirements listed above. University approved GEP course lists for each of the following units can be found at https://oucc.dasa.ncsu.edu/general-education-program-

- Mathematical Sciences (6 credit hours Includes MA 111 and one course from the University approved GEP Mathematical Sciences course list. B. Natural Sciences (7 credit hours - include one laboratory course or course with a lab) Choose from the University approved GEP Natural Sciences course list.
- <u>C.</u> Humanities (6 credit hours selected from two different disciplines/course prefixes)
- Choose from the University approved GEP Humanities course list. The History elective in the major requirements fulfills 3 hours of this requirement. D. Social Sciences (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Social Sciences course list.
- E.
- Physical Education/Healthy Living (2 credit hours at least one 100-level Fitness and Wellness Course) Choose from the University approved GEP Physical Education Healthy Living course list.
- <u>F.</u> Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists) Choose a course from the GEP Mathematical Sciences or Natural Sciences course list.
- G.
- H.
- Interdisciplinary Perspectives (2 credit hours) Choose from the University approved GEP Interdisciplinary Perspectives course list. Introduction to Writing (4 credit hours satisfied by completing ENG 101 with a C- or better)
- The following Co-Requisites must be satisfied to complete the General Education Program requirements: I. U.S. Diversity (USD)
- Thoose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite. Only one course that satisfies this co-requisite is required J. Global Knowledge (GK)
- hoose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global
- Knowledge (GK) co-requisite. Only one course that satisfies this co-requisite is required. ĸ. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation. Design Studies requires 6 credit hours of FL beyond FL 102.

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fulfills 3 hours of this requirement. Proposed Changes 11/15/2017 11:34 AM

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DS100 Culture/DN Context	3
OS 200 Survey of Design Studies	3
Art History: HA 202, 203,298,310 or 395	6
Design History: ARC 241, LAR 444, GD 331, ADN 475 or D 231	9
Design Foundations: ADN 111 2D, ADN 112 3D or ADN 414 Color & Light	6
ADN 281 Basic Drawing	3
ADN 219 Digital Imaging	3
ADN 490 International Studio/Experience	
ADN418 Contemporary Issues	3
S 481 Design Studies Capstone Seminar	3
OS 483 Design Studies Capstone Research Paper	3
L Foreign Language	6
COM 110 Public Speaking	
Aumanities: 3 credit hours must be (HI) History (fulfills GEP requirement)	3
Advanced Writing: ENG 201,214, 215, 287, 288, 292, 301, 316, 323, 325,	3

*GEP Requirements

Humanities	3
Mathematical Science	
Natural Sciences	
Social Sciences	6
Additional Breadth (ADB)	3
Interdisciplinary Perspective (IDP)	5
English 101 Intro to Writing	4
Health and Exercise Studies	2
the second second second second second	36 total credit hours

3 of 4

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(DS) DESIGN STUDIES ADVISED ELECTIVES: 24 CREDIT HOURS (3 credit hours per course)

From each of the three units select a minimum of two courses (6 credit hours) and a maximum of three courses (9 credit hours). 6 credit hours must be at the 300 level or higher.

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\DN	111	2D Design Process & Methods	ADN	386	Basic Sculpture	Moved (insertion) [2]
\DN	112	3D Design Process & Methods	ADN	411	Visual Laboratory II	
NDN	212	Basic Photography	ADN	414	Color and Light	
DN	219	Digital Imaging	ADN	415	Visualizing Narrative	
RC	232	Structure & Materials	ADN	419	Multimedia & Digital Imaging	
DN	272	Intro to Printing & Surface Design	ADN	481	Intermediate Drawing	
DN	273	Fibers, Materials & Processes	ADN	486	Intermediate Sculpture	
DN	292	Special Topics in Art+Design	ID	492	Special Topics in Industrial Design	
DN	311	Basic Visual Laboratories	DS	494	Design Studies Internship	
DN	312	Intermediate Photography			a construction of the cons	

Theory Unit

<u>0</u> Graphic Design Theory & Practice <u>1</u> Intro to Environment & Behavior for <u>Designers</u>	ADN LAR D	<u>571</u> <u>579</u> <u>592</u>	Fibers & Surface Design Seminar Human Use of Urban Landscape Special Topics in Design	Moved (insertion) [3]
	1 Intro to Environment & Behavior for	1 Intro to Environment & Behavior for Designers LAR 2 Professional Practice in Industrial Design ADN 2 Special Topics in Design DS 5 Human-Centered Design DS 2 Special Topics in Design DS 2 Special Topics in Design DS	1 Intro to Environment & Behavior for Designers LAR 579 2 Professional Practice in Industrial Design ADN 492 2 Special Topics in Design DS 481 5 Human-Centered Design DS 483 2 Special Topics in Design DS 483	1 Intro to Environment & Behavior for Designers LAR 579 Human Use of Urban Landscape 2 Professional Practice in Industrial Design D 592 Special Topics in Design 2 Special Topics in Design DS 481 Design Studies Senior Research Seminar 2 Special Topics in Design DS 483 Design Studies Senior Capstone 2 Special Topics in Design DS 483 Design Studies Senior Capstone

History Unit

ARC	241	Introduction to World Architecture
ARC	242	History of Western Architecture
D	292	Special Topics in Design
GD	342	History of Graphic Design
ARC	441	History of Cont. Architecture (ARC 241 ADN
		ARC 242 Pre-Reqs)
LAR	444	History of Landscape Architecture
ADN	475	Pre-Industrial World Textiles

D	492	Special Topics in Design
ID	492	Special Topics in Industrial Design
ADN	561	Animation Seminar
HI	591	Intro to Museology
D	592	Special Topics in Design
HI	Any H	istory Course from GEP Humanities
ID	444	History of Industrial Design

- Any History Course from GEP Humanities List 444 History of Industrial Design

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Select 3 credit hours from each unit. Check the course lists for each unit in the SIS degree audit for this program for the most up-to-date course lists.

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ADN 111 2D Design		
ADN 112 3D Design		
ADN 212 Basic Photography		
ADN 219 Digital Imaging		
ADN 271 Intro to Printing & Sur	face Design	
ADN 273 Fibers, Materials & Pro	ocesses	
ADN 292 Special Topics in Desig	gn	
ADN 311 Basic Visual Laborator	ies	
ADN 312 Intermediate Photograp	bhy	
ADN 384 Basic Painting		
ADN 386 Basic Sculpture		
ADN 411 Visual Laboratory II		
ADN 414 Color and Light		
ADN 419 Multimedia & Digital I	maging	
ADN 472 Advanced Surface Des		
ADN 481 Intermediate Drawing		
ADN 484 Intermediate Painting		
ADN 486 Intermediate Sculpture		
ADN 492 Special Topics in Desig		
ARC 232 Structure & Materials	5	
DS 494 Design Internship		
ID 255 Contemporary Mfg. Pr	ocess I	
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ID 492 Digital Rendering	2017P-90	
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ADN 418 Contemporary Issues in		
ADN 571 Fibers & Surface Desig		
DS 244 Material Culture & Ind	<u> </u>	
DS 492 Museum Theory & Pra		
GD 200 Graphic Design Theory		
LAR 221 Intro to Environment &		
LAR 511 Community Design Pol	icy	

LAR 579 Human Use of Urban Landscape

ID 262 Professional Practice in Industrial Design

ID 445 Human-Centered Design

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Proposed Changes	11/15/17 11:34 AM
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:

ADN 475 Pre-Industrial World Textiles

ARC 241 Intro. to World Architecture

ARC 242 History of Western Architecture

ARC 441 Hist Cont ARC (ARC 241, ARC 242 pre-reqs)

ARC 442 History of NC Architecture

D 492A Iconography

- DS 251 History of Aesthetics
- GD 342 History of Graphic Design
- HA 203 History of American Art
- HA 202 History of Art / Renaissance-20th Century
- HA 310 History of Art & Photography
- HI Any History Course from GEP Humanities List
- HI 592 Advanced Museology
- ID 492F / ID 582F History of Industrial Design
- LAR 444 History of Landscape Architecture



College of Agriculture & Life Sciences Department of Crop and Soil Sciences cals.ncsu.edu/crop-and-soil-sciences Campus Box 7620 Raleigh, NC 27695-7620 P: 919.515.2647

Memorandum - Creation of a New Subject Area Acronym

To: Dr. Michael Mullen Vice Chancellor and Dean of the Division of Academic and Student Affairs

From: Dr. David A. Crouse Undergraduate Teaching Coordinator

Aug rand

Date: 10 November 2017

In July 2016, the Department of Crop Science and the Department of Soil Science merged to form the Department of Crop and Soil Sciences. Prior to the merger, both departments had a series of courses under their respective subject areas that are now duplicative in the new merged department. The Department requests the creation of a new subject area acronym, CSSC, which will allow us to consolidate duplicative courses under a single course number. Once the acronym is created, course actions will follow that rename one course (e.g., CS 492 to CSSC 492) and delete its duplicated soil science version (e.g., SSC 492). Multiple courses will be consolidated.

SIGNATURE PAGE

COURSE ACTION for Creation of CSSC Course Acronym

Recommended F

Head, Department of Crop and Soil Sciences

Recommended By:

Chair, College Curriculum Committee

Endorsed By

College Dean

10/11/14 Data

Date

Date

Date

Approved By:

Chair, University Courses & Curricula Committee	Date
Chair, Council on Undergraduate Education	Date
Dean, Division of Academic and Student Affairs (DASA)	Date

Joint Department of **BIOMEDICAL** ENGINEERING

152 MacNider Hall Campus Box 7575 Chapel Hill, NC 27599 919.966.1175 • bme.unc.edu

4130 Engineering Building III Campus Box 7115 Raleigh, NC 27695 919.515.5252 • bme.ncsu.edu



DATE:	October 31, 2017
TO:	Office of the Dean of Academic and Student Affairs
FROM:	Lianne Cartee, Chair, BME Undergraduate Affairs Committee
SUBJECT:	BME Curriculum Change

Attached please find the proposed curriculum change for the Biomedical Engineering program. In an effort to better prepare our graduates for future careers and advanced studies as well as increase opportunities for students in our unique program to take advantage of additional opportunities on the UNC campus, the faculty of Biomedical Engineering, in consultation with student and industry representatives, has developed a comprehensive new curriculum. The curriculum change will impact first year students entering the university in the fall of 2018. Current first year students may opt-into the new curriculum, classroom space permitting. Curriculum changes are staggered so students following the existing curriculum can complete their current curriculum. Details of the curriculum changes are attached including the current Format A, the proposed Format A, an edited version of the online 8 semester display, and the proposed Format B. Consultations with affected departments follow.

The attached diagram and table illustrate the flow of the curriculum and the choice of specialization electives. All required courses are taught on both the UNC and NC State campus in alternate semesters (see red and blue F, S, S1 and S2 to indicate semester and campus when class is offered). Courses are scheduled to enable students to travel to the opposite campus for a half or whole day in order to take classes. This will give our students additional scheduling flexibility to incorporate study abroad, co-op and similar experiences in their education. If a student misses a required class in one semester, the class will be available on the opposite campus the following semester. Senior level electives are unique to each campus, giving students additional electives to choose from across the two campuses.

Should you need any additional information, please feel free to contact me at 919-515-6726 or lacartee@ncsu.edu.

Sincerely,

Lianne A. Cartee, Ph.D.

CURRICULUM ACTION SIGNATURE PAGE

RECOMMENDED BY:

HEAD, DEP RTMENT/PROGRAM

DATE

ADDITIONAL SIGNATURES (IF NEEDED)

ENDORSED BY: GNOV CHAIR, COLLEGE COURSES & CURRICULA COMMITTEE ADDITIONAL SIGNATURES (IF NEEDED) DATE í. avelle Nome COLLEGE DEAN DATE ADDITIONAL SIGNATURES (IF NEEDED)

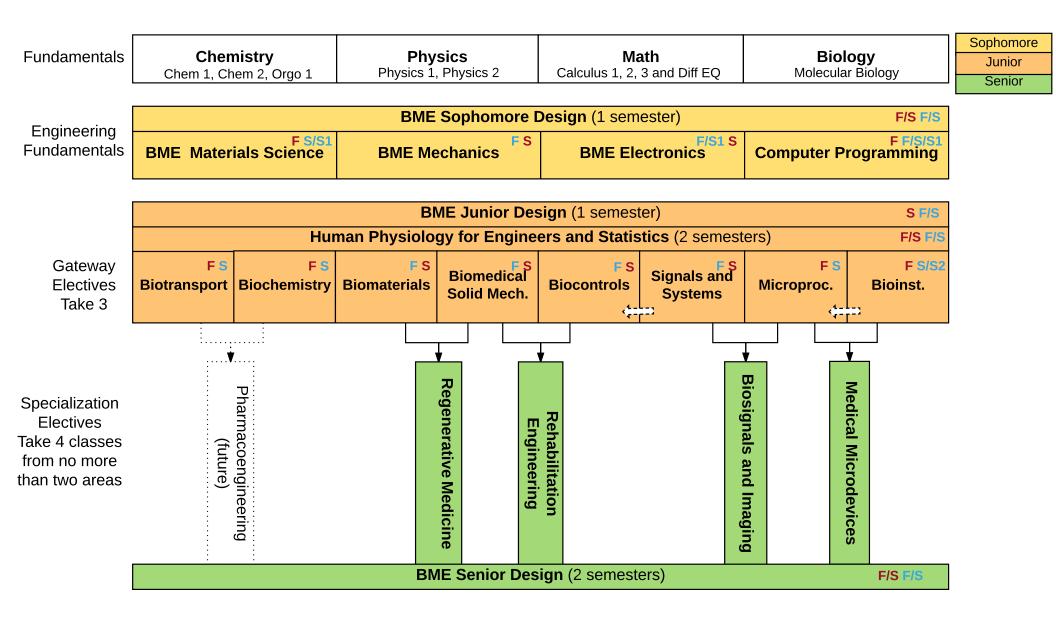
APPROVED BY:

CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE

DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS

DATE

DATE



Specialization Area Electives

Pharmacoengineering	g (Group 061)	
BMME 485	Biotechnology	3
Regenerative Medicir	ne (Group 063)	
BME 462	Biomaterials Characterization	3
BME 484	Fundamentals of Tissue Engineering	3
BMME 455	Biofluid Mechanics	3
Or MAE 308	Fluid Mechanics	3
Or CE 382	Hydraulics	3
BMME 441	Thermal Physics	3
Or MAE 201	Engineering Thermodyamics I	3
Or MSE 301	Intro to Thermodynamics of Materials	3
BIT 466	Animal Cell Culture	2
and BME 483	Tissue Engineering Technologies	2
BMME 420	Introduction to Synthetic Biology	3
BMME 470	Analysis of Tissue Engineering Technologies	3
TE 463	Polymer Engineering	3
PHYS 405	Biological Physics	3
Rehabilitation Engine	ering (Group 064)	
BME 418	Wearable Biosensors	3
BME 425	Bioelectricity	3
BME 444	Orthopedic Biomechanics	3
BME 467	Mechanics of Tissues and Implants Requirements	3
BMME 405	Biomechanics of Movement	3
BMME 445	Systems Neuroscience	3
BMME 447	Neural Basis of Rehabilitation Engineering	3
Biosignals and Imagin	g (Group 066)	
BME 412	Biomedical Signal Processing	3
BMME 461	Introduction to Medical Imaging	3
BMME 581	Biomedical Microcontroller Applications II	3
ECE 455	Computer Control of Robots	3
ECE 456	Mechatronics	3
ECE 461	Embedded Systems	3
MATH 528	Mathematical Methods for Physical Scientists	3
Medical Microdevices		
BME 412	Biomedical Signal Processing	3
BME 418	Wearable Biosensors	3
BME 522	Medical Instrumentation	3
BME 536	Digital Control Systems	3
BMME 455	Biofluid Mechanics	3
Or MAE 308	Fluid Mechanics	3
Or CE 382	Hydraulics	3
BMME 441	Thermal Physics	3
Or MAE 201	Engineering Thermodyamics I	3
Or MSE 301	Intro to Thermodynamics of Materials	3
BMME 581	Biomedical Microcontroller Applications II	3
E 304	Intro to Nano Science and Technology	3
ECE 505	Neural Interface Engineering	3

Biomedical Engineering (new curriculum)

GEP FORMAT A

(SEMESTER-BY-SEMESTER CURRICULUM DISPLAY)

Current: X Proposed: Effective Semester: 1/2013

DEGREE TITLE: B. S. in Biomedical Engineering CONCENTRATION TITLE: N/A

CURRENT DEGREE KEY: 14BME2131

		F	reshma	n Year		
		Fall Semester	Credits		Spring Semester	Credits
CH	101	Chemistry, A Molecular Science (C-)	3	СН	221 Organic Chem I	3
CH	102	General Chemistry Lab (C-)	1	СН	222 Organic Chem I Lab	1
E	101	Introduction to Engr & Prob Solv	1	MA	241 Calculus II (C-)	4
Е	115	Intro to Computing Environ	1	PY	205 Physics for Engr & Sc I (C-)	3
ENG	101	Academic Writing and Research (C-)	4	PY	206 Physics for Engr & Sc I Lab (C-)	1
MA	141	Calculus I (C-)	4	EC	205 Economics (GEP Soc Sci Reg* ¹)	3
PE	1**	Fitness and Wellness Course*	1	PE	*** Physical Education / Healthy Living*	1
		Semester Total	15		Semester Total	16

			Sop	homoi	re Year		
		Fall Semester	(Credits		Spring Semester	Credits
BME	201	Comp Meth in BME		3	BIO	183 Intro Biol: Cellular & Molecular	4
BME	204	Biomedical Measurements		3	BME	203 Intro Mat Sci of Biomaterials	3
MAE	206	Engineering Statics or		3	BME	252 Engineering Design I	1
CE	214	Engineering Mechanics - Statics			BME	210 Analog and Digital Circuits	4
MA	242	Calculus III		4	MAE	208 Engineering Dynamics	3
PY	208	Physics for Engr & Sc II		3			
PY	209	Physics for Engr & Sc II Lab		1			
			Semester Total	17		Semester Total	15

			Junior	Year		
		Fall Semester	Credits		Spring Semester Cr	redits
BME	301	Human Physiology for Engineers I	3	BME	302 Human Physiology for Engineers II	3
BME	311	Linear Systems in BME	3	***	*** BME Elective B ²	3
MA	341	Applied Diff Equations	3	***	*** BME Elective C ²	3
***	***	BME Elective A ²	3	BME	352 Engineering Design II	2
ST	370	Prob and Statistics for Engrs	3	ENG	331 Comm.Engr.& Tech. or	3
				ENG	333 Comm. Sci. & Res.	
				***	*** GEP Requirement*	3
		Semester Total	15		Semester Total	17

Senior Year										
		Fall Semester		Credits			Spring Semester		Credits	
BME	451	BME Senior Design I		3	BME	452	BME Senior Design II		3	
***	***	BME Elective D ²		3	***	***	BME Elective F ²		3	
***	***	BME Elective E ²		3	***	***	GEP Requirement*		2-3	
MAE	301	Thermodynamics I or		3	***	***	GEP Requirement*		3	
MSE	301	Equilibrium and Rate Processes			***	***	GEP Requirement*		3	
***	***	GEP Requirement*		3	***	***	GEP Requirement*		3	
			Semester Total	15				Semester Total	17-18	

Minimum Total Credit Hours Required for Graduation 127^{I,J,K}

Major/Program requirements and footnotes:

¹Choose from EC 201 or 205, or ARE 201. ² Choose from an appropriate sequence of electives. These must include at least 15 hours of engineering topics.

No specific emphasis: Students will work out a plan of study with their advisor that includes at least two 300- or 400-level BME electives and any other courses listed for the emphasis areas. There must be a sequence of at least three related upper-level BME electives to demonstrate an area of depth. One course can be an appropriate non-engineering course.

Biomechanics: (A) MAE 214 or CE 313: Solid Mechanics; (B) MAE 308 or CE 382: Fluid Mechanics; (C) BME 342: Experimental & Analytical Methods in Biomechanical Engineering Analysis; (D) BME 441: Biomechanics; (E) and (F) Any BME elective or appropriate course approved by the student's advisor. Students following this area of emphasis should take MAE 201 or MSE 301 in the spring of their junior year and delay BME Elective B until the fall of the senior year.

Biomaterials : (A) TE 463: Polymer Engineering; (B) MAE 214 or CE 313: Solid Mechanics; (C) BME 362: Biomaterials Characterization (D) E 304: Introduction to Nano Science and Technology or MSE 485: Biomaterials (E) Any BME elective or appropriate course approved by the student's advisor; and (F) TE/BME 467: Mechanics of Tissues and Implants. Students following this emphasis area should take MAE 201 or MSE 301 in the fall of their junior year and the technical writing course in the spring of their junior year.

Biomedical Instrumentation: (A) Any BME elective or appropriate course approved by the student's advisor; (B) BME 422: Fundamentals of Biomedical Instrumentation; (C) BME 412: Biomedical Signal Processing; (D) BME 425: Bioelectricity; (E) and (F) Take two from BME 480: Biomedical Microcontroller Applications; ECE 308: Elements of Control; ECE 436: Digital Control Systems: ECE 455: Computer Control of Robots; ECE 456: Mechatronics; ECE 561: Embedded Systems; and BME 522: Medical Instrumentation. Students following this emphasis area may choose to take a GEP course in the fall semester of the junior year and BME Elective A in the spring semester of the senior year.

^{*}General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html.

- A. <u>Mathematical Sciences</u> (6 credit hours one course with MA or ST prefix) Fulfilled as part of the Major requirements.
- B. Natural Sciences (7 credit hours include one laboratory course or course with a lab) Fulfilled as part of the Major requirements.
 - C. <u>Humanities</u> (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Humanities course list.

- D. Social Sciences (6 credit hours selected from two different disciplines/course prefixes)
 Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics. Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement.

 E. Physical Education/Healthy Living (2 credit hours at least one 100-level Fitness and Wellness Course)
 Choose from the University approved GEP Physical Education/Healthy Living course list

		Biomedical Eng	gineeri	ng	[14BMEBS Req T	erm Sum	imer 2 18]	
								
					First Year			
	Fall Semester		Credi	ts		Spring S		Credits
СН	101	Chemistry, A Molecular Science ^{31,2}	3		СН	20 <mark>2</mark> 1	Chemistry: A Quantitative Science Organic Chem I	3
		General Chemistry	1				Quantitative Chemistry	
СН	102	Lab ^{31,2}			СН	20 2 2	Lab Organic Chem I Lab	1
E	101	Introduction to Engr & Prob Solv ^{41,2}	1		МА	241	Calculus II ^{31,2}	4
E	115	Intro to Computing Environ ^{1,2}	1		РҮ	205	Physics for Engr & Sc I ^{31,2}	3
ENG	101	Academic Writing and Research ^{41,3}	4		РҮ	206	Physics for Engr & Sc I Lab ^{31,2}	1
			4				Fund of Econ ^D (or EC 201 or ARE 201) Economics	
MA	141	Calculus I ^{31,2}			EC	205	(GEP Soc Sci Req*) ¹	3
HESF-	1 <u>*</u> **	Health & Exercise Studies Course ^{*^E}	1		HES_ E	<u>***</u> 102	Engineering in the 21st Century Health & Exercise Studies Course*	2 1
	1-	Semester Total	15			102	Semester Total	17 6
		Semester Total	15				Semester Total	1/9
					nore Year			1
	Fall Sem	ester	Credi	ts	Spring Semester			Credits
BME/BMME ⁴	201	Comp Meth in BME	3		BIO	183	Intro Biol: Cellular & Molecular	4
BME/BMME ^{4,5} BME	2094	Introduction to the Materials Science of Biomaterials Biomedical Measurements	4 3		BME/BMME ^{4,5}	20 3 5	Intro to Biomedical Mechanics Intro Mat Sci of Biomaterials	4 3
, BME/BMME ^{4,5} MAE	298 06	BME Design and Manufacturing 1 Engineering Statics or	2 3		BME	252	Engineering Design I	<u>1</u>
CE	214	Engineering Mechanics			BME/BMME ^{4,5}	207 10	Analog & Digital Circuits Electronics	4
MA	242	Calculus III	4		MAE	208	Engineering Dynamics	3
РҮ	208	Physics for Engr & Sc II	3		СН	221	Organic Chem I	3
РҮ	209	Physics for Engr & Sc II Lab	1		СН	222	Organic Chem I Lab	1
••	200	Semester Total	17				Semester Total	- 16 5
			/					
	1	<u> </u>	 ++	nic	Dr Year	I		I
	Eall Sam	ostor	Credi		T	Spring S	emester	Credits
Fall Semester Human Physiology for Engineers I: Electrical			Creat	13			Human Physiology for Engineers II: Mechanical	Creuits
BME/BMME ⁴	301	Analysis	4 3		BME/BMME ⁴	302	Analysis	4 3
BME	311	Linear Systems in BME	3		BME/BMME ^{4,6} ***	<u>***</u> 3*5	BME Elective B ² Gateway 2	3

		Applied Diff Equations						
MA	341	or	3		BME/BMME ^{4,6} ***	<u>***</u> 3*5	BME Elective C ² Gateway 3	3
		Differential Equations					Engineering BME Design	
MA	331	for the Life Sciences			BME/BMME ⁴	352 398	and Manufacturing II	2
4.6		BME Elective						
BME/BMME ^{4,6}	<u>***</u> 3*5	A ² Gateway 1	3		ENG	331	Comm.Engr.& Tech. or	3
		Prob and Statistics for						
		EngrsGEP						
ST ***	370 ***	Requirement*	3		ENG	333	Comm. Sci. & Res.	
* * *	***	Engineering Elective ⁷	3		***	***	GEP Requirement*	3
		Semester Total	16 <mark>5</mark>				Semester Total	15 <mark>7</mark>
			Se	enio	or Year			
	Fall Seme	ester	Cred	its	Spring Semester			Credits
BME	451	BME Senior Design I or	3		BME	452	BME Senior Design II or	3
BMME	697	BME Senior Design I			BMME	698	BME Senior Design II	
		BME <mark>Elective</mark>					BME Specialty Elective	
<u>***</u>	***	₽²Specialty Elective 1 ⁸	3		<u>***</u>	***	3 ⁸ Elective F ²	3
							BME Specialty Elective	
<u>***</u>	<u>***</u>	BME Elective E ²	3		<u>***</u>	<u>***</u>	4 ⁸ GEP Requirement*	3
MAE	201	Thermodynamics I or	3		***	***	GEP Requirement*	3
		Equilibrium and Rate					Physical Education /	
MSE	301	Processes			HESF	***	Healthy Living*	1
***	***	GEP Requirement*	3		<u>***</u>	<u>***</u>	GEP Requirement*	3
* * *	* * *	GEP Requirement*	3		<u>***</u>	<u>***</u>	GEP Requirement*	2-3
		Semester Total	15				Semester Total	17-
								18 13
Minimum Total C	Credit Ho	urs Required for Grad	luatio	n* ^{1,J}	i,κ		•	
								124 <mark>7</mark>

Major/Program requirements and footnotes:

⁴Choose from EC 201 or 205, or ARE 201.

¹Required course for admission to the program

²Choose from an appropriate sequence of electives. These must include at least 15 hours of engineering topics.

²³ Grade of C (2.0) or higher required.

³⁴Minimum Ggrade of C- or higher required

No specific emphasis: Students will work out a plan of study with their advisor that includes at least two 300- or 400-level BME electives and any other courses listed for the emphasis areas. There must be a sequence of at least three related upper-level BME electives to demonstrate an area of depth. One course can be an appropriate non-engineering course.

Biomechanics: (A) MAE 314 or CE 313: Solid Mechanics; (B) MAE 308 or CE 382: Fluid Mechanics; (C) BME 342: Experimental & Analytical Methods in Biomechanical Engineering Analysis; (D) BME 441: Biomechanics; (E) and (F) Any BME elective or appropriate course approved by the student's advisor. **Biomaterials:** (A) MAE 314 or CE 313: Solid Mechanics; (B) TE 463: Polymer Engineering; (C) PCC 471: Chemistry of Biopolymers (no engineering topics); (D) TE 466: Polymeric Biomaterials; (E) Any BME elective or approved by the student's advisor; and (F) TE/BME 467: Mechanics of Tissues and Implants. Students following this emphasis area should take MAE 301 or MSE 301 in the fall of their junior year and the technical writing course in the spring of their junior year.

Biomedical Instrumentation: (A) Any BME elective or appropriate course approved by the student's advisor; (B) BME 422: Fundamentals of Biomedical Instrumentation; (C) BME 412: Biomedical Signal Processing; (D) BME 425: Bioelectricity; (E) and (F) Take two from BME 480: Biomedical Microcontroller Applications; ECE 435: Elements of Control; ECE 436: Digital Control Systems: ECE 455: Computer Control of Robots; ECE 456: Mechatronics; ECE 561: Embedded Sytems; and BME 522: Medical Instrumentation. Students following this emphasis area may choose to take a GEP course in the fall semester of the junior year and BME Elective A in the spring semester of the senior year.

3 Grade of C (2.0) or higher.

4 Minimum grade of C-

⁴BME/BMME indicates the class is taught BME XXX on the NC State campus in the semester shown and as BMME XXX on the UNC campus and the alternate semester.

⁵Additional options available on the degree audit for students with credit from the previous curriculum, transfer credit, double majors, study abroad credit or similar experience.

⁶Take three gateway electives to meet the pre-requisites for 2 specialization areas

⁷Any 300 or greater level engineering course

⁸Take four Specialty Electives from no more than two specialization areas

*General Education Program (GEP) requirements and GEP Footnotes

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at https://oucc.dasa.ncsu.edu/general-education-program/.

A. Mathematical Sciences (6 credit hours – one course with MA or ST prefix)

Fulfilled as part of the Major requirements.

B. Natural Sciences (7 credit hours - include one laboratory course or course with a lab)

Fulfilled as part of the Major requirements.

C. Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list.

D. Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics. Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Science Requirement.

E. Health & Exercise Studies (2 credit hours - at least one 100-level Health & Exercise Studies Course)

Choose from the University approved GEP Health & Exercise Studies course list.

F. Additional Breadth – (3 credit hours to be selected from the following checked University approved GEP course lists)

XX Humanities/Social Sciences/Visual and Performing Arts

G. Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

H. Introduction to Writing (4 credit hours satisfied by completing ENG 101 with a C- or better)

The following **Co-Requisites** must be satisfied to complete the General Education Program requirements

I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

J. Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

K. Foreign Language proficiency – Proficiency at the FL_102 level is required for graduation.

FORMAT A (SEMESTER-BY-SEMESTER CURRICULUM DISPLAY)

Indicate display status: Current:

Proposed: x Proposed Effective Semester: 08/2018

Degree/Plan Title: Biomedical and Health Sciences Engineering Concentration/Subplan Title:

Plan SIS Code: 14BMEBS

Subplan SIS Code:

<u>New Degree Audit required</u>? (Y or N) Y

<u>Critical Path Courses</u> - Identify using the code (CP) which courses are considered critical path courses which represent specific major requirements that are predictive of student success in a given program/plan. Place the (CP) next to the credit hours for the course.

		FF	RESHMAN Y	EAR	
		FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDIT
СН	101	Chemistry, A Molecular Science ^{1,2}	3	CH 201 Chemistry: A Quantitative Science	3
СН	102	General Chemistry Lab ^{1,2}	1	CH 202 Quantitative Chemistry Lab	1
E	101	Introduction to Engr & Prob Solv ^{1,2}	1 (CP)	MA 241 Calculus II ^{1,2}	4 (CP)
E	115	Intro to Computing Environ ^{1,2}	1 (CP)	PY 205 Physics for Engr & Sc I ^{1,2}	3 (CP)
ENG	101	Academic Writing and Research ^{1,3}	4 (CP)	PY 206 Physics for Engr & Sc I Lab ^{1,2}	1 (CP)
MA	141	Calculus I ^{1,2}	4 (CP)	E 102 Engineering in the 21st Century	2
HESF	1**	Fitness and Wellness Course ^E	1	EC 205 Fund of Econ ^D (or EC 201 or ARE 201)	3
			Total:15		Total:1
		SO	PHOMORE `	/EAR	
		FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDIT
	MME ^{4,5}		3 (CP)	BIO 183 Intro Biol: Cellular &	4
BME/B	MME ^{4,5}	209 Introduction to the Materials Science of	4 (CP)	Molecular	
		Biomaterials		BME/BMME ^{4,5} 205 Intro to Biomedical	4 (CP)
BME/B	MME ^{4,5}	298 BME Design and Manufacturing 1	2 (CP)	Mechanics	
MA		242 Calculus III	4	BME/BMME ^{4,5} 207 Biomedical Electronics	4 (CP)
PY		208 Physics for Engr & Sc II	3 (CP)	CH 221 Organic Chem I	3
PY		209 Physics for Engr & Sc II Lab	1 (CP)	CH 222 Organic Chem I Lab	1
			Total:17		Total:1
			JUNIOR YEA	R	
		FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDIT
BME/B	MME ⁴	301 Human Physiology: Electrical	4	BME/BMME ⁴ 302 Human Physiology:	4
		Analysis		Mechanical Analysis	
MA		341 Applied Diff Equations <i>or</i>	3	BME/BMME ^{4,6} 3*5 BME Gateway 2	3
MA		331 Differential Equations for the		BME/BMME ^{4,6} 3*5 BME Gateway 3	3
		Life Sciences		BME/BMME ^{4,5} 398 BME Design and	2
BME/B	MME ^{4,6}		3	Manufacturing II	
***		*** Engineering Elective ⁷	3	*** GEP Requirement *	3
***		*** GEP Requirement*	3		-
			Total:16		Total:1
			SENIOR YEA	R	
		FALL SEMESTER	CREDITS	SPRING SEMESTER	CREDIT
BME	451	BME Senior Design I or	3	BME 452 BME Senior Design II or	3
BMME		BME Senior Design I	-	BMME 698 BME Senior Design II	-
		BME Specialty Elective 1 ⁸	3	BME Specialty Elective 3 ⁸	3
		BME Specialty Elective 2 ⁸	3	BME Specialty Elective 4 ⁸	3
***	***	GEP Requirement*	3	*** *** GEP Requirement*	3
***	***	GEP Requirement*	3	Physical Education / Healthy	1
			-	HESF *** Living*	-
			Total:15		Total:1
		Minimum Credit Hour		for Graduation ^{*[,],K} : 124	

Major/Program Footnotes:

¹Required course for admission to the program

²Grade of C or higher required

³Grade of C- or higher required

⁴BME/BMME indicates the class is taught BME XXX on the NC State campus in the semester shown and as BMME XXX on the UNC campus and the alternate semester.

⁵Additional options available on the degree audit for students with credit from the previous curriculum, transfer credit, double majors, study abroad credit or similar experience.

⁶Take three gateway electives to meet the pre-requisites for 2 specialization areas

⁷Any 300 or greater level engineering course

⁸Take four Specialty Electives from no more than two specialization areas

^{*}General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html.

- <u>Mathematical Sciences</u> (6 credit hours one course with MA or ST prefix) Choose from the University approved GEP Mathematical Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:
- B. Natural Sciences (7 credit hours include one laboratory course or course with a lab) Choose from the University approved GEP Natural Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:
- <u>C.</u> <u>Humanities</u> (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Humanities course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:
- <u>Social Sciences</u> (6 credit hours selected from two different disciplines/course prefixes)
 <u>Choose from the University approved GEP Social Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement: Choose 3 credits from the University approved GEP Social Sciences course (so if completed to fulfill the GEP Social Sciences requirement.
 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement.
 </u>
- <u>Physical Education/Healthy Living</u> (2 credit hours at least one 100-level Fitness and Wellness Course) Choose from the University approved GEP Physical Education/Healthy Living course list.
- <u>Additional Breadth</u> (3 credit hours to be selected from the following checked University approved GEP course lists)
- Humanities/Social Sciences/Visual and Performing Arts or _____Mathematical Sciences/Natural Sciences/Engineering
 Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:

H. Introduction to Writing (4 credit hours satisfied by completing ENG 101 with a C- or better)

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

L. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite. The following course(s) completed as part of the Major requirements may fulfill this requirement:

J. Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite. The following course(s) completed as part of the Major requirements may fulfill this requirement:

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

FORMAT A

(SEMESTER-BY-SEMESTER CURRICULUM DISPLAY)

Indicate display status: Current:

Proposed: x Proposed Effective Semester: 08/2018

Degree/Plan Title: Biomedical and Health Sciences Engineering Concentration/Subplan Title:

Plan SIS Code: 14BMEBS

Subplan SIS Code:

New Degree Audit required? (Y or N) Y

<u>Critical Path Courses</u> - Identify using the code (CP) which courses are considered critical path courses which represent specific major requirements that are predictive of student success in a given program/plan. Place the (CP) next to the credit hours for the course.

		Ff	RESHMAN YE	EAR				
		FALL SEMESTER	CREDITS			SPRI	NG SEMESTER	CREDIT
CH 102 E 101 E 115 ENG 101 MA 141	General Introduc Intro to Academ Calculus	try, A Molecular Science ^{1,2} I Chemistry Lab ^{1,2} ction to Engr & Prob Solv ^{1,2} Computing Environ ^{1,2} nic Writing and Research ^{1,3} s J ^{1,2} and Wellness Course ^E	3 1 (CP) 1 (CP) 4 (CP) 4 (CP) 1 <i>Total:</i> 15	CH CH MA PY PY E EC	202 (241 (205 206 102	Chemisti Quantita Calculus Physics f Physics f Engineer	ry: A Quantitative Science tive Chemistry Lab	3 1 4 (CP) 3 (CP) 1 (CP) 2 3 <i>Total</i> :1
		FALL SEMESTER	CREDITS			SPR	NG SEMESTER	CREDIT
BME/BMME ^{4,5} BME/BMME ^{4,5} BME/BMME ^{4,5} MA PY PY	209	Comp Meth in BME Introduction to the Materials Science of Biomaterials BME Design and Manufacturing 1 Calculus III Physics for Engr & Sc II Physics for Engr & Sc II Lab	3 (CP) 4 (CP) 2 (CP) 4 3 (CP) 1 (CP) Total:17	BME/ CH CH	BMME ^{4,}		Intro Biol: Cellular & Molecular Intro to Biomedical Mechanics Biomedical Electronics Organic Chem I Organic Chem I Lab	4 4 (CP) 4 (CP) 3 1 <i>Total:</i> 1
			JUNIOR YEA	R		000	NC CENTER	167 CREDIT
BME/ <mark>BMME⁴</mark> MA MA	301 341 331	FALL SEMESTER Human Physiology: Electrical Analysis Applied Diff Equations or Differential Equations for the Life Sciences	CREDITS 4 3	BME/ BME/	BMME ⁴ BMME ^{4,} BMME ^{4,} BMME ^{4,}	302 ⁶ 3*5 ⁶ 3*5	ING SEMESTER Human Physiology: Mechanical Analysis BME Gateway 2 BME Gateway 3 BME Design and	4 3 3 2
BME/BMME ^{4,6} *** ***	⁶ 3*5 *** ***	BME Gateway 1 Engineering Elective ⁷ GEP Requirement*	3 3 3	***		***	Manufacturing II GEP Requirement*	3 Total:1
			Total:16 SENIOR YEA	R				210101.1
		FALL SEMESTER	CREDITS				ING SEMESTER	CREDIT
BME 451 BMME 697	BME S BME S BME S GEP R	Senior Design I or Senior Design I Specialty Elective 1 ⁸ Specialty Elective 2 ⁸ Requirement* Requirement*	3 3 3 3 3 3	BME BMM *** HESF	452 E 698 ***	BME S BME S BME S GEP R Physic	Senior Design II or Senior Design II Specialty Elective 3 ⁸ Specialty Elective 4 ⁸ equirement* cal Education / Healthy	3 3 3 3 1
			Triblar			Living	*	Tabal 1
		Minimum Credit Hou	Total:15 Irs Required	for Grad	luation ^{*I,}	^{,J,K} : 124	Y Y	Total:1

Major/Program Footnotes:

²Grade of C or higher required

³Grade of C- or higher required

⁴BME/BMME indicates the class is taught BME XXX on the NC State campus in the semester shown and as BMME XXX on the UNC campus and the alternate semester.

⁵Additional options available on the degree audit for students with credit from the previous curriculum, transfer credit,

double majors, study abroad credit or similar experience.

⁶Take three gateway electives to meet the pre-requisites for 2 specialization areas

⁷Any 300 or greater level engineering course

⁸Take four Specialty Electives from no more than two specialization areas

General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at <u>http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html</u>.

- <u>A</u> <u>Mathematical Sciences</u> (6 credit hours one course with MA or ST prefix) Choose from the University approved GEP Mathematical Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:
- B. Natural Sciences (7 credit hours include one laboratory course or course with a lab) Choose from the University approved GEP Natural Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:
- C. Humanities (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Humanities course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:
- D. Social Sciences (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Social Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement: Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics. Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement.
- E. <u>Physical Education/Healthy Living</u> (2 credit hours at least one 100-level Fitness and Wellness Course) Choose from the University approved GEP Physical Education/Healthy Living course list.
- Additional Breadth
 - (3 credit hours to be selected from the following checked University approved GEP course lists)

 Humanities/Social Sciences/Visual and Performing Arts or
 ______Mathematical Sciences/Natural Sciences/Engineering
- G. Interdisciplinary Perspectives (5-6 credit hours) Choose from the University approved GEP Interdisciplinary Perspectives course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:
- H. Introduction to Writing (4 credit hours satisfied by completing ENG 101 with a C- or better)
- The following **Co-Requisites** must be satisfied to complete the General Education Program requirements:
- U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite. The following course(s) completed as part of the Major requirements may fulfill this requirement:

Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite. The following course(s) completed as part of the Major requirements may fulfill this requirement:

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

GEP FORMAT B – CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Biomedical Engineering

Current Degree Key: 14BMEBS

Effective Date of Revision: 7/2009 8/2018

MAJOR FIELD OF STUDY REQUIREMENTS:		
Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a C-wall or MGPA requirement		List GEP category and hours satisfied by a Major requirement
Math		
MA 141 (C)-wall, MA 241 (C)-wall, MA 242	12	Mathematics (6 hours)
(MA 341 or MA 331)	3	
ST370	3	
Sciences		
CH 101 (C)-wall, CH 102 (C)-wall,	4	Natural Sciences (4 hours)
CH 201, CH 202, CH 221, CH 222	4 8	Natural Sciences (4 hours)
PY 205 (C)-wall, PY 208	8	
BIO 183	4	
BME Major		
BME Major GRP 010 Computer Programming (BME 201 or BMME 201 or CSC	3	
113)		
BME 201		
BME 204	3	
GRP 011 BME Mechanics (BME 205, BMME 205 or (MAE 208 and	4	
(BME 215 or BMME 215))		
GRP 012 BME Electronics (BME 207 or BMME 207 or BME 210 or	4	
(ECE 331 and (BME 217 or BMME 217)))		
BME 210		
GRP 013 BME Materials Science (BME 209 or BMME 209 or ((BME	4	
203 or MSE 203 or MSE 201) and BMME 219)) GRP 020 Sophomore Design (BME 298 or BMME 298 or (BME 252	1 2	
and BME 299))	τz	
BME 252		
GRP 030 Electrical Physiology (BME 301 or BMME 301)	4 3	Satisfies the GEP Advanced Writing and
BME 301		Speaking Co-requisite
GRP 031: Mechanical Physiology (BME 302 or BMME 302)	3 4	
BME 302		
BME 311	3	
GRP 032: Junior Design (BME 398 or BMME 398 or BME 352)	2	
BME 352 GRP 041: Senior Design I (BME 451 or BMME 697)	3	
BME 451		
GRP 042: Senior Design II (BME 452 or BMME 698)	3	
Other Maion		
Other Major	2	
GRP 031 (MSE 203 or BME 203) GRP 032 (CE 214 or MAE 206)	3	
GRP 033 (MAE 208)	3	
GRP 035 (ENG 331 or ENG 333)	3	
GRP 036 (MAE 201 or MSE 301)	3	
OPT 001 (SEQ 001, SEQ 002, or SEQ 003)	5 6(3) = 18	
<u>SEQ 001 (BME 342, (BME 441 or BME 541), (MAE 214 or CE</u>	5,0, 10	
313), (MAE 308_Or CE 382))		
BME 466 or BME 566). (MAE 214 or CE 313). and (TE	1	

467 or DME 467))		
4 67 or BME 467))		
SEQ 003 ((BME 412 or BME 512), BME 422, (BME 425 or BME		
525) and choose 2 from (BME 480, ECE 308, ECE 455, (ECE 4E6 or ECE EE6) or (ECE 522 or BME 522)))		
(ECE 456 or ECE 556), or (ECE 522 or BME 522)))		
GRP 050 BME 3x5 Gateway Electives (Pick 3 from two groups)		
GRP 051 (BME 315, BME 325), GRP 053 (BME 335, BME 345),		
GRP 054 (BME 345, BME 355), GRP 046 (BME 365, BME 375),		
GRP 057 (BME 375, BME 385)		
GRP 060 BME 4xx Elective (Pick 4 from no more than two groups)		
GRP 061 Pharmacoengineering (BMME 485)		
GRP 063 Regenerative Medicine(BME 462, BME 484, GRP 070, GRP		
071, GRP 072, BMME 420, BMME 470, TE 463),		
GRP 064 Rehabilitation Engineering (BME 418, BME 425, BME 444,		
BME 467, BMME 405, BMME 445, BMME 447),		
GRP 066 Biosignals and Imaging (BME 412, BMME 461, BMME 581,		
ECE 455, ECE456, ECE 461)		
GRP 067 Medical Microdevices(BME 412, BME 418, BME 522, BME		
536, GRP 070, GRP 071, BMME 581, E 304, ECE 505),		
GRP 070 Engineering Elective (Pick 1)		
GRP 050, GRP 060		
GRP 070 Fluid Mechanics Electives		
MAE 308, CE 382, BMME 455		
GRP 071 Thermodynamics electives		
MAE 201, MSE 301, BMME 441		
GRP 072 Tissue Engineering Technologies		
BIT 466 and BME 483		
Concentration Courses/Groups/Electives:		
Free Electives:		
Total credit hours under Major Field of Study:	<mark>99-</mark> 96 hours	
Minimum 27 hours required in program area.	55 56 110013	
COLLEGE REQUIREMENTS:		
Orientation Course(s):		
E 101 and E 115	2	E115 satisfies Technology Fluency requirement
Other: (ex: Adv Communication courses)		
Economics Elective (EC 205 or EC201 or ARE 201)	3	Social Science
E 102 Engineering in the 21 st century	2	
Total credit hours under College Requirements:	7 5 hours	
	1	

NCSU GENERAL EDUCATION PROGRAM REQUIREMEN	NTS	At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category.
Courses in the Major and/or Minor may also fulfill a General Educ requirement; however, a GEP category may not be subset to requ specific course from the category list. Required courses must be li the Major/College requirements.	iire a	 ²Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴Co-requisite is satisfied by a Major/College course requirement.
Specific courses should not be listed in any of the fields below of than ENG 101.		 ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements
English 101	4	ENG 101 (C-)
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	5 3	Choose course(s) from the University Approved GEP course list for this category
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	23 -21 hours	
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity* or Global Knowledge** co-requisite are marked on course lists with asterisks as indicated.
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category
Foreign Language Proficiency	n/a	FL_102
The following requirements must be satisfied within the College/Program:		
Advanced Communication	Х	Satisfied by College/Program Requirements
Technology Fluency	Х	Satisfied by College/Program Requirements

Total credit hours required to complete Degree:		As applicable, indicate here the overall GPA requirement for degree completion including course
Total must be within 120-128 credit hours.	hours	completion.

Hatice,

After consulting with our CE382 instructors, I am pleased to confirm that BME205 will be considered an appropriate pre-req for BME students enrolling in CE382... so that we don't need to enroll students manually, we may consider adding this to the pre-req list through a minor course action.

Regards,

Rudi

Hatice,

The addition of MA331 as an option to MA341 is appropriate for BME program and the Math Department approves this curricular revision. Alina

Alina Duca, PhD

Thank you for informing us of the change in the BME curriculum. We understand that TE 463 and BME/TE 467 will continue to be electives in the BME curriculum but enrollment will likely decrease beginning fall of 2019 with an additional drop of enrollment in the fall of 2020.

Regards, REG

Russell E. Gorga, Ph.D.

Professor Alumni Distinguished Undergraduate Professor Director of Undergraduate Programs and Associate Department Head

Hatice,

MSE has no problem with this.

Director of Undergraduate Programs, Mathematics Department College of Sciences | North Carolina State University http://www.math.ncsu.edu/undergrad | (919) 515-1875 | SAS 2108

Thanks, Cheryl

Cheryl Cass, Ph.D. Associate Professor, Teaching Director of Undergraduate Programs Department of Materials Science and Engineering North Carolina State University Office: 3002B Engineering Building I (Centennial Campus) Phone: (919) 515-2479 https://www.mse.ncsu.edu/profile/caparzel

On Mon, Oct 23, 2017 at 6:37 PM, Hatice Ozturk <<u>hoo@ncsu.edu</u>> wrote: Hi Cheryl,

BME is submitting a new curriculum action and offering more courses from the BME department. As a result, we are dropping MSE/BME203 requirement from the BME curriculum effective Fall 2019.

Please let us know your response.

Thank you

Hatice

Hatice,

Chemistry is in favor of this, however, based on previous 201 enrollment during Spring semesters over the last several years, we will not be able to accommodate 50 additional students in the Spring alone. We can however accommodate that number of students over the entire academic year (Fall,Spring,Summer) and therefore we encourage your students to plan accordingly. Please let me know if you have any questions.

Jeremy

On Tue, Oct 17, 2017 at 3:05 PM, Hatice Ozturk <<u>hoo@ncsu.edu</u>> wrote: Hi,

On the 8-semester display, the course will be on the Freshman Spring semester with effective date of Spring 2019.

Hatice

On Tue, Oct 17, 2017 at 2:42 PM, Jeremiah Feducia <<u>jfeduci@ncsu.edu</u>> wrote: Dear Hatice,

Is there a particular semester we should expect this enrollment increase in?

On Tue, Oct 17, 2017 at 2:39 PM, Laura Sremaniak <<u>lssreman@ncsu.edu</u>> wrote: Hi Hatice,

Thanks for sending this information to our department for comment. I am cc'ing our co-Directors of the undergraduate program to see if this is acceptable.

Thanks, Laura

On Mon, Oct 16, 2017 at 11:43 AM, Hatice Ozturk <<u>hoo@ncsu.edu</u>> wrote:

Hi Laura,

This is Hatice, your former Women and Science team member. I am writing this note to you as the Biomedical Engineering Department Course and Curriculum Committee Co-Chair. BME department is a joint department with UNC-CH and we are in the process of creating a unified curriculum. One of the areas we are balancing is chemistry requirements on both campuses. UNC requires 2-semesters of chemistry before organic chemistry, NCSU, requires only one semester of chemistry before organic chemistry. BME program would like to add CH 201/202 to the unified curriculum in order to balance the basic science requirements.

I am requesting Chemistry department's permission to do so. This will mean an enrollment increase of 50 students per year.

Please let me know if this is acceptable.

Thank you

Hatice

Thanks. We're ok with your changes.

Jack

On Tue, Oct 24, 2017 at 1:30 PM, Hatice Ozturk <<u>hoo@ncsu.edu</u>> wrote: Jack,

Thank you for your prompt response. BME 8 semester display is attached. MAE 308 falls under the footnote 4 - Any engineering elective 3xx or higher.

Please let me know if you have other requests.

Hatice

On Tue, Oct 24, 2017 at 9:50 AM, Jack Edwards <<u>jredward@ncsu.edu</u>> wrote: Hatice - your changes with regard to 208/206/214 are fine with us. We'd like a little more information re. your use of 308 - it is an elective in your curriculum, but what are the other choices? If you have a draft copy of your new curriculum so that we understand better where it fits, that would be great.

Thanks Jack

On Mon, Oct 23, 2017 at 6:31 PM, Hatice Ozturk <<u>hoo@ncsu.edu</u>> wrote:

Hi Jack,

This is Hatice, Lianne's co-chair in the BME Undergraduate Affairs Committee. BME is in the process of submitting a new curriculum and more courses are offered from the BME department. I am writing this note to consult with MAE on the following changes:

We are dropping MAE 206 and MAE 208 as requirements, but some students may choose; dropping MAE 214 as emphasis area elective, but some students may choose.

We are keeping MAE 308 as an elective. A new Biomedical Mechanics course (Statics and dynamics combo plus biomedical applications lab) has been created to take place of statics and dynamics requirements in the BME curriculum and we hope that it will be an acceptable prerequisite to MAE 308.

Hatice

Rudi,

Thank you for your prompt response. BME 205 Biomedical Mechanics Course Syllabus is attached. This is the UNC version but the NCSU version is identical.

Please let me know if you have other requests.

Hatice

May you please send me the syllabus for the new BME course so that we can make sure the topics required for CE382 are included?

Thanks,

Rudi

On Mon, Oct 23, 2017 at 6:19 PM, Hatice Ozturk <<u>hoo@ncsu.edu</u>> wrote:

Hi Rudi,

This is Hatice, Lianne's co-chair in the BME Undergraduate Affairs Committee. BME is in the process of submitting a new curriculum and more courses are offered from the BME department. I am writing this note to consult with CE on the following changes:

We are dropping CE 214 as requirement, but some students may choose; dropping CE 313 as emphasis area elective, but some students may choose.

We are keeping CE 382 as an elective. A new Biomedical Mechanics course (Old CE 213 plus biomedical applications lab) has been created to take place of statics and dynamics requirements in the BME curriculum and we hope that it will be an acceptable prerequisite to CE 382.

Please let us know your response .

Hatice O. Ozturk

Biomedical Engineering



College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive, Page Hall Raleigh, NC 27695-7904 P; 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student AffairsFROM: Dr. Lisa Bullard, Departmental Curriculum Chair, Chemical Engineering Department

RE: Curriculum Revision for 14CHEBS to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Chemical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

	SIGNATURES	
RECOMMENDED BY:	Carter S. Erdking HEAD, DEPARTMENT PROGRAM	Nov 15, 2017
ENDORSED BY:	CUAR COLLEGE COURSES & CURRICULA COMMITTEE	- JNOV 11 DATE
	Jerome P. faille	12/04/17
APPROVED BY:	CONLEGE DEAN	DATE / -
	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

APPROVAL DATE

Chemical Engineering [14CHEBS Req Term Spring 13]

				ıman Yea	ir		
CUL	1.01	Fall Semester	Cred		1000	Spring Semester	Credits
CH		Chemistry, A Molecular Science ¹	3	CH		Chemistry - Quantitative Sci.	3
CH E		General Chemistry Lab ¹ Introduction to Engr & Prob Solv ^{1,2}	1	CH		Quantitative Chem Lab	1
E		Intro to Computing Environ ¹²	1	MA PY		Calculus II'	4
ENG		Academic Writing and Research ¹²	4	PY		Physics for Engr & Sc 1	3
MA		Calculus I'	4	EC	200	Physics for Engr & Sc I Lab Economics (or EC 201 or ARE 201)*	1
		Health & Exercise Studies	1	HES	***	Health & Exercise Studies	3
		Semester To	1	TILO		Semester Tota	
			Sanha	mono Va			
		Fall Semester	Cred	more Yea	ar	Spring Semester	Credits
CH	221	Organic Chemistry I (or CH 225)	3	CH	223	Organic Chemistry II (or CH 227)	3
CH	222	Organic Chemistry I Lab (or CH 226)	1	CH		Organic Chemistry II Lab (or CH 228)	1
CHE	205	Chemical Proc Prin ²	4	CHE		Chemical Proc Systems ²	3
MA		Calculus III ²	4	MA		Applied Differential Eq ²	3
***	***	GEP Requirement*	3	PY		Physics Engr & Scientists II	3
				PY		Physics Engr & Scientists II Lab	1
				***		GEP Requirement*	3
		Semester To	otal 15			Semester Tota	I 17
			Juni	ior Year			
		Fall Semester	Credi	ts		Spring Semester	Credits
СН	315	Quantitative Analysis	4	СН	***	Chemistry Elective'	4
CHE	311	Transport Processes 12	3	CHE		Transport Processes II	3
CHE	315	Chem Process Thermo	3	CHE		Thermo of Chem & Phase Eq	3
ECE	331	Prin Electrical Engr or		CHE		Chem Engr Lab I	4
MSE		Struct & Prop Engr Mat	3	***		Free Elective	3
***		GEP Requirement*	3				
CHE	395	Professional Dev Seminar	1				
		Semester To	otal 17			Semester Tota	1 17
			Seni	or Year			
		Fall Semester	Credi	ts		Spring Semester	Credits
CHE		Chem Engr Lab II	2	CHE	435	Proc System Analy & Control	3
CHE		Des & Analy Chem Reactors	3	CHE	451	CHE Design II	3
CHE		CHE Design 1	3	***	***	Technical Elective*	3
***		Technical Elective ⁴	3	***		GEP Requirement*	3
* * *	***	GEP Requirement* Semester To	3	***	***	GEP Requirement (Interdisc Persp)*	2-3
		Semester 10	(a) 14			Semester Total	14-15
	115		Mi	nimum T	otal C	redit Hours Required for Graduation	125
Cours	ses requ	am requirements and footnotes: ired for Change of Degree Audit (CODA). CH 10	01 102 MA				
Grade	- 01 C- 0	or better required, E 115 requires satisfactory com	pletion (S).				
*Techr	nstry ele	ectives include: BCH 351, BCH 451, CH 335, CH ectives: BAE 322, BEC 462, BEC 463, BEC 488,	1437, CH 6	10, FS 402,	FS 502	2, PCC 461, PCC 464, PSE 335	
4/1.0	E 4/9.	CE 484, E 304, ECE 331, ECE 468, ECE 568, ISI	F 311 ISF 4	143 CHE 4	60 and	higher electives MAE 206 MAE 208 MAE	
314, N	1AE 40	6, MAE 421, MSE 201, MEA 479, NE 404, NE 4	19. PSE 42	5. TE 466			
To cor	nplete t	ucation Program (GEP) requirements and GEI he requirements for graduation and the General E	P Footnotes	ii auram the i	followi	nu catagoni cradu haure and an magister mar b	
Univer	rsity app	proved GEP course lists for each of the following	categories c	an be found	d ai	ing category credit nours and co-requisites must t	be satisfied.
http://c	Ducc.ncs	su edu/gep-courses. 6 credit hours selected from two different disciplin					
Choos	e from I	he University approved GEP Humanities course i	list				
Social	Science	es (6 credit hours selected from two different disc	iplines/cour	se prefixes))		
Choos	se 3 crea	dits from the University approved GEP Social Sc. 5 (or EC 201 or ARE 201), taken as part of the M	iences cour:	se list in a c	hsciplin	ne other than Economics.	
ine (1)	"I' Soci	al Sciences requirement.				credit hours needed to fulfill	
Health	& Exe	ercise Studies (2 credit hours - must include one l	HESF 100-I	evel course)		
Additi	onal B	he University approved GEP Health & Exercise S readth - (3 credit hours to be selected from the fo	Studies cour	se list		orp	
Choose	e from t	he Humanities/Social Sciences/Visual and Perform	ming Arts	iversity app	noved (JEF COURSE HSIS)	
Interd	isciplin	ary Perspectives (5-6 credit hours)					
The fo	llowing	he University approved GEP Interdisciplinary Pe- Co-Requisites must be satisfied to complete the	rspectives c General Ed	ourse list ucation Pro	gram re	quirements	
L	U.S.	Diversity (USD)					
	Ch	oose from the University approved GEP U.S. Dive eting the U.S. Diversity (USD) co-requisite.	ersity cours	e list or cho	oose a c	ourse identified on the approved GEP – course l	ists as
3	. Glol	bal Knowledge (GK)					
	C.h.	oose from the University approved GEP Global K eting the Global Knowledge (GK) co-requisite.	nowledge c	ourse list of	r choos	e a course identified on the approved GEP cours	se lists as
Б	. For	eign Language proficiency - Proficiency at the F	102 100	tie seatting	1.0	a meridian de la companya de la comp	

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

Chemical Engineering [14CHEBS Req Term Spring 2018]

			Fresh	nman Ye	ear		
		Fall Semester	Credi	ts		Spring Semester	Credits
CH		Chemistry, A Molecular Science ¹	3	CH	201	Chemistry - Quantitative Sci.	3
CH		General Chemistry Lab	1	CH	202	Quantitative Chem Lab	1
E		Introduction to Engr & Prob Solv ^{1,2}	1	MA	241	Calculus II ¹	4
E		Intro to Computing Environ ^{1,2}	1	PY	205	Physics for Engr & Sc 1 ¹	3
ENG		Academic Writing and Research ^{1,2}	4	PY		Physics for Engr & Sc I Lab ¹	1
MA		Calculus I ¹	4	E	102	Engr in the 21st Century (GEP IP)	2
HESI	:]**	Health & Exercise Studies	1	HES	***	Health & Exercise Studies	1
		Semester To	otal 15			Semester To	tal 15
		E # C		more Y	ear		
		Fall Semester	Credi		1222	Spring Semester	Credits
CH		Organic Chemistry I (or CH 225)	3	CH		Organic Chemistry II (or CH 227)	3
CH		Organic Chemistry I Lab (or CH 226)	1	CH		Organic Chemistry II Lab (or CH 228)	
CHE		Chemical Proc Prin ²	4	CHE		Chemical Proc Systems ²	3
MA		Calculus III ²	4	MA		Applied Differential Eq ²	3
EC	205	Economics (or EC 201 or ARE 201)*	3	PY		Physics Engr & Scientists II	3
				PY		Physics Engr & Scientists II Lab	
				***	***	GEP Requirement*	
		Semester To	otal 15			Semester To	tal 17
			Jun	ior Yea	ŕ		
		Fall Semester	Credi	ts		Spring Semester	Credits
CH	315	Quantitative Analysis	4	CH	***	Chemistry Elective ³	2
CHE	311	Transport Processes I ²	3	CHE	312	Transport Processes II	13
CHE	315	Chem Process Thermo	3	CHE	316	Thermo of Chem & Phase Eq	3
ECE	331	Prin Electrical Engr or		CHE		Chem Engr Lab I	4
MSE	201	Struct & Prop Engr Mat	3	***	***	Free Elective	3
***	***	GEP Requirement*	3				
CHE		Professional Dev Seminar	1				
		Semester To	otal 17			Semester Tot	tal 17
			Sen	ior Yea	r		
		Fall Semester	Credit			Spring Semester	Credits
CHE	331	Chem Engr Lab II	2	CHE	125	Proc System Analy & Control	
CHE		Des & Analy Chem Reactors	3	CHE		CHE Design II	3
CHE		CHE Design I	3	***	***	Technical Elective ⁴	3
k**	***	Technical Elective ⁴	3	***	***	GEP Requirement*	3
**	***	GEP Requirement*	3	***	***	GEP Requirement*	
		Semester To				Semester Tot	3 al
Majo	r/Progi	am requirements and footnotes:	Μ	linimun	n Total (Credit Hours Required for Graduatio	n 125
¹ Cour	ses requ	ired for Change of Degree Audit (CODA). CH 1 or better required, E 115 requires satisfactory con	01, 102; MA	A 141, 24	I; PY 205	, 206 must be completed with C or higher.	
3Chen	nistry el	ectives include: BCH 351, BCH 451, CH 335, CI	1437, CH 6	10, FS 40	2, FS 502	, PCC 461, PCC 464, PSE 335.	
⁴ Tech 477, (nical El CE 479,	ectives: BAE 322, BEC 462, BEC 463, BEC 488, CE 484, E 304, ECE 331, ECE 468, ECE 568, IS 6, MAE 421, MSE 201, MEA 479, NE 404, NE 4	BEC 562, H	BEC 577, 443, CHE	BIT 464, 460 and 1	BIT 563, BME 466, CE 373, CE 476, CE	
To co	mplete	ucation Program (GEP) requirements and GE the requirements for graduation and the General E proved GEP course lists for each of the following	Education Pro	ogram, th	e followin	g category credit hours and co-requisites must	be satisfied.
http://	ouce.nc	su.edu/gep-courses. 6 credit hours selected from two different discipl			ind at		
Choos	se from	the University approved GEP Humanities course	list .				
Socia	Scienc	es (6 credit hours selected from two different disc	ciplines/cour	rse prefixe	es)		
		edits from the University approved GEP Social So 05 (or EC 201 or ARE 201), taken as part of the N					
		ial Sciences requirement.	ngor reguire	cincinis, se	majica 5 c	real nours needed to juijin	
		ercise Studies (2 credit hours - must include one			se)		
Choos	se from	the University approved GEP Health & Exercise creadth - (3 credit hours to be selected from the f	Studies cour	rse list.		I'm Y	
Choos	se from	the Humanities/Social Sciences/Visual and Perfor	onowing Ur	iiversity a	ipproved (JEP course lists)	
		nary Perspectives (5-6 credit hours)	and and				
		the University approved GEP Interdisciplinary P					
		g Co-Requisites must be satisfied to complete the S. Diversity (USD)	General Ed	ucation P	rogram re	quirements:	
	CI	hoose from the University approved GEP U.S. Div	ersity cours	e list or c	hoose a ci	ourse identified on the approved GEP course	lists as
		eeting the U.S. Diversity (USD) co-requisite.					
		bal Knowledge (GK) hoose from the University approved GEP Global 1	Knowledge ,	course lie	or choose	e a course identified on the approved CED and	rse liste av
	me	eeting the Global Knowledge (GK) co-requisite.					ov 11313 US
0		reign Language proficiency - Proficiency at the	FL 102 leve	el is requi	red for gra	iduation	

GEP FORMAT B – CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Chemical Engineering

Current Degree Key: 14CHEBS

Effective Date of Revision: 1/2018

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math		
MA 141 (C-), MA 241(C-), MA 242	12	Mathematics (6 hours)
GRP 030 Differential Equations (MA 341 or MA 301) (C-)	3	
Sciences		
CH 101(C-), CH 102(C-)	4	Natural Sciences (4 hours)
PY 205(C-), PY 208	8	Natural Sciences (4 hours)
CH 201(C-), CH 202	4	
GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)	4	
GRP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224)	4	
CH 315		
GRP 032 Chemistry Elective (BCH 451; CH 437; TC 461; CH	4	
401and 402; CH 415 and (CH 230 or CH 232); CH 461; CH	4	
610; CH 615); FS 402		
CHE Major		
CHE 205 (C-)	4	
CHE 225 (C-)	3	
CHE 311 (C-)	3	
CHE 312	3	
CHE 315 (C-)	3	
CHE 316	3	
CHE 330	4	
CHE 331	2	
CHE 395	1	
CHE 435	3	
CHE 446	3	
CHE 450	3	
CHE 451	3	
Other Major		
GRP 031 (ECE 331 or MSE 201)	3	
GRP 034 Technical Electives (BAE 422; CE 213, 214, 215, 373,	6	
456, 476, 477, 484; CHE 460, 462; ECE 331; ISE 311, 443; MAE	Ŭ	
206, 208, 314, 406, 421; MSE 201, NE 404, 419; TC 401; TE 466;		
NPS 425		
Concentration Courses/Groups/Electives:		
ree Electives:		
EXC 901 Free Elective EXCEPT NOT		
CH 111, ECI 105, ENG 110, FLC 1**, FLE 1**, FLF 1**, FLG	3	
L**, FLH 1**, FLI 1**, FLJ 1**, FLK 1**, FLN 1**, FLP 1**, FLR		
, FLS 1, GRK 1**, LAT 1**, MA 100, MA 101, MA 103,		

Total credit hours under College Requirements:	7 hours	
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
<u>Orientation Course(s)</u> ; E 101, E 115 and E102	4	Technology Fluency Requirement
COLLEGE REQUIREMENTS:		
Total credit hours under Major Field of Study: Minimum 27 hours required in program area.	97 hours	
MA 107, MA 108, MA 111, MA 121, MA 131, MA 231, PY 211, PY 212)		

NCSU GENERAL EDUCATION PROGRAM REQUIREMENTS Courses in the Major and/or Minor may also fulfill a General Education requirement; however, a GEP category may not be subset to require a specific course from the category list. Required courses must be listed in the Major/College requirements. Specific courses should not be listed in any of the fields below other than ENG 101.		At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category. ² Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴ Co-requisite is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements
English 101 (C-)	4	ENG 101
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	21 hours	
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity* or Global Knowledge** co-requisite are marked on course lists with asterisks as indicated.

U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category
Foreign Language Proficiency	n/a	FL_102
The following requirements must be satisfied within the College/Program:		
Advanced Communication	X	Satisfied by College/Program Requirements
Technology Fluency	X	Satisfied by College/Program Requirements

Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	125 Total hours	Graduation requirements include: (1) 2.0 overall GPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all CHE designated courses, or a (C-) or higher in all CHE designated courses.
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College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive. Page Hall Raleigh. NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

- TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs
- FROM: Dr. Lisa Bullard, Departmental Curriculum Chair, Chemical Engineering Department
- **RE:** Curriculum Revision for 14CHE-14CHEBMF to specify the GEP (IP) Course, E102: Engineering In the 21st Century.

By means of this memorandum and the attached documents, the Chemical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

SIGNATURES

RECOMMENDED BY:	Carta S. Erdkin HEAD, DEPARTMENT PROGRAM	Nov 15, 2017 Date:
ENDORSED BY:	CHARACOLLEGE COURSES & CURRICULA COMMITTEE	DATE
APPROVED BY:	COILEGE DEAN - Favelle	12/04/17 DATE
	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

APPROVAL DATE

Chemical Engineering (BS): Biomanufacturing Sciences (14CHEBMF)

Freshman Year

Fall Semester	Credit	Spring Semester	Credit
CH 101 Chemistry, A Molecular Science ^{4, 6}	3	CH 201 Chemistry – Quantitative Sci. ^{1, 6}	3
CH 102 General Chemistry Lab ^{4, 6}	1	CH 202 Quantitative Chem Lab ⁶	1
E 101 Introduction to Engr & Prob Solv ¹	1	MA 241 Calculus II ⁴	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engr & Sc I ⁴	3
ENG 101 Academic Writing and Research ¹	4	PY 206 Physics for Engineer & Scientists I Lab ⁴	1
MA 141 Calculus I ⁴	4	EC 205 Economics (or EC 201 or ARE 201)*	3
HES_*** Health & Exercise Studies Course	21	HES_*** Health & Exercise Studies Course	1
	15		16

Sophomore Year

Fall Semester	Credit	Spring Semester	Credit
BEC 220 Intro Biomanufacturing	1	BIO 183 Intro Biology: Cellular & Molecular	· 4
CH 221 Organic Chemistry I ^{5, 1}	3	CH 223 Organic Chemistry II ⁵	3
CH 222 Organic Chemistry I Lab ⁵	1	CH 224 Organic Chemistry II Lab ⁵	1
CHE 205 Chemical Proc Prin ¹	4	CHE 225 Chemical Proc Systems ¹	3
MA 242 Calculus III ¹	4	MA 341 Applied Differential Eq ¹	3
PY 208 Physics Engr & Scientists I	3	GEP Requirement*	3
PY 209 Physics for Engineer & Scientists II Lab	1		

17

Junior Year

Fall Semester	Credit	Spring Semester	Credit
BCH 451 Intro Biochemistry	4	BBS 426 Industrial Microbiology & Bioman Lab	4
BEC 363 Found. of Recomb Microorg for Biomanuf.	2	BEC 330 Prin & Applications of Biosparations	3
BEC 463 Ferm. of Recomb Microorg	2	CHE 312 Transport Processes II	1
CHE 311 Transport Processes I ¹	3	CHE 316 Thermo of Chem & Phase Eq	3
CHE 315 Chem Process Thermo ¹	3	Free Elective	3
GEP Requirement*	3	GEP Requirement*	3
	17		17

Senior Year

Fall Semester	Credit	Spring Semester	Credit
BEC 436 Downstream Proc of Biomaterials	2	Biomanufacturing Elective ²	2
BEC 480 Large Scale Fermentation OR BEC 485 Large Scale Recovery & Purification	2	CHE 435 Proc System Analy & Control	3
CHE 395 Professional Dev Seminar	1	CHE 451 CHE Design II	3
CHE 447 Bioreactor Engineering	3	Bioethics Course (GEP IP Req*) ³	3
CHE 450 CHE Design I	3	GEP Requirement*	2-3
GEP Requirement*	3		
	14		13-14

Minimum Credit Hours Required for Graduation $*^{i,J,K}$:

125

Major/Program requirements and footnotes

¹ Minimum grade of (C-) required.

² The Biomanufacturing elective course must be selected from the following list: BEC 440, 441, 462, 475, 480, 483, 485, 488, 497, 541. NOTE: Course selected from the choice of either BEC 480/485 cannot be used to satisfy this requirement (i.e. counted twice).

³ The bioethics course must be selected from: IDS 201, 303; STS 302, 304, 320; STS(PHI) 325

⁴ Grade of C (2.0) or higher required.

⁵ CH 225/226 may substitute for CH 221/222 and CH 227/228 may substitute for CH 223/224.

⁶ CH 103/104 may substitute for CH 101/102 and CH 203/204 may substitute for CH 201/202.

*General Education Program (GEP) requirements and GEP Footnotes

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at <u>https://oucc.dasa.ncsu.edu/general-education-program/.</u>

A. Mathematical Sciences (6 credit hours – one course with MA or ST prefix) Choose from the University approved GEP Mathematical Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:

B. Natural Sciences (7 credit hours – include one laboratory course or course with a lab) Choose from the University approved GEP Natural Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:

C. Humanities (6 credit hours selected from two different disciplines/course prefixes)
 Choose from the University approved GEP Humanities course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:
 D. Social Sciences (3 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Social Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement: EC 205, EC 201, or ARE 201

E. Health & Exercise Studies (2 credit hours – at least one 100-level Health & Exercise Studies Course)

Choose from the University approved GEP Health & Exercise Studies course list.

F. Additional Breadth $-(3 \text{ credit hours to be selected from the following checked University approved GEP course lists)$

X Humanities/Social Sciences/Visual and Performing Arts or _____ Mathematical Sciences/Natural Sciences/Engineering

G. Interdisciplinary Perspectives (5-6 credit hours)

2 credits to be selected from the approved GEP Interdisciplinary Perspectives list. Course chosen to meet the Biotech Minor Group E requirement in the Major satisfies 3 credit hours of the 5 credit hours needed to fulfill the GEP Interdisciplinary Perspectives requirement. H. Introduction to Writing (4 credit hours satisfied by completing ENG 101 with a C- or better)

The following **Co-Requisites** must be satisfied to complete the General Education Program requirements

I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite. The following course(s) completed as part of the Major requirements may fulfill this

requirement:

J. Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite. The following course(s) completed as part of the Major requirements may fulfill this requirement:

K. Foreign Language proficiency – Proficiency at the FL_102 level is required for graduation.

<u>B. S. in Chemical Engineering</u> <u>Biomanufacturing Sciences Concentration</u>

Fall Semester CH 101 (or 103) General Chemistry I ^{1a} CH 102 (or 104) General Chemistry I Lab ^{1a} E 101 Introduction to Engr & Prob Solv ^{1a} E 115 Intro to Computing Environ ENG 101 Academic Writing & Research ^{1a} MA 141 Calculus I ^{1a} HESx 1** Fitness & Wellness Course*	Credit 3 1 1 1 4 4 1 1 1 5	Spring Semester CH 201 (or 203) General Chemistry II ^{1b} CH 202 (or 204) General Chemistry II Lab MA 241 Calculus II ^{1a} PY 205 Physics for Engr & Sc 1 ^{1a} PY 206 Physics for Engr & Sc I Lab ^{1a} EC 205 Econ (or EC 201 or ARE 201)* HESx (100 or 200 level) Elective* E 102 Engr in the 21 st century (GEP IP)	Credit 3 1 4 3 1 3 1 3 1 3 1 3 1 8
Fall Semester BEC 220 Intro Biomanufacturing CH 221 (or 225) Organic Chemistry I ^{1b} CH 222 (or 226) Organic Chemistry I Lab CHE 205 Chemical Proc Prin ^{1b} MA 242 Calculus III ^{1b} PY 208 Physics Engr & Scientists II PY 209 Physics Engr & Scientists II Lab	Credit 1 3 1 4 4 3 1 1 7 1 7 1 7 1 7 1 7 1 7 1 7 1 1 7 1	Spring Semester BIO 183 Intro Bio: Cellular & Molecular CH 223 (or 227) Organic Chemistry II CH 224 (or 228) Organic Chemistry II Lab CHE 225 Chemical Proc Systems ^{1b} MA 341 Applied Differential Eq ^{1b} Removed GEP	Credit 4 3 1 3 3 1 1 1 1 1 1 1 1 1 1
Fall Semester BCH 451 Intro Biochemistry BEC 363 Found Recomb Micro for Biom BEC 463 Ferm of Recomb Microorg CHE 311 Transport Processes 1 ¹ CHE 315 Chem Process Thermo ¹ GEP Requirement*	Credit 4 2 2 3 3 <u>3 3 1 7 </u>	Spring Semester BEC 426 Industrial Micro & Bioman Lab BEC 330 Prin & Applications of Biosep CHE 312 Transport Processes II CHE 316 Thermo of Chem & Phase Eq Free Elective GEP Requirement*	Credit 2 2 3 3 3 <u>3 3 16 </u>
Fall Semester BEC 436 Downstream Proc of Biomat BEC 480 Large Scale Fermentation OR BEC 485 Large Scale Recov & Purif CHE 395 Professional Dev Seminar CHE 447 Bioreactor Engineering CHE 450 CHE Design I GEP Requirement*	Credit 2 2 1 3 3 <u>3 3 1 4 </u>	Spring Semester Biomanufacturing Elective ² CHE 435 Proc System Analy & Control CHE 451 CHE Design II Bioethics Course (GEP IP Req*) ³ GEP Requirement*	Credit 2 3 3 <u>2-3</u> 13-14

Minimum Credit Hours Required for Graduation*:

125

Major/Program requirements and footnotes:

^{1a} Must be completed with grade of (C) or higher.

^{1b} Must be completed with grade of (C-) or higher.

² The Biomanufacturing elective course must be selected from the following list: BEC 440/540, BEC 441/541, BEC/CHE 462, BEC 475/575, BEC 480/580, BEC/BME 483, BEC 485/585, BEC/CHE 488, BEC 497, BIT 466. NOTE: Course selected from the choice of either BEC 480/485 cannot be used to satisfy this requirement (i.e. counted twice).

³ The bioethics course must be selected from: IDS 201, 303; STS 302, 304; STS(PHI) 325

* General Education Program (GEP) requirements:

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html.

PHYSICAL EDUCATION - 2 hours to be selected from the approved GEP Physical Education list.

a. One fitness and wellness course (any PE 100-level course).

b. One additional credit hour of PE activity courses.

<u>HUMANITIES</u> - 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

<u>SOCIAL SCIENCES</u> - 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

<u>ADDITIONAL BREADTH</u> - 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

<u>INTERDISCIPLINARY PERSPECTIVES</u> - 2 credits to be selected from the approved GEP Interdisciplinary Perspectives list. Course chosen to meet the Bioethics course requirement in the Major satisfies 3 credit hours of the 5 credit hours needed to fulfill the GEP Interdisciplinary Perspectives requirement.

Co-requisites:

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

Foreign Language proficiency at the FL_102 level will be required for graduation.

GEP FORMAT B – CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Chemical Engineering, Biomanufacturing Sciences Concentration

Current Degree Key: 14CHEBS-14CHEBMF

Effective Date of Revision: 1/2018

MAJOR FIELD OF STUDY REQUIREMENTS: Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
<u>Aath</u>	12	A death a weating (C. harves)
1A 141(C-), MA 241(C-), MA 242	12	Mathematics (6 hours)
1A 341 (C-)	3	
tiences		
H 101(C-), CH 102(C-)	4	Natural Sciences (4 hours)
Y 205(C-), PY 208	8	Natural Sciences (4 hours)
H 201(C-), CH 202	4	
RP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)	4	
RP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224)	4	
RP 035 BIO 183 or ZO 160	4	
CH 451	4	
HE Major		
<u>HE Major</u> HE 205(C-)	4	
HE 225(C-)	3	
HE 311(C-)	3	
HE 312	3	
HE 315(C-)	3	
HE 316	3	
HE 395	1	
HE 435	3	
HE 447	3	
HE 450	3	
HE 450	3	
	5	
Other Major		
BEC 220	1	
EC 320	2	
EC 330	2	
EC 420	2	
EC 426	2	
BS 426	2	
RP 037 Bioethics Elective (IDS 201, IDS/NR 303; PHI 325; STS 302,	3	GEP Interdisciplinary Perspectives category
04, 320, 325)	5	l l l l l l l l l l l l l l l l l l l
RP 038 BEC 480 or 485	2	
RP 039 Blomanufacturing Elective (BEC 440, 442, 480, 485, 495,	2	
97; CHE 463; BME 495; BIT 466, 470)	-	
oncentration Courses/Groups/Electives:		
ree Electives:		
XC 901 Free Elective EXCEPT NOT		
CH 111, ECI 105, ENG 110, FLC 1**, FLE 1**, FLF 1**, FLG	3	
, FLH 1, FLI 1**, FLJ 1**, FLK 1**, FLN 1**, FLP 1**, FLR		
••, FLS 1••, GRK 1••, LAT 1••, MA 100, MA 101, MA 103,		

MA 107, MA 108, MA 111, MA 121, MA 131, MA 231, PY 211, PY 212)		
Total credit hours under Major Field of Study: Minimum 27 hours required in program area.	100 hours	
COLLEGE REQUIREMENTS:		
Orientation Course(s): E 101, E 115 and <mark>E102</mark>	4	Technology Fluency Requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 hours	

NCSU GENERAL EDUCATION PROGRAM REQUIREMEN Courses in the Major and/or Minor may also fulfill a General Educ requirement; however, a GEP category may not be subset to requi specific course from the category list. Required courses must be list the Major/College requirements. Specific courses should not be listed in any of the fields below of than ENG 101.	ation ire a sted in	At least one of the following must be listed: ³ Choose course(s) from the University Approved GEP course list for this category. ³ Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴ Co-requisite is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.
General Education Program Requirements:	Credit	How will the GEP requirement be met?
Minimum 39-40 hrs	hours	(choose applicable statement from 1-6 listed above)
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Mojor moy double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements ore satisfied by Major course requirements
Natural Sciences (minimum of 7 credits) (at least 1 lobarotory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	×	Minimum requirements ore satisfied by Major course requirements
English 101 (C-)	4	ENG 101
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category
Social Sciences (minimum of 6 credits) (from two different disciplines) Caurse(s) in the Major may double-count to satisfy this requirement ond also satisfy bath the Global Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the cotegory.
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Mojor/College requirements connot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Glabol Knawledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) In the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	21 hou	 Required Departmental course in Bioethics will satisfy 3 hours of Humanities, Additional Breadth, or Interdisciplinory Perspectives category.
GEP Co-Requisites:		Courses token in the Major, GEP, or Minar may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity® or Glabai Knowledge®® co-requisite are marked on course lists with asterisks as indicated.

U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category
Foreign Language Proficiency	n/a	FL_102
The following requirements must be satisfied within the College/Program:		
Advanced Communication	X	Satisfied by College/Program Requirements
Technology Fluency	X	Satisfied by College/Program Requirements

Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	125 Total hours	Graduation requirements include: (1) 2.0 overall GPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all CHE designated courses, or a (C-) or higher in all CHE designated courses.
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College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive, Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs FROM: Dr. Lisa Bullard, Departmental Curriculum Chair, Chemical Engineering Department

RE: Curriculum Revision for 14CHE-14CHEBIO to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Chemical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

 SIGNATURES

 RECOMMENDED BY:
 Cutur S. Euclide
 Nov 15, 2017

 HEAD, DEPARTMENTPROGRAM
 Date

 ENDORSED BY:
 Structure
 Structure

 Contraction
 Structure
 Date

 Date
 Structure
 Date

 Date
 Structure
 Date

 Date
 Date
 Date

 Approved By:
 Chair, University Courses & Curricula Committee
 Date

 Dean of Undergraduate Academic Programs
 Date

APPROVAL DATE

6. FORMAT B - CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Chemical Engineering, Biomolecular Concentration

Current Degree Key: 14CHEBS- 14CHEBIO

Effective Date of Revision: 01/2018

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate If course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math		in open requirement
MA 141 (C-), MA 241 (C-), MA 242 (C-)	12	Mathematics (6 hours)
GRP 031 Differential Equations (MA 341 or MA 301)(C-)	3	
Sciences	- I	
CH 101 (C-), CH 102(C-)	4	Natural Sciences (4 hours)
PY 205(C-), PY 208	8	
CH 201(C-), CH 202		Natural Sciences (4 hours)
GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)	4	
GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)	4	
GRP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224)	4	
GRP 030 BIO 183	4	
GRP 032 BIT 410	4	
GRP 033 BIT Laboratory Modules (BIT 462, 464, 466, 467,	4	
468, 481, 569)		
BCH 451	4	
CHE Major		
CHE 205(C-)	4	
CHE 225(C-)	3	
CHE 311(C-)	3	
CHE 312	3	
CHE 315(C-)	3	
CHE 316	3	
CHE 330	4	
CHE 395	1	
CHE 435	3	
CHE 447	3	
CHE 450	3	
CHE 450	3	
CHE 497	3	
CHE 551	3	
GRP 037 Bioethics Elective (IDS 201, 303; PHI 325; STS 302, 304,	3	
320, 325)	-	
Concentration Courses/Groups/Electives:		
Technical Elective:		
BEC 330, BEC (CHE) 462, BEC (CHE) 463, BEC 480, BEC 485, BEC	2	
488, BBS 426, BIT 464, PSE 425, CE 373, ECE 331, MSE 201, NE 419, TE 466.	2.	

Total credit hours under Major Fleid of Study: Minimum 27 hours required in program area.	102 hours	
COLLEGE REQUIREMENTS:		
Orientation Course(s): E 101, E 115 and E102	4	Technology Fluency Requirement
<u>Other:</u> (ex: Adv Communication courses) Economics Elective (EC 205, EC201, or ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 hours	

NCSU GENERAL EDUCATION PROGRAM REQUIREMENTS Courses in the Major and/or Minor may also fulfill a General Educati requirement; however, a GEP category may not be subset to require specific course from the category list. Required courses must be liste the Major/College requirements. Specific courses should not be listed in any of the fields below othe than ENG 101.		At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category. ³ Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴ Co-requisite is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.	
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)	
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) In the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements	
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	×	Minimum requirements are satisfied by Major course requirements	
English 101 (C-)	4	ENG 101	
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to sotisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category	
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.	
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts	
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category	
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category	
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	18 hours	Required Departmental course in Bloethics will satisfy 3 hours of Humanities, Additional Breadth, or Interdisciplinary Perspectives category.	

GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity® or Global Knowledge®® co-requisite are marked on course lists with asterisks as indicated.
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category
Foreign Language Proficiency	n/a	FL_102
The following requirements must be satisfied within the College/Program:		
Advanced Communication	X	Satisfied by College/Program Requirements
Technology Fluency	X	Satisfied by College/Program Requirements

Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	127 Total hours	Graduation requirements include: (1) 2.0 overalliGPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all CHE designated courses, or a (C-) or higher in all CHE designated courses.
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Chemical Engineering (BS): Biomolecular (14CHEBS-14CHEBIO)

Freshman Year

Fall Semester	Credit	Spring Semester	Credit
CH 101 Chemistry A Molecular Sci. ¹	3	CH 201 Chemistry – Quantitative Sci. ⁵	3
CH 102 General Chemistry Lab ¹	1	CH 202 Quantitative Chem. Lab	1
E 101 Intro to Engr & Prob Solv ¹	1	MA 241 Calculus II ¹	4
E 115 Intro to Computing Environ.	1	PY 205 Physics for Engineers & Scientists I ¹	3
ENG 101 Acad. Writing & Research ¹	4	PY 206 Physics for Engineer & Scientists I Lab	1
MA 141 Calculus I ¹	4	EC 205 Economics (or EC 201 or ARE 201*)	3
HES_*** Health & Exercise Studies Course	* 1	HES_*** Health & Exercise Studies Course*	1
	15		16

Sophomore Year

Fall Semester	Credi	spring Semester	Credit
CH 221 Organic Chemistry I ⁶	3	CH 223 Organic Chemistry II ⁶	3
CH 222 Organic Chemistry I Lab ⁶	1	CH 224 Organic Chemistry II Lab ⁶	1
CHE 205 Chemical Proc. Princ ⁵	4	CHE 225 Chem. Proc. Systems⁵	.3
MA 242 Calculus III ⁵	4	MA 341 Applied Differential Equations ⁵	3
PY 208 Physics Engineers & Scientists II	3	BIO 183 Intro Biology: Cellular & Molecular Bio.	4
PY 209 Physics for Engineer & Scientists II Lab	1	GEP Requirement*	3
	16		17

Junior Year

Fall Semester	Credit	Spring Semester	Credit
BCH 451 Intro Biochemistry	4	BIT Lab Modules ²	4
CHE 311 Transport Processes I ⁵	3	CHE 312 Transport Processes II	3
CHE 315 Chem. Process Thermo ⁵	3	CHE 316 Thermo of Chem & Phase Eq	3
BIT 410 Manipulation ReDNA (4 cr.) 4	CHE 330 Chem Engr Lab I	4
GEP Requirement*	3	GEP Requirement *	2-3
CH 395 Professional Dev. Seminar	1		
	18		16-17

Senior Year

Fall Semester	Credit	Spring Semester	Credit
CHE 447 Bioreactor Engineering	3	CHE 435 Proc. System Analy & Control	3
CHE 450 CHE Design I	3	CHE 451 CHE Design II	3
CHE 497 CHE Engr Projects I	3	CHE 551 Biochemical Engineering	3
GEP Requirement*	3	Technical Elective ⁴	2-3
Biotech Minor Group E (GEP IP req*)	³ 3	GEP Requirement*	3
	15		14-15

Minimum Credit Hours Required for Graduation*,1,1,K:

127

Major/Program requirements and footnotes

¹ Minimum grade of C- required.

² Students must take two 2-hour BIT lab modules from the following lists. In addition, selected BIT 495 Special Topics Courses may be approved by the Biotechnology advisor.

- BIT Lab Module Group 1 (2 cr): BIT/CHE 464, BIT 467/567, BIT 474/574, BIT/CH 572
- BIT Lab Module Group 2 (2 cr): Any course in Group 1 + BIT 466/566, BIT 471/571

³ Biotech Minor Group E must be selected from: IDS 201, 303; STS 302, 304, 320; STS/PHI 325
 ⁴ Technical Elective must be selected from: BEC 330; BEC(CHE) 462, BEC(CHE) 463; BEC 480, 485, 488; BBS 426; CHE/BIT 464; PSE 425; CE 373, ECE 331, MSE 210, NE 419, PSE 425, TE 466.

⁵ Grade of C (2.0) or higher required.

⁶ CH 225/226 may substitute for CH 221/222 and CH 227/228 may substitute for CH 223/224.

*General Education Program (GEP) requirements and GEP Footnotes

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at <u>https://oucc.dasa.ncsu.edu/general-education-program/</u>.

A. Mathematical Sciences (6 credit hours – one course with MA or ST prefix)

Course(s) completed as part of the Major requirements may fulfill part or all of this requirement.

B. Natural Sciences (7 credit hours – include one laboratory course or course with a lab) *Course(s) completed as part of the Major requirements may fulfill part or all of this requirement.*

C. Humanities (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Humanities course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement:

D. Social Sciences (3 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Social Sciences course list or the following course(s) if completed as part of the Major requirements may fulfill part or all of this requirement: EC 205, EC 201, or ARE 201

E. Health & Exercise Studies (2 credit hours – at least one 100-level Health & Exercise Studies Course)

Choose from the University approved GEP Health & Exercise Studies course list.

F. Additional Breadth – (3 credit hours to be selected from the following checked University approved GEP course lists)

X Humanities/Social Sciences/Visual and Performing Arts

G. Interdisciplinary Perspectives (5-6 credit hours)

2 credits to be selected from the approved GEP Interdisciplinary Perspectives list. Course chosen to meet the Biotech Minor Group E requirement in the Major satisfies 3 credit hours of the 5 credit hours needed to fulfill the GEP Interdisciplinary Perspectives requirement. **H. Introduction to Writing** (4 credit hours satisfied by completing ENG 101 with a C- or better)

The following Co-Requisites must be satisfied to complete the General Education Program

requirements I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) corequisite. The following course(s) completed as part of the Major requirements may fulfill this requirement:

J. Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) corequisite. The following course(s) completed as part of the Major requirements may fulfill this requirement:

K. Foreign Language proficiency – Proficiency at the FL_102 level is required for graduation.

Bachelor of Science in Chemical Engineering Biomolecular Engineering Concentration

Fall Semester	Credit	Spring Semester	Credit
CH 101 (or 103) General Chemistry I1a	3	CH 201 (or 203) General Chemistry II ^{1b}	3
CH 102 (or 104) General Chemistry I Lab ^{1a}	1	CH 202 (or 204) General Chemistry II Lab	1
E 101 Introduction to Engr & Prob Solv ^{1a}	1	MA 241 Calculus II ^{1a}	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engr & Sc I ^{1a}	3
ENG 101 Academic Writing & Research ^{1a}	4	PY 206 Physics for Engr & Sc I Lab ^{1a}	1
MA 141 Calculus I ^{1a}	4	EC 205 Econ (or EC 201 or ARE 201)*	3
HESx 1** Fitness & Wellness Course*	1	HESx (100 or 200 level) Elective*	
	15	E102 Engr in the 21st century (GEP IP)	<u>1</u> 3
			18
Fall Semester	Credit	Spring Semester	Credit
CH 221 (or 225) Organic Chemistry I ^{1b}	3	CH 223 (or 227) Organic Chemistry II	3
CH 222 (or 226) Organic Chemistry I Lab	1	CH 224 (or 228) Organic Chemistry II Lab	1
CHE 205 Chemical Proc Prin ^{1b}	4	CHE 225 Chemical Proc Systems ^{1b}	3
MA 242 Calculus III ^{1b}	4	MA 341 Applied Differential Eq ^{1b}	3
PY 208 Physics Engr & Scientists II	3	BIO 183 Intro Biol: Cellular & Molecular	4
PY 209 Physics Engr & Scientists II Lab	1	GEP Requirement*	3
	16		<u>1</u> 7
Fall Semester	Credit	Spring Semester	Credit
BCH 451 Intro Biochemistry	4	BIT *** BIT Lab Module – Group 1 ² *	2
CHE 311 Transport Processes I ^{1b}	3	BIT *** BIT Lab Module – Group 2^2 *	2
CHE 315 Chem Process Thermo ^{1b}	3	CHE 312 Transport Processes II	3
BIT 410 Manipulation ReDNA (4 cr.)	4	CHE 316 Thermo of Chem & Phase Eq	3
GEP Requirement*	3	CHE 330 Chem Engr Lab I	4
CHE 395 Professional Dev Seminar	1	GEP Requirement*	2-3
	18		16-17
Fall Semester	Credit	Saving Sometan	0
		Spring Semester	Credit
CHE 447 Bioreactor Engineering	3	CHE 435 Proc System Analy & Control	3
CHE 450 CHE Design I	3	CHE 451 CHE Design II	3
CHE 497 Chemical Engr Projects	3	CHE 551 Biochemical Engineering	3 <mark>3</mark>
GEP Requirement*	3	Technical Elective ⁴	3
Biotech Minor Grp E (GEP IP req^*) ³	3		-
	15		12
Minimum Credit Hours Required for Graduat	ion*:		127

3

Major/Program requirements and footnotes:

^{1a} Must be completed with grade of (C) or higher.

^{1b} Must be completed with grade of (C-) or higher.

² Students must take two 2-hour BIT lab modules from the following list:

Group 1 (Engineering-Based Elective): BIT 464, 467, 477, 495 (from the group of: Genetic Engineering of Yeast and Fungi, Genome Engineering, Virus Biotechnology, Yeast Metabolic Engineering, Immunology Methods, Confocal Microscopy, Next Generation DNA Forensics, High Level Throughput Discovery, or CRISPR Tech.), 572, 574

Group 2: <u>Any course in Group 1 above</u> + BIT 466, 471, 478, 495 (from the group of: Computational Biology, mRNA, Gene Manipulation in Zebrafish, Mapping the Brain, Epigenetics, Insect Genomes or Stem Cells).

³ Biotech Minor Group E must be selected from: IDS 201, 303; STS 302, 304; STS(PHI) 325. If another IP GEP course has already been taken, BIT 501 (1 hr) can satisfy the Biotech Minor Group E requirement.
 ⁴ Technical Elective must be selected from: any CHE course numbered CHE 460 or above, including CHE 596 special topics; BEC 330, BEC(CHE) 462, BEC(CHE) 463, BEC 480, BEC 485, BEC 488, BBS 426, any Group I BIT course, PSE 425, CE 373, ECE 331, MSE 201, NE 419, TE 466.

*General Education Program (GEP) requirements:

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html

<u>PHYSICAL EDUCATION</u> - 2 hours to be selected from the approved GEP Physical Education list.

a. One fitness and wellness course (any PE 100-level course).

b. One additional credit hour of PE activity courses.

<u>HUMANITIES</u> - 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

<u>SOCIAL SCIENCES</u> - 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

<u>ADDITIONAL BREADTH</u> - 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

<u>INTERDISCIPLINARY PERSPECTIVES</u> - 2 credits to be selected from the approved GEP Interdisciplinary Perspectives list. Course chosen to meet the Biotech Minor Grp E requirement in the Major satisfies 3 credit hours of the 5 credit hours needed to fulfill the GEP Interdisciplinary Perspectives requirement.

Co-requisites:

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.



College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive. Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Lisa Bullard, Departmental Curriculum Chair, Sustainable Engineering, Energy and Environment

RE: Curriculum Revision for 14CHEBS-14CHEHON to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Chemical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

	SIGNATURES	
RECOMMENDED BY:	Carta S. Erdkind HEAD, DEPARTMENT PROGRAM	Nov 15, 2017 Date
ENDORSED BY:	Chair, College Courses & Curricula Committee	DATE
	COILLEGE DEAN . Favelle	12/04/17 Date
APPROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	Date
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	Date

APPROVAL DATE

Chemical Engineering (BS): Honors Program (14CHEBS-14CHEHON)

Freshman Year

Fall Semester	Credit	Spring Semester	Credit
CH 101 Chemistry, A Molecular Science ^{7,9}	3	CH 201 Chem Quantitative Science ^{1,9}	3
CH 102 General Chemistry Lab ^{7,9}	1	CH 202 Quantitative Chem. Lab ⁹	1
E 101 Introduction to Engr & Prob Solv ¹	1	MA 241 Calculus II ⁷	4
E 115 Intro to Computing Envir	1	PY 205 Physics for Engineering & Scientists I ⁷	4
ENG 101 Academic Writing and Research ¹	4	PY 206 Physics for Engineers & Scientists Lab ⁷	1
MA 141 Calculus I ⁷	4	EC 205 Economics (or EC 201 or ARE 201)	3
HES_***Health & Exercise Studies Course*	1	*HES_***Health & Exercise Studies Course*	1
	15		16

Sophomore Year

Fall Semester	Credit	Spring Semester	Credit
CH 221 Organic Chemistry I ^{8, 1}	3	CH 223 Organic Chemistry II ⁸	3
CH 222 Organic Chemistry Lab ⁸	1	CH 224 Organic Chemistry II Lab ⁸	1
CHE 205 Chemical Process Prin ¹	4	PY 208 Physics for Engineers & Scientists II	3
MA 242 Calculus III ¹	4	PY 209 Physics for Engineers & Scientists II Lab	1
GEP Requirement*	3	CHE 225 Chemical Proc Systems ¹	3
		MA 341 Applied Differential Eqns ¹	4
		GEP Requirement*	3
	15		17

Junior Year

Fall Semester	Credit	Spring Semester	Credit
CH 315 Quantitative Analysis	3	CH *** Chemistry Elective ³	4
CH 316 Quantitative Analysis Lab	1	CHE 312H Transport Processes II	3
CHE 311H Transport Processes I	3	CHE 316 Thermo of Chem & Phase Eq	3
CHE 315 Chem. Process Thermo	3	CHE 330 Chem Engr Lab I	4
MA *** Mathematics Elective ²	3	ENG 333 Comm for Science and Research	n 3
GEP Requirement*	3		
CHE 395 Professional Dev Semina	r 1		
	17		17

Senior Year

Fall Semester	Credit	Spring Semester	Credit
CHE 497 Chem Engr Projects	3	CHE 435 Proc Sys Analy & Control	3
CHE 446 Des & Analy Chem. React	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	CHE *** Honors Electives ⁵	3
CHE 7** CHE Elective ⁴	3	GEP Requirement*	3
GEP Requirement*	3	GEP IP Requirement	2-3
		CHE 495 Honors Thesis Prep ⁶	1
	15		15-16

Minimum Credit Hours Required for Graduation:

Major/Program Requirements and footnotes

¹ Minimum grade of (C-) required.

² Math electives include: MA 401, 402, 405, 427, 501.

³ Chemistry electives include: PCC 464: Chemistry of Polymeric Materials; CH 437: Physical Chemistry; BCH 351 General Biochemistry; BCH 451: Principles of Biochemistry; FS 402: Chemistry of Food and Bioprocessed Materials; CH 610: Special Topics in Chemistry ⁴ CHE 7xx includes CHE 711, 713, 715, 717.

⁵ Honors electives include CHE 460 and above, CHE 5xx, CHE 7xx.

⁶ An honors thesis is required for completion of the Honors Program.

⁷ Grade of C (2.0) or higher required.

⁸ CH 225/226 may substitute for CH 221/222 and CH 227/228 may subsitute for CH 223/224.

⁹ CH 103/104 may substitute for CH 101/102 and CH 203/204 may substitute for CH 201/202

*General Education Program (GEP) requirements

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at <u>https://oucc.dasa.ncsu.edu/general-education-program/.</u>

Health & Exercise Studies – 2 hours to be selected from the approved GEP Health & Exercise Studies list.

- 1. One fitness and wellness course (any Health & Exercise Studies 100-level course).
- 2. One additional credit hour of Health & Exercise Studies activity courses.

HUMANITIES– 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

SOCIAL SCIENCES – 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

ADDITIONAL BREADTH – 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

INTERDISCIPLINARY PERSPECTIVES – 5 credits to be selected from the approved GEP Interdisciplinary Perspectives list.

Co-requisites

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

Bachelor of Science in Chemical Engineering Honors Program_ 14CHEBS-14CHEHON [Req Term Spring 2018]

Fall Semester	Credit	Spring Semester	Credit
CH 101 (or 103) General Chemistry 1 ^{1a}	3	CH 201 (or 203) General Chemistry II ^{1b}	3
CH 102 (or 104) General Chemistry 1 Lab ^{1a}	1	CH 202 (or 204) General Chemistry II Lab	1
E 101 Introduction to Engr & Prob Solv ^{1a}	1	MA 241 Calculus II ^{1a}	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engr & Sc I ^{1a}	3
ENG 101 Academic Writing and Research ^{1a}	4	PY 206 Physics for Engr & Sc I Lab ^{1a}	1
MA 141 Calculus I ^{1a}	4	EC 205 Econ (or EC 201 or ARE 201)*	3
HESx 1** Fitness & Wellness Course*	<u>1</u>	HESx (100 or 200 level) Elective*	1
	15	E102 Engr in the 21 st Century	2
			18

Fall Semester	Credit	Spring Semester	Credit
CH 221 (or 225) Organic Chemistry 1 ^{1b}	3	CH 223 (or 227) Organic Chemistry II	3
CH 222 (or 226) Organic Chemistry I Lab	1	CH 224 (or 228) Organic Chemistry II Lab	1
CHE 205 Chemical Proc Prin ^{1b}	4	CHE 225 Chemical Proc Systems ^{1b}	3
MA 242 Calculus III ^{1b}	4	MA 341 Applied Differential Eq ^{1b}	3
GEP Requirement*	<u>3</u>	PY 208 Physics Engr & Scientists II	3
	15	PY 209 Physics Engr & Scientists II Lab	1
		GEP Requirement*	<u>3</u>
			17

Fall Semester	Credit	Spring Semester
CH *** Chemistry Elective ³	4	CH 315 Quantitative Analysis
CHE 311H Transport Processes I ^{1b}	1	CH 316 Quantitative Analysis Lab
CHE 315 Chem Process Thermo ^{1b}	3	CHE 312H Transport Processes II
Mathematics Elective ²	3	CHE 316 Thermo of Chem & Phase Eq
GEP Requirement*	3	CHE 330 Chem Engr Lab I
CHE 395 Professional Dev Seminar	3	ENG 333 Comm for Science and Research
	<u>1</u>	
	17	

Fall Semester	Credit	Spring Semester	Credit
CHE 446 Des & Analy Chem Reactors	3	CHE 435 Proc System Analy & Control	3
CHE 450 CHE Design I	3	CHE 451 CHE Design II	3
CHE 497 Chemical Engr Projects	3	CHE *** Honors Electives ⁵	3
CHE 7** CHE Elective ⁴	3	GEP Requirement*	3
GEP Requirement*	<u>3</u>	Remove IP GEP requirement	
	15	CHE 495 Honors Thesis Prep ⁶	1
			13

Minimum Credit Hours Required for Graduation:

Credit

<u>3</u>

Requirements:

Students must have a total GPA of 3.5 and a major GPA (CHE 205 + CHE 225) of 3.5 to enroll in the departmental Honors Program. The Honors Program requirements can also be combined with another concentration (see Dr. Bullard for course planning).

Major/Program requirements and footnotes:

^{la} Must be completed with grade of (C) or higher.

^{1b} Must be completed with grade of (C-) or higher.

² Math electives include: MA 401, 402, 405, 427, 501.

³ Chemistry electives include: PCC 461/464: Chemistry of Polymeric Materials (fall only): BCH 451: Principles of Biochemistry; BCH 351, General Biochemistry; CH 437: Physical Chemistry; FS 402: Chemistry of Food and Bioprocessed Materials (fall only); PSE 335: Green Chemistry

⁴ CHE 7xx includes CHE 711, 713, 715, 717.

⁵ Honors electives include CHE 455 and above, CHE 5xx, CHE 7xx.

⁶ An honors thesis is required for completion of the Honors Program.

* General Education Program (GEP) requirements:

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at http://www.ncsu.edu/uap/academic-standards/.

<u>PHYSICAL EDUCATION -</u> 2 hours to be selected from the approved GEP Physical Education list.

a. One fitness and wellness course (any PE 100-level course).

b. One additional credit hour of PE activity courses.

<u>HUMANITIES</u> - 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

<u>SOCIAL SCIENCES</u> - 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

<u>ADDITIONAL BREADTH</u> - 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

<u>INTERDISCIPLINARY PERSPECTIVES</u> - 5 credits to be selected from the approved GEP Interdisciplinary Perspectives list.

Co-requisites:

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

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GEP FORMAT B – CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Chemical Engineering, Honors Concentration

Current Degree Key: 14CHEBS-14CHEHON

Effective Date of Revision: 1/2018

Required Courses/Groups/ Electives: Credit Hours GEP category, if applicable Indicate if course or course groupings have a c-cwall or MGP requirement List GEP category, and hours satisfied by a Major requirement Math MA141 (C), MA 241 (C), MA 242 12 GRP 030 Differential Equations (MA 301 or MA 301)(C-) 3 GRP 030 Differential Equations (MA 401, 402, 405, 427, 501; Sciences 3 CH 101(C-), CH 102(C-) 4 Y 205(C-), PY 208 8 CH 201(C-), CH 202 4 GRP 030 Organic Chemistry 1 with Lab (CH 221 and CH 222) 4 GRP 032 Organic Chemistry 1 with Lab (CH 223 and CH 224) 4 GRP 032 Organic Chemistry 2 with Lab (CH 233 and CH 224) 4 GRP 032 Organic Chemistry 2 with Lab (CH 232); CH 461; CH 4 GRP 033 Chemistry Elective (BCH 451; CH 437; TC 461; CH 4 GRP 033 Chemistry Elective (BCH 451; CH 437; TC 461; CH 4 GRP 033 Chemistry Elective (BCH 451; CH 437; TC 461; CH 4 GRP 033 Chemistry Elective (CH 451; CH 437; TC 461; CH 3 GRE 0315(C-) 3 3 CHE 325(C-) 3 3 CHE 315(C-) 3 3	MAJOR FIELD OF STUDY REQUIREMENTS:		
C-wall or MGPA requirementMajor requirementMA11 (C-), MA 241(C-), MA 24212GRP 030 Oliferential Equations (MA 341 or MA 301)(C-)3Sciences3CR 030 Oliferential Equations (MA 401, 402, 405, 427, 501;Sciences4Mathematics (ic hours)Sciences4CH 101(C-), CH 102(C-)4PV 205(C-), CH 2024GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)4GRP 020 Organic Chemistry 2 with Lab (CH 223 and CH 224)4CH 3154Stoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 402; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 41; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 42; CH 415 and (CH 230 or CH 232); CH 461; CHStoland 42; CH 415 and (CH 230 or CH 233); CH 461; CHStoland 42; CH 423CH 435CH 435 <t< th=""><th>Required Courses/Groups/ Electives:</th><th>Credit Hours</th><th>GEP category, if applicable</th></t<>	Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Wath WA 141 (C-), MA 241(C-), MA 242 Mathematics (6 hours) Mathematics Elective (MA 401, 402, 405, 427, 501; SRP 031 Mathematics Elective (MA 401, 402, 405, 427, 501; SRP 031 Mathematics Elective (MA 401, 402, 405, 427, 501; SRP 031 Mathematics Elective (MA 401, 402, 405, 427, 501; SRP 032 Organic Chemistry 1 with Lab (CH 221 and CH 222) A 4 SRP 023 Organic Chemistry 2 with Lab (CH 223 and CH 222) A 4 H3 15 SRP 032 Organic Chemistry 2 with Lab (CH 223 and CH 224) H3 315 SRP 032 Organic Chemistry 2 with Lab (CH 223 and CH 224) H4 203(C-), CH 415 and (CH 230 or CH 232); CH 461; CH 01and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 01and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 142 205(C-) HE 205(C			
AA 141 (C-), MA 241 (C-), MA 242 12 Mathematics (6 hours) BP 030 Differential Equations (MA 341 or MA 301)(C-) 3 SG 427) 3 Sc 427) 4 Natural Sciences (4 hours) Y 205(C-), PY 208 4 NR 020 Organic Chemistry 1 with Lab (CH 221 and CH 222) 4 RP 020 Organic Chemistry 2 with Lab (CH 223 and CH 224) 4 H 315 4 RR 023 Chemistry Elective (BCH 451; CH 437; TC 451; CH 4 01and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 4 112 3 HE 205(C-) 3 HE 205(C-) 3 HE 205(C-) 3 HE 2131H(C-) 3 HE 3131H(C-) 3 HE 315(C-) 4 HE 235(C-) 3 HE 315(C-) 4 HE 235(C-) 3 HE 316 3 HE 318(C-) 3 HE 316 3 HE 435 3 HE 446 3 SRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 185, 498, 5**, 7**) 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement Sinder Tabler 3 HE 435 3 Sinder Tabler Colubres Un	•		Major requirement
SRP 030 Differential Equations (MA 341 or MA 301)(C-) 3 SRP 031 Mathematics Elective (MA 401, 402, 405, 427, 501; 3 Sciences 4 H101(C-), CH 102(C-) 4 Y205(C-), PY 208 8 Natural Sciences (4 hours) 4 SRP 032 Organic Chemistry 1 with Lab (CH 221 and CH 222) 4 SRP 032 Organic Chemistry 2 with Lab (CH 223 and CH 224) 4 H315 4 SRP 032 Organic Chemistry 1 with Lab (CH 232 and CH 224) 4 H3 315 4 SRP 032 Organic Chemistry 1 with Lab (CH 232 and CH 224) 4 H3 315 4 SRP 032 Organic Chemistry 1 with Lab (CH 231 and CH 224) 4 H3 315 4 SRP 032 Chemistry Elective (SCH 451; CH 437; TC 461; CH 4 10; CH 615); <u>F5 402</u> 4 H4 225(C-) 3 H4 225(C-) 3 H4 235(C-) 4 H4 2316 3 H5 310(C-) 4 H5 310(C-) 3 H4 232 3 H4 2316 3 H4 2316 3			
BRP 031 Mathematics Elective (MA 401, 402, 405, 427, 501; 3 Sciences Autural Sciences (4 hours) K101(C-), CH 102(C-) 4 N205(C-), FY 208 8 SRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222) 4 SRP 020 Organic Chemistry 2 with Lab (CH 221 and CH 222) 4 SRP 032 Organic Chemistry 2 with Lab (CH 230 and CH 224) 4 H 315 4 SRP 032 Chemistry Elective (BCH 451; CH 437; TC 461; CH 400) 4 S10; CH 615); <u>F5 402</u> 3 CHE Malor 4 CHE 225(C-) 3 CHE 315(C-) 3 CHE 316 3 CHE 316(C-) 3 CHE 435 3 CHE 435 3 CHE 446 3 CHE 446 3 CHE 47* 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement CHE 485 1 CHE 485			Mathematics (6 hours)
Sciences 4 Natural Sciences (4 hours) CH 101(C-), CH 102(C-) 4 Natural Sciences (4 hours) P 205(C-), PY 208 4 Natural Sciences (4 hours) GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222) 4 4 GRP 020 Creatic Chemistry 2 with Lab (CH 221 and CH 222) 4 4 GRP 020 Creatic Chemistry 2 with Lab (CH 232 and CH 224) 4 4 GRP 032 Chemistry Elective (BCH 451; CH 437; TC 461; CH 40 4 4 GRP 032 Chemistry Elective (BCH 451; CH 437; TC 461; CH 40 4 4 GH 201 Creating and (CH 230 or CH 232); CH 461; CH 40 4 4 GH 201 Creating and (CH 230 or CH 232); CH 461; CH 40 3 5 GH 231H(C-) 3 4 3 CHE 312H 3 3 4 CH 231G(C-) 4 3 4 CH 231G(C-) 3 3 4 CH 2312H 3 3 4 CH 231G(C-) 3 3 5 CH 231G(C-) 3 3 3 CH 232 (C-) 3 3 3 CH 231G(C-) 3 <td< td=""><td></td><td></td><td></td></td<>			
SciencesANatural Sciences (4 hours)CH 101(C-), CH 102(C-)48VY 205(C-), FY 2084GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)4GRP 020 Organic Chemistry 2 with Lab (CH 223 and CH 224)4GRP 022 Chemistry Elective (BCH 451; CH 437; TC 451; CH 400 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and 401 and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 415 and 401 and 402; CH 415 and 401 a		3	
H 101(C-). CH 102(C-) 4 Natural Sciences (4 hours) PY 205(C-), PY 208 8 Natural Sciences (4 hours) H 201(C-). CH 202 4 4 SRP 025 Organic Chemistry 1 with Lab (CH 221 and CH 222) 4 4 Charles Chemistry 2 with Lab (CH 223 and CH 224) 4 4 Charles Chemistry Elective (BCH 451; CH 437; TC 461; CH 400) 4 4 SRP 025 Organic Chemistry 2 with Lab (CH 232); CH 461; CH 400) 4 4 SRP 025 Chemistry Elective (BCH 451; CH 437; TC 461; CH 400) 4 4 SRP 025 Chemistry Elective (BCH 451; CH 437; TC 461; CH 400) 4 4 SIGE 0402 Charles Char	CSC 427)		
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SRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222) 4 SRP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224) 4 H 315 4 SRP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224) 4 H 315 4 SRP 025 Chemistry Elective (BCH 451; CH 437; TC 461; CH 4 4 1001and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 4 4 HE 205(C-) 4 CHE 311H(C-) 3 CHE 311H(C-) 3 CHE 312H 3 CHE 312G 4 CHE 312H 3 CHE 312H 3 CHE 312H 3 CHE 330 4 CHE 435 3 CHE 446 3 CHE 450 3 CHE 451 3 CHE 497 3 SRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 43 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement Concentration Courses/Groups/Electives: 3 Concentration Courses/Groups/Electives: 95 hours			
GRP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224) 4 CH 315 4 CH 315 4 SRP 032 Chemistry Elective (BCH 451; CH 437; TC 461; CH 401and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 4 4 Diand 402; CH 415 and (CH 230 or CH 232); CH 461; CH 4 4 CHE 205(C-) 4 CHE 205(C-) 4 CHE 311H(C-) 3 CHE 312H 3 CHE 312H 3 CHE 315 3 CHE 3130 4 CHE 435 3 CHE 435 3 CHE 446 3 CHE 451 3 CHE 452 3 CHE 451 3 CHE 451 3 CHE 452 3 CHE 451 3 CHE 495 1 CHE 7** 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement String 33 3 Concentration Courses/Groups/Electives: Total credit hours under Major Field of Study: <u>Minimum 27 hours required in program areo. </u>			
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401and 402; CH 415 and (CH 230 or CH 232); CH 461; CH 510; CH 615); F5 402 CHE 205(C-) 4 CHE 225(C-) 3 CHE 211H(C-) 3 CHE 311H(C-) 3 CHE 312H 3 CHE 315(C-) 3 CHE 335 1 CHE 435 3 CHE 446 3 CHE 446 3 CHE 450 3 CHE 495 1 CHE 497 3 CHE 497 3 CHE 7** 3 GEP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 43 3 GEP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 43 3 GENG 333 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement So 333 3 Credit hours of the GEP Humanities requirement Total credit hours under Major Field of Study: <u>B5 hours</u> Minimum 27 hours required in program area. <u>B5 hours</u>			
610; CH 615); <u>F5 402</u> 4 CHE Major 3 CHE 205(C-) 4 CHE 312H 3 CHE 312H 3 CHE 315(C-) 3 CHE 3330 4 CHE 435 3 CHE 435 3 CHE 446 3 CHE 450 3 CHE 495 1 CHE 495 1 CHE 497 3 CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 497, 7**) 3 GHer Major 3 Cher Major 3 Concentration Courses/Groups/Electives:: 5 Total credit hours under Major Field of Study: <u>95 hours</u>		4	
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CHE 205(C-) 4 CHE 225(C-) 3 CHE 311H(C-) 3 CHE 312H 3 CHE 315(C-) 3 CHE 336 3 CHE 330 4 CHE 335 1 CHE 335 3 CHE 446 3 CHE 451 3 CHE 495 1 CHE 495 1 CHE 497 3 CHE 7** 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement GIP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 GIP Major 3 Cher Major 3 Concentration Courses/Groups/Electives: 3 Concentration Courses/Groups/Electives: 95 hours Minimum 27 hours required in program area. 95 hours	510, CH 615); <u>F\$ 402</u>		
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CHE 312H 3 CHE 315(C-) 3 CHE 316 3 CHE 330 4 CHE 335 1 CHE 435 3 CHE 435 3 CHE 450 3 CHE 451 3 CHE 495 1 CHE 497 3 CHE 7** 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement 333 Concentration Courses/Groups/Electives; Minimum 27 hours required in program area.			
CHE 315(C-) 3 CHE 316 3 CHE 330 4 CHE 330 4 CHE 335 1 CHE 435 3 CHE 446 3 CHE 450 3 CHE 451 3 CHE 495 1 CHE 495 1 CHE 497 3 CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 Gther Major 3 Cher Major 3 ENG 333 3		3	
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CHE 330 4 CHE 335 1 CHE 435 3 CHE 435 3 CHE 435 3 CHE 435 3 CHE 446 3 CHE 450 3 CHE 451 3 CHE 495 1 CHE 497 3 CHE 497 3 CHE 7** 3 GEP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement 333 3 Concentration Courses/Groups/Electives: Minimum 27 hours required in program area.			
CHE 395 1 CHE 435 3 CHE 446 3 CHE 450 3 CHE 451 3 CHE 495 1 CHE 497 3 CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement Stream Major 3 ENG 333 3 Concentration Courses/Groups/Electives: 95 hours Minimum 27 hours required in program area. 95 hours			
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CHE 446 3 CHE 450 3 CHE 451 3 CHE 495 1 CHE 497 3 CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement Other Major ENG 333 3 Concentration Courses/Groups/Electives: 3 Total credit hours under Major Field of Study: Minimum 27 hours required in program area. 95 hours			
CHE 450 3 CHE 451 3 CHE 495 1 CHE 497 3 CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 Other Major Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 Other Major ENG 333 3 Concentration Courses/Groups/Electives: 3 Total credit hours under Major Field of Study: Minimum 27 hours required in program area. 95 hours			
CHE 451 3 CHE 495 1 CHE 497 3 CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 Other Major 3 ENG 333 3 Concentration Courses/Groups/Electives: 3 Total credit hours under Major Field of Study: Minimum 27 hours reguired in program area. 95 hours			
CHE 495 1 CHE 497 3 CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 Other Major 3 ENG 333 3 Concentration Courses/Groups/Electives: 3 Total credit hours under Major Field of Study: 95 hours Minimum 27 hours required in program area. 95 hours			
CHE 497 3 CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 Other Major 3 ENG 333 3 Concentration Courses/Groups/Electives; 3 Total credit hours under Major Field of Study: 95 hours Minimum 27 hours required in program area. 95 hours			
CHE 7** 3 GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 Other Major ENG 333 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement Concentration Courses/Groups/Electives: 3 Total credit hours under Major Fleid of Study: Minimum 27 hours required in program area. 95 hours			
GRP 033 Honors Elective (CHE 460, 461, 465, 467, 469, 475, 485, 498, 5**, 7**) 3 GEP Advanced Communication co-requisite 3 credit hours of the GEP Humanities requirement Other Major ENG 333 3 Concentration Courses/Groups/Electives; 3 Total credit hours under Major Field of Study: Minimum 27 hours required in program area. 95 hours 95 hours			
485, 498, 5**, 7**) GEP Advanced Communication co-requisite Other Major 3 ENG 333 3 Concentration Courses/Groups/Electives; 3 Total credit hours under Major Field of Study: 95 hours Minimum 27 hours required in program area. 95 hours		3	-
485, 498, 5**, 7**) GEP Advanced Communication co-requisite Other Major 3 ENG 333 3 Concentration Courses/Groups/Electives; 3 Total credit hours under Major Field of Study: 95 hours Minimum 27 hours required in program area. 95 hours			8
Other Major 3 credit hours of the GEP Humanities ENG 333 3 Concentration Courses/Groups/Electives; 3 Total credit hours under Major Field of Study: 95 hours Minimum 27 hours required in program area. 95 hours		3	
Other Major 3 requirement ENG 333 Concentration Courses/Groups/Electives;	185, 498, 5**, 7**)		
ENG 333 Concentration Courses/Groups/Electives; Concentration Courses/Groups/Electives; Image: Concentration Courses/Groups/Electives; Total credit hours under Major Field of Study: 95 hours Minimum 27 hours required in program area. Image: Concentration Courses/Groups/Electives;			
Concentration Courses/Groups/Electives; Concentration Courses/Groups/Electives; Total credit hours under Major Field of Study: Minimum 27 hours required in program area.		3	requirement
Total credit hours under Major Field of Study: 95 hours Minimum 27 hours required in program area. 95 hours	ENG 333		
Minimum 27 hours required in program area.	Concentration Courses/Groups/Electives;		
		95 hours	
	COLLEGE REQUIREMENTS:		

Orientation Course(s): E 101 , E102 and E115	4	Technology Fluency Requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 hours	*

NCSU GENERAL EDUCATION PROGRAM REQUIREMEN Courses in the Major and/or Minor may also fulfill a General Educ requirement; however, a GEP category may not be subset to requ specific course from the category list. Required courses must be li the Major/College requirements.	At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category. ² Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴ Co-requisite is satisfied by a Major/College course requirement.	
Specific courses should not be listed in any of the fields below of than ENG 101.	ther	⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.
General Education Program Requirements:	Credit	How will the GEP requirement be met?
Minimum 39-40 hrs	hours	(choose opplicable statement from 1-6 listed above)
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements ore satisfied by Major course requirements
Natural Sciences (minimum of 7 credits) (at least 1 loborotory) Course(s) In the Mojor may double-count to satisfy this requirement ond also satisfy both the Globol Knowledge and Diversity co-requisites.	x	Minimum requirements ore satisfied by Mojor course requirements
English 101 (C-)	4	ENG 101
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) In the Major may double-count to satisfy this requirement and also satisfy both the Glabal Knowledge and Diversity co-regulates.	6	Choose course(s) from the University Approved GEP course list for this category
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Majar may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements connot sotisfy this requirement and on AB course cannot be double-counted except in sotisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual ond Performing Arts
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Mojor moy double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	21 hours	
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity® or Glabal Knawledge® co-requisite are marked an course lists with asterisks as indicated.
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this cotegory
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this cotegory
Foreign Language Proficiency	n/a	FL_102

The following requirements must be satisfied within the College/Program:		
Advanced Communication	X	Satisfied by College/Program Requirements
Technology Fluency	X	Satisfied by College/Program Requirements

Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	127 Totalhours	Graduation requirements include: (1) 2.0 overall GPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all CHE designated courses, or a (C-) or higher in all CHE designated courses.	
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College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive. Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Lisa Bullard, Departmental Curriculum Chair, Chemical Engineering Department

RE:

Curriculum Revision for 14CHEBS-14CHENAN to specify the GEP (IP) Course, E102: Engineering In the 21st Century.

By means of this memorandum and the attached documents, the Chemical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

SIGNATURES

RECOMMENDED BY:	Cutu S. Eudkins HEAD, DEPARTMENT FOR CRAM	Nov 15, 2017 Date
ENDORSED BY:	CHAR COLLEGE COURSES & CURRICULA COMMITTEE	15 Nov 17 Date
	COILLEGE DEAN Favelle	12/04/17 DATE
APPROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

APPROVAL DATE

Chemical Engineering (BS): Nanoscience (14CHEBS-14CHENAN)

Freshman Year

Fall Semester	Credit	Spring Semester	Credit
CH 101 Chemistry, A Molecular Science ^{4, 6}	3	CH 201 Chemistry – Quantitative Sci. 1,6	3
CH 102 General Chemistry Lab ^{4,6}	1	CH 202 Quantitative Chem Lab ⁶	1
E 101 Introduction to Engr & Prob Solv ¹	1	MA 241 Calculus II ⁴	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engineers & Scientists I ⁴	3
ENG 101 Academic Writing and Research ¹	4	PY 206 Physics for Engineers & Scientists I Lab ⁴	1
MA 141 Calculus I ⁴	4	EC 205 Economics (or EC 201 or ARE 201)*	3
HES_*** Health & Exercise Studies Course	* 1	HES_*** Health & Exercise Studies Course*	1
	15		16

Sophomore Year

Fall Semester	Credit	Spring Semester	Credit
CH 221 Organic Chemistry I ^{5, 1}	3	CH 223 Organic Chemistry II ⁵	3
CH 222 Organic Chemistry I Lab⁵	1	CH 224 Organic Chemistry II Lab ⁵	1
CHE 205 Chemical Proc Prin ¹	4	CHE 225 Chemical Proc Systems ¹	3
MA 242 Calculus III ¹	4	MA 341 Applied Differential Eq ¹	3
PY 208 Physics for Engineers & Scientists II	3	MSE 201 Struct & Prop Engr Mat	3
PY 209 Physics for Engineers & Scientists II Lab	1	GEP Requirement*	3
	16		16

Junior Year

Fall Semester	Credit	Spring Semester	Credit
CH *** Chemistry Elective ²	4	CH 437 Phys Chem for Engrs	4
CHE 311 Transport Processes I ¹	3	CHE 312 Transport Processes II	3
CHE 315 Chem Process Thermo ¹	3	CHE 316 Thermo of Chem & Phase Ec	3
GEP Requirement*	3	CHE 330 Chem Engr Lab I	4
GEP Requirement*	3	Free Elective	3
CHE 395 Professional Dev Semina	r 1		
	17		17

Senior Year

Fall Semester	Credit	Spring Semester	Credit
CHE 331 Chem Engr Lab II	2	CHE 435 Proc System Analy & Control	3
CHE 446 Des & Analy Chem Reactors	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	Nanoscience Elective ³	3
Nanoscience Elective ³	3	GEP Requirement*	3
GEP Requirement*	3	GEP IP Requirement*	2-3
	14		14-15

Minimum Credit Hours Required for Graduation:

Major/Program requirements and footnotes

¹ Minimum grade of (C-) required.

² Chemistry electives include: CH 316: Quantitative Analysis; BCH 451: Principles of Biochemistry; CH 610: Special Topics in Chemistry; FS 402: Chemistry of Food and Bioprocesses Materials; PCC 464: Chemistry of Polymeric Materials; BCH 351 General Biochemistry

³ Nanosciences Electives include: CHE/MSE 455: Polymer Technology and Engineering, CH 460: Chemical Properties of Electronic Materials, CHE 461: Polymer Sciences and Technology, CHE 462: Colloid Science and Macromolecular Physics, CHE 467: Rheology, CHE 597D: Colloidal and Macromolecular Physics, CHE 597J: Polymers at Interfaces and in Confined Geometries, E 304 Introduction to Nanoscience, ECE 331: Principles of Electrical Engineering I, CH 795M: Special Topics in Chemistry, MSE 425: Polymer Science & Technology, MSE 331: Elec Properties of Materials, MSE 460: Microelectronic Materials, PY 407:

Introduction to Modern Physics, BEC 462: Bio-Nanotechnology. Additional nanoscience electives may be approved on a case-by-case basis as new courses are introduced.

⁴ Grade of C (2.0) or higher required.

⁵ CH 225/226 may substitute for CH 221/222 and CH 227/228 may substitute for CH 223/224.

⁶ CH 103/104 may substitute for CH 101/102 and CH 203/204 may substitute for CH 201/202.

*General Education Program (GEP) requirements

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at https://oucc.dasa.ncsu.edu/general-education-program/.

Health & Exercise Studies – 2 hours to be selected from the approved GEP Health & Exercise Studies list.

a. One fitness and wellness course (any Health & Exercise Studies 100-level course).

b. One additional credit hour of Health & Exercise Studies activity courses.

HUMANITIES – 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

SOCIAL SCIENCES – 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

ADDITIONAL BREADTH – 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

INTERDISCIPLINARY PERSPECTIVES – 5-6 credits to be selected from the approved GEP Interdisciplinary Perspectives list.

Co-requisites

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

Bachelor of Science in Chemical Engineering

Nanoscience concentration

[14CHEBS-14CHENAN Req Term Spring 2018]

Fall Semester	Credit	Spring Semester	Credit
CH 101 (or 103) General Chemistry I ^{1a}	3	CH 201 (or 203) General Chemistry II ^{1b}	3
CH 102 (or 104) General Chemistry I Lab ^{1a}	1	CH 202 (or 204) General Chemistry II Lab	1
E 101 Introduction to Engr & Prob Solv ^{1a}	1	MA 241 Calculus II ^{1a}	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engr & Sc I ^{1a}	3
ENG 101 Academic Writing and Research ^{1a}	4	PY 206 Physics for Engr & Sc I Lab ^{1a}	1
MA 141 Calculus I ^{1a}	4	EC 205 Econ (or EC 201 or ARE 201)*	3
HESx 10* Fitness & Wellness Course*	1	HESx (100 or 200 level) Elective*	1
	15	E102 Engr in the 21 st Century	2
			18

Fall Semester	Credit	Spring Semester	Credit
CH 221 (or 225) Organic Chemistry I ^{1b}	3	CH 223 (or 227) Organic Chemistry II	3
CH 222 (or 226) Organic Chemistry I Lab	1	CH 224 (or 228) Organic Chemistry II Lab	1
CHE 205 Chemical Proc Prin ^{1b}	4	CHE 225 Chemical Proc Systems ^{1b}	3
MA 242 Calculus III ^{1b}	4	MA 341 Applied Differential Eq ^{1b}	3
PY 208 Physics Engr & Scientists II	3	MSE 201 Struct & Prop Engr Mat	3
PY 209 Physics Engr & Scientists II Lab	1	GEP Requirement*	<u>3</u>
. 0	16		16

Fall Semester	Credit	Spring Semester
CH *** Chemistry Elective ²	4	CH 437 Phys Chem for Engrs
CHE 311 Transport Processes I ^{1b}	3	CHE 312 Transport Processes
CHE 315 Chem Process Thermo ^{1b}	3	CHE 316 Thermo of Chem & F
GEP Requirement*	3	CHE 330 Chem Engr Lab I
GEP Requirement*	3	Free Elective
CHE 395 Professional Dev Seminar	<u>1</u>	
	17	

Fall Semester	Credit	Spr
CHE 331 Chem Engr Lab II	2	CH
CHE 446 Des & Analy Chem Reactors	3	CHI
CHE 450 CHE Design I	3	Nan
Nanoscience Elective ³	3	GEI
GEP Requirement*	<u>3</u>	Ren
	14	

Minimum Credit Hours Required for Graduation:

Fall Semester

sses II 3 & Phase Eq 3 4 I <u>3</u> 17 ring Semester Credit E 435 Proc System Analy & Control 3

Remove GEP	3	
GEP Requirement*	3	
Nanoscience Elective ³	3	
CHE 451 CHE Design II	3	
	-	

125

Credit

Major/Program requirements and footnotes:

^{1a} Must be completed with grade of (C) or higher.

^{1b} Must be completed with grade of (C-) or higher.

² Chemistry electives include: PCC 461/464: Chemistry of Polymeric Materials (fall only): BCH 451: Principles of Biochemistry; BCH 351, General Biochemistry; CH 315/316: Quantitative Analysis, FS 402: Chemistry of Food and Bioprocessed Materials (fall only); PSE 335: Green Chemistry

³ Nanosciences Electives include: E304: Introduction to Nano Science and Technology; CHE(ECE) 468: Conventional and Emerging Nanomanufacturing Techniques and Their Applications in Nanosystems; MSE 455: Polymer Technology and Engineering, CH 460: Nano-Electronic Materials, CHE 461: Polymer Sciences and Technology, CHE 462: Fundamentals of Bio-Nanotechnology, CHE 467: Rheology, CHE 470: Colloidal and Nanoscale Engineering, CHE 597D: Colloidal and Macromolecular Physics, CHE 597J: Polymers at Interfaces and in Confined Geometries, ECE 331: Principles of Electrical Engineering I, MSE 425: Polymer Science & Technology, MSE 331: Elec Properties of Materials, MSE 460: Microelectronic Materials, PY 407: Introduction to Modern Physics. Additional nanoscience electives may be approved on a case-by-case basis as new courses are introduced.

*General Education Program (GEP) requirements:

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at http://www.ncsu.edu/uap/academic-standards/.

<u>PHYSICAL EDUCATION</u> - 2 hours to be selected from the approved GEP Physical Education list.

a. One fitness and wellness course (any PE 100-level course).

b. One additional credit hour of PE activity courses.

<u>HUMANITIES</u> - 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

<u>SOCIAL SCIENCES</u> - 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

<u>ADDITIONAL BREADTH</u> - 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

<u>INTERDISCIPLINARY PERSPECTIVES</u> - 5 credits to be selected from the approved GEP Interdisciplinary Perspectives list.

Co-requisites:

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

GEP FORMAT B – CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Chemical Engineering, Nanoscience Concentration

Current Degree Key: 14CHEBS-14CHENAN

Effective Date of Revision: 1/2018

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
\underline{Math}	12	Adaption of the sure
MA 141(C-), MA 241(C-), MA 242 GRP 030 Differential Equations (MA 341 or MA 301)	12	Mathematics (6 hours)
	3	
(C-)		
Sciences		
СН 101 (С-), СН 102 (С-)	4	Natural Sciences (4 hours)
PY 205(C-), PY 208	8	Natural Sciences (4 hours)
CH 201(C-), CH 202	4	
GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)	4	
GRP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224)	4	
GRP 031 Chemistry Elective (BCH 451; TC 461; CH 315,401	4	
and 402, 415 and 416, 437, 461, 610, 615; FS 402)		
<u>CHE Major</u>		
CHE 205(C-)	4	
CHE 225(C-)	3	
CHE 311(C-)	3	
CHE 312	3	
CHE 315(C-)	3	
CHE 316	3	
CHE 330	4	
CHE 331	2	
CHE 395	1	
CHE 435	3	
CHE 446	3	
CHE 450	3	
CHE 451	3	
Other Maior		
<u>Other Major</u> MSE 201		
WISE 201	3	
GRP 034 Nanoscience Electives (CH 795M; CHE 455, 460, 461, 462,	6	
467, 543, 5961, 597D, 597J; ECE 331; MSE 331, 425, 455, 460; PY		
407)		
Concentration Courses/Groups/Electives:		
Free Electives:		
EXC 901 Free Elective EXCEPT NOT		
(CH 111, ECI 105, ENG 110, FLC 1**, FLE 1**, FLF 1**, FLG		
1**, FLH 1**, FLI 1**, FLI 1**, FLK 1**, FLN 1**, FLP 1**, FLR	3	
1**, FLS 1**, GRK 1**, LAT 1**, MA 100, MA 101, MA 103,		
MA 107, MA 108, MA 111, MA 121, MA 131, MA 231, PY 211,		
PY 212)		

Total credit hours under Major Fleld of Study: Minimum 27 hours required in program area.	97 hours	
COLLEGE REQUIREMENTS:		
Orientation Course(s): E 101 , E115 and E102	4	Technology Fluency Requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 Hour	rs

Courses in the Major and/or Minor may also fulfill a General Education equirement; however, a GEP category may not be subset to require a pecific course from the category list. Required courses must be listed in the Major/College requirements. pecific courses should not be listed in any of the fields below other han ENG 101.		At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category. ² Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁶ Co-requisite is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts.	
		⁶ Choose course(s) from the University Approved GEP course lists	
		for the Natural and Mathematical Sciences.	
General Education Program Requirements:	Credit	How will the GEP requirement be met?	
Minimum 39-40 hrs	hours	(choose applicable statement from 1-6 listed above)	
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Mojor may double-count to sotisfy this requirement and also sotisfy both the Globol Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements	
Natural Sciences (minimum of 7 credits) (at least 1 loboratory) Course(s) in the Mojor may double-count to sotisfy this requirement and also sotisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements	
English 101 (C-)	4	ENG 101	
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category	
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to sotisfy this requirement and also sotisfy both the Globol Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.	
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements connot sotisfy this requirement ond on AB course connot be double-counted except in sotisfying the Globol Knowledge ond Diversity co-requisites.	3	Choose caurse(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts	
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category	
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category	
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	2.1 hours		
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fuifill the co-requisites. Courses that satisfy the U.S. Diversity® or Global Knowledge®® co-requisite ore marked on course lists with asterisks as indicated.	
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category	

Foreign Language Proficiency	n/a	FL_102
The following requirements must be satisfied within the College/Program:		-
Advanced Communication	X	Satisfied by College/Program Requirements
Technology Fluency	X	Satisfied by College/Program Requirements

Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	125 Total hours G	raduation requirements include: (1) 2.0 overall GPA r higher in all courses attempted at NCSU and (b) 2.0 PA or higher in all CHE designated courses, or a (C-) or Igher in all CHE designated courses.
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College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive, Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Lisa Bullard, Departmental Curriculum Chair, Chemical Engineering Department

RE: Curriculum Revision for 14CHEBS - 14 CHETE to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Chemical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

SIGNATURES

artu S. RECOMMENDED BY: HEAD, DEPARTMEN ENDORSED BY: U COLLEGE COURSES & CURRICULA COMMITTEE COLLEGE DEAN APPROVED BY: CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE DATE DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS DATE

APPROVAL DATE

Chemical Engineering & Textile Engineering (BS): Dual Major (14CHEBS-14CHETE)

Freshman Year

Fall Semester	Credit	Spring Semester	Credit
CH 101 Chemistry, A Molecular Science ^{1, 6}	3	CH 201 Chemistry – Quantitative Sci. ^{2, 6}	3
CH 102 General Chemistry Lab ^{1, 6}	1	CH 202 Quantitative Chem Lab ⁶	1
E 101 Introduction to Engr & Prob Solv ²	1	MA 241 Calculus II ¹	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engineers & Scientists I ¹	3
ENG 101 Academic Writing and Research ²	4	PY 206 Physics for Engineers & Scientists I Lab ¹	1
MA 141 Calculus I ¹	4	TE 110 Comp Based Model Engineers	3
HES_*** Health & Exercise Studies Course*	1	HES_*** Health & Exercise Studies Course*	1
	15		16

Sophomore Year

Fall Semester	Credit	Spring Semester	Credit
CH 221 Organic Chemistry I ^{3,2,7}	3	TE 201 Textile Engr. Sci.	4
CH 222 Organic Chemistry Lab ⁷	1	MAE 206 Engr Statics OR CE 214 Engr Statics	3
CHE 205 Chemical Proc Prin ²	4	MA 341 Applied Differential Eq ²	3
MA 242 Calculus III ²	4	CH 223 Organic Chemistry II ⁷	3
PY 208 Physics Engineers & Scientists II	3	CH 224 Organic Chemistry II Lab ⁷	1
PY 209 Physics for Engineers & Scientists II Lab	1	CHE 225 Chemical Proc Systems ²	3
	16		17

Junior Year

Fall Semester	Credit	Spring Semester	Credit
CH 315 Quantitative Analysis	3	TE 302 Textile Mfg Proc II	4
CH 316 Quantitative Analysis Lab	1	ST 370 Prob & Stat for Engineers	3
TE 301 Engr Textile Structures I	3	CHE 312 Transport Processes II	3
GC 120 Found of Graphics	3	CHE 316 Thermo of Chem & Phase Eq	3
CHE 311 Transport Processes I ²	3	TE 205 Analog & Digital Cirguits ⁵	4
CHE 315 Chem Process Thermo ^{2,4}	3		
CHE 395 Professional Dev Seminar	1		
	17		17

Senior Year

Fall Semester	Credit	Spring Semester	Credit
CHE 446 Des & Analy Chem Reactors	3	TE 402 Textile Engr Des II ⁶	4
CHE 450 CHE Design I	3	TE 404 Six Sigma Quality	3
GEP IP Requirement*	3	TE 424 Tex Engr Qual Impr Lab	1
TE 401 Textile Engr Des I	4	GEP Requirement*	3
EC 205 Economics* OR EC 201 Economics* OR ARE 201 Economics*	3	GEP Requirement*	3
		GEP Requirement*	3
	16		17

Fifth Year

Fall Semester	Credit
CHE 330 Chem Engr Lab I	4
CHE 435 Proc System Analy & Control	3
PCC 301 Tech of Dyeing & Finish	3
GEP IP Requirement*	1
GEP IP Requirement*	2-3
	16

Minimum Credit Hours Required for Graduation*:

Major/Program requirements and footnotes

¹ Grade of C (2.0) or higher required.

² Minimum grade of C- required.

³ CH 221 will replace TE 200 (in the Textile Engineering curriculum)

⁴ CHE 315/ 316 will replace TE 303 (in the Textile Engineering curriculum)

⁵TE 402 will replace CHE 451 (in the Chemical Engineering curriculum)⁶ CH 225/226 may substitute for CH 221/222 and CH 227/228 may substitute for CH 223/224.

⁶CH 103/104 may substitute for CH 101/102 and CH 203/204 may substitute for CH 201/202.

⁷CH 225/226 may substitute for CH 221/222 and CH 227/228 may substitute for CH 223/224.

*General Education Program (GEP) requirements

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at https://oucc.dasa.ncsu.edu/general-education-program/.

Health & Exercise Studies – 2 hours to be selected from the approved GEP Health & Exercise Studies list. a. One Health & Exercise Studies course (any HES 100-level course).

b. One additional credit hour of Health & Exercise Studies activity courses.

Humanities – 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

Social Sciences – 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205, 201 or ARE 201 taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

Additional Breadth – 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

Interdisciplinary Perspectives – 5 credits to be selected from the approved GEP Interdisciplinary Perspectives list.

Co-requisites

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

CURRICULUM IN CHEMICAL ENGINEERING & TEXTILE ENGINEERING (Degrees Earned: B.S. Chemical Engineering and B.S. Textile Engineering) [14CHEBS-CHETE Req Term Spring 2018]

Fall Semester	Credit	Spring Semester	Credit
CH 101 (or 103) General Chemistry I ¹	3	CH 201 (or 203) General Chemistry II ²	3
CH 102 (or 104) General Chemistry I Lab ¹	1	CH 202 (or 204) General Chemistry II Lab	1
E 101 Introduction to Engr & Prob Solv ¹	1	MA 241 Calculus II ¹	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engr & Sc I ¹	3
ENG 101 Academic Writing and Research ¹	4	PY 206 Physics for Engr & Sc I Lab ¹	1
MA 141 Calculus I ¹	4	TE 110 Comp Based Model Engineers	3
HESx 1** Fitness & Wellness Course*	1	HESx (100 or 200 level) Elective*	1
	15	E102 Engr in the 21st Century	<u>1</u> 2
			18
CH 221 (or 225) Organic Chemistry I ^{2,3}	3	TE 201 Textile Engr. Sci.	4
CH 222 (or 226) Organic Chemistry I Lab	1	MAE 206 Engr Statics OR	4
CHE 205 Chemical Proc Prin ²	4	CE 214 Engr Statics	3
MA 242 Calculus III ²	4	MA 341 Applied Differential Eq ²	3
PY 208 Physics Engr & Scientists II	3	CH 223 (or 227) Organic Chemistry II	3
PY 209 Physics Engr & Scientists II Lab	1	CH 224 (or 228) Organic Chemistry II Lab	1
	<u>1</u> 6	CHE 225 Chemical Proc Systems ²	3
	10	orni 225 onemen 1100 Systems	<u>1</u> 7
CH 215 Quantitativa Analysia	2	TE 202 T	
CH 315 Quantitative Analysis CH 316 Quantitative Analysis Lab	3	TE 302 Textile Mfg Proc II	4
TE 301 Engr Textile Structures I	1	ST 370 Prob & Stat for Engineers	3
GC 120 Found of Graphics	3 3	CHE 312 Transport Processes II	3
CHE 311 Transport Processes I ²	3	CHE 316 Thermo of Chem & Phase Eq	3 <u>4</u>
CHE 315 Chem Process Thermo ^{2,4}	3	TE 205 Analog & Digital Circuits ⁵	4 17
CHE 395 Professional Dev Seminar			1/
	1 17		
CHE 446 Des & Analy Chem Reactors	3	TE 402 Textile Engr Des II ⁶	4
CHE 450 CHE Design I	3 3	TE 404 Six Sigma Quality	3
GEP IP Requirement* TE 401 Textile Engr Des I		TE 424 Tex Engr Qual Impr Lab	1
EC 205 Econ (or EC 201 or ARE 201)	4	GEP Requirement*	3
EC 205 ECOII (OF EC 201 OF ARE 201)	<u>3</u> 16	GEP Requirement*	3 <u>3</u>
	10	GEP Requirement*	<u>5</u> 17
CHE 330 Chem Engr Lab I	4		
CHE 435 Proc System Analy & Control	3		
PCC 301 Tech of Dyeing & Finish	4		
GEP Requirement* Remove GEP Requirement	3		
	14		

Minimum Credit Hours Required for Graduation*:

Major/Program requirements and footnotes:

¹ Must be completed with grade of C or higher for CODA.

² Must be completed with grade of C-or higher for major requirements.

³CH 221 will replace TE 200 (in the Textile Engineering curriculum)

⁴ CHE 315 will replace TE 303 (in the Textile Engineering curriculum)

⁵ TE 402 will replace CHE 451 (in the Chemical Engineering curriculum)

⁶ TE 110 is eliminated (TE program) due to similar content embedded in CHE 205 & 225.

* General Education Program (GEP) requirements:

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at http://www.ncsu.edu/uap/academic-standards/gep/courselists/index.html.

PHYSICAL EDUCATION - 2 hours to be selected from the approved GEP Physical Education list.

a. One fitness and wellness course (any PE 100-level course).

b. One additional credit hour of PE activity courses.

<u>HUMANITIES - 6</u> credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

<u>SOCIAL SCIENCES</u>- 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205, 201 or ARE 201 taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

<u>ADDITIONAL BREADTH</u> - 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

<u>INTERDISCIPLINARY PERSPECTIVES</u>- 5 credits to be selected from the approved GEP Interdisciplinary Perspectives list.

Co-requisites:

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

Degree Title: Bachelor of Science in CHE/TE Double Major

Current Degree Key: 14CHEBS-14CHETE

Effective Date of Revision: 1/2018

Required Courses (Course (Starti	Credit	P category, if applicable
Required Courses/Groups/ Electives:	Hours	
Indicate if course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math		and a second
MA 141 (C-), MA 241 (C-), MA 242	12	Mathematics (6 hours)
GRP 031 Differential Equations (MA 341 or MA 301)	3	
Sciences		
CH 101 (C-), CH 102 (C-)	4	Natural Sciences (3 hours)
PY 205 (C-), PY 208	8	Natural Sciences (4 hours)
CH 201, CH 202	4	
GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)	4	
GRP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224)	4	
CH 315	4	
CHE/TE Major		
CHE 205	4	
CHE 225	3	
CHE 311	3	
CHE 312	3	
CHE 315	3	
CHE 316		
CHE 330	3 4	
CHE 395		
CHE 446	1	
CHE 446	3	
TE 110	3	
TE 201	3	
TE 201	4	
TE 301	4	
	3	
TE 302	4	
TE 401	4	
TE 402	4	
TE 404	3	
TE 424	1	
TE/CHE 435	3	
Other Major		
GRP 030 (CE 214 or MAE 206)	3	
SC 120	3	
ST 370	3	
PCC 301	#3	
PCC 304	1	

Concentration Courses/Groups/Electives:		
Free Electives:		
Total credit hours under Major Field of Study: Minimum 27 hours required in program area.	119 hours	
COLLEGE REQUIREMENTS:	A	
Orientation Course(s): E 101 (C-), E 115 (C-) AND E102	4	E115 satisfies Technology Fluency Requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science (3 hours)
Total credit hours under College Requirements:	7HOURS	

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NCSU GENERAL EDUCATION PROGRAM REQUIREMEN Courses in the Major and/or Minor may also fulfill a General Edu requirement; however, a GEP category may not be subset to requ specific course from the category list. Required courses must be l the Major/College requirements. Specific courses should not be listed in any of the fields below o than ENG 101.	At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category. ² Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁶ Co-requisite is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.	
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Mojor may double-count to satisfy this requirement and also sotisfy both the Global Knowledge and Diversity co-requisites.	×	Minimum requirements are satisfied by Major course requirements
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge ond Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements
English 101	4	ENG 101
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Mojor may double-count to satisfy this requirement and also sotisfy both the Global Knowledge and Diversity co-requisites.	6	Required Department course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Mojor may double-count to satisfy this requirement ond also satisfy both the Global Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/Callege requirements cannat satisfy this requirement and an AB caurse cannot be double-counted except in satisfying the Global Knowledge ond Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course list for this category
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) In the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category

Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.			
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity® or Global Knowledge®® co-requisite are marked on course lists with asterisks as indicated.	
U.S. Diversity co-requisite*		Choose course(s) from the University Approved GEP course list for this category	
Global Knowledge co-requisite** Foreign Language Proficiency		Choose course(s) from the University Approved GEP course list for this category FL_102	
Advanced Communication		Satisfied by College/Program Requirements	
Technology Fluency		Satisfied by College/Program Requirements	
Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	147 Totel hou	As applicable, indicate here the overall GPA requirement for degree completion including course completion.	



College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive. Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Lisa Bullard, Departmental Curriculum Chair, Sustainable Engineering, Energy and Environment

RE: Curriculum Revision for 14CHE-14CHESEE to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Chemical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

 SIGNATURES

 RECOMMENDED BY:
 Citus S. Euclein
 Nov 15, 2017

 ENDORSED BY:
 Date
 Date

 CHAIR, COLLEGE COURSES & CURRICULA COMMITTEE
 Date

 Outer
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APPROVAL DATE

Chemical Engineering (BS): Sustainable Engineering, Energy and the Environment (14CHEBS-14CHESEE)

Freshman Year

Fall Semester	Credit	Spring Semester	Credit
CH 101 Chemistry, A Molecular Science ^{4,7}	3	CH 201 Chemistry – Quantitative Sci. ^{1, 7}	3
CH 102 General Chemistry Lab ^{4, 7}	1	CH 202 Quantitative Chem Lab ⁷	1
E 101 Introduction to Engr & Prob Solv ¹	1	MA 241 Calculus II ⁴	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engineers & Scientists I ⁴	3
ENG 101 Academic Writing and Research ¹	4	PY 206 Physics for Engineers & Scientists I Lab ⁴	1
MA 141 Calculus I ⁴	4	EC 205 Economics (or EC 201 or ARE 201)*	3
HESF 1**Health & Exercise Studies Course?	* 1	HES_***Health & Exercise Studies Course*	1
	15		16

Sophomore Year

Fall Semester	Credit	Spring Semester	Credit
CH 221 Organic Chemistry I ⁶	3	CH 223 Organic Chemistry II ^{6, 1}	3
CH 222 Organic Chemistry Lab ⁶	1	CH 224 Organic Chemistry II Lab ⁶	1
CHE 205 Chemical Proc Prin ¹	4	CHE 225 Chemical Proc Systems ¹	3
MA 242 Calculus III ¹	4	MA 341 Applied Differential Eq ¹	3
GEP Requirement*	3	PY 208 Physics for Engineers & Scientists II	3
		PY 209 Physics for Engineers & Scientists II Lab	1
		GEP Requirement*	

Junior Year

Fall Semester	Credit	Spring Semester	Credit
PSE 335 Principles of Green Chemistry	/ 4	CH *** Chemistry Elective ²	4
CHE 311 Transport Processes I ¹	3	CHE 312 Transport Processes II	3
CHE 315 Chem Process Thermo ¹	3	CHE 316 Thermo of Chem & Phase Eq	3
CHE 497 Chem Engr Project I	3	CHE 330 Chem Engr Lab I	4
Free Elective	3	GEP Requirement*	3
	16		17

Senior Year

Fall Semester	Credit	Spring Semester	Credit
CHE 331 Chem Engr Lab II	2	CHE 435 Proc System Analy & Control	3
CHE 446 Des & Analy Chem Reactors	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	Concentration Elective ³	3
Concentration Elective ³	3	GEP Requirement*	3
GEP Requirement*	3	Restricted Elective ⁵	2-3
CHE 395 Professional Dev Seminar	1		
	15		14-15

Minimum Credit Hours Required for Graduation*:

Major/Program requirements and footnotes

¹ Minimum grade of (C-) required.

² Chemistry electives include: CH 316 Quantitative Analysis, CH 437 Physical Chemistry; BCH 351 General Biochemistry; BCH 451 Princ of Biochemistry; FS 402 Chem of Food & Bioprocessed Materials; PCC 461/464 Chem of Polymeric Materials

³ Concentration electives include: CE 373; Principles of Environmental Engineering; CE 476: Air Pollution Control; CE 484: Water and Waste Systems; CE 456: Air Quality; CE 477: Solid Waste Management; CE 478: Energy and Climate; PSE 425 Bioenergy and Biomaterials Engineering; FB/PSE 476: Environmental Life Cycle Analysis; BAE 528: Biomass to Renewable Energy Processes.

⁴ Grade of C (2.0) or higher required.

⁵ Choose a course from the following restricted electives list. This requirement will count toward satisfying the GEP Interdisciplinary Perspectives requirement. Some courses may also count in fulfilling the GEP Global Knowledge co-requisite as indicated (GK). Please consult with your advisor.

- ES 100 Introduction to Environmental Sciences (GK)
- ES 200 Climate Change and Sustainability ^(GK)
- ES 300 Energy and Environment (GK)
- IDS 201 Environmental Ethics (GK)
- SMT 231 Sustainable Manufacturing
- SMT 232 Recycling to Create a Sustainable Environment
- PCC 401 Impact of Industry on the Environment and Society

⁶ CH 225/226 may substitute for CH 221/222 and CH 227/228 may substitute for CH 223/224. ⁷CH 103/104 may substitute for CH 101/102, and CH 203/204 may substitute for CH 201/202.

*General Education Program (GEP) requirements

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at <u>https://oucc.dasa.ncsu.edu/general-education-program/</u>.

Health and Exercise Studies-2 hours to be selected from the approved GEP Health & Exercise Studies list.

a. One Health and Exercise Studies course (any Health and Exercise Studies 100-level course).b. One additional credit hour of Health and Exercise Studies activity courses.

HUMANITIES – 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

SOCIAL SCIENCES – 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

ADDITIONAL BREADTH – 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

INTERDISCIPLINARY PERSPECTIVES – 3 credits to be selected from the approved GEP Interdisciplinary Perspectives list. *Courses taken to satisfy the restricted elective requirement will fulfill 2-3 hours of IP.*

Co-requisites

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as

meeting the U.S. Diversity and Global Knowledge co-requisites. Foreign Language proficiency at the FL_102 level will be required for graduation.

B.S. in Chemical Engineering Sustainable Engineering, Energy and the Environment 14CHEBS-CHESEE [Req Term Spring 2018]

Fall Semester	Credit	Spring Semester	Credit
CH 101 (or 103) General Chemistry I ^{1a}	3	CH 201 (or 203) General Chemistry II ^{1b}	3
CH 102 (or 104) General Chemistry I Lab ^{1a}	1	CH 202 (or 204) General Chemistry II Lab	1
E 101 Introduction to Engr & Prob Solv ¹	1	MA 241 Calculus II ^{1a}	4
E 115 Intro to Computing Environ	1	PY 205 Physics for Engr & Sc I ^{1a}	3
ENG 101 Academic Writing and Research ¹	4	PY 206 Physics for Engr & Sc I Lab ^{1a}	1
MA 141 Calculus I ^{1a}	4	EC 205 Economics (or EC 201 or ARE	3
HESx 1** Fitness & Wellness Course*	1	201)*	
	15	HESx (100 or 200 level) Elective*	1
		E102 Engr in the 21 st century	2
			18
Fall Semester	Credit	Spring Semester	Credit
CH 221 (or 225) Organic Chemistry I ^{1b}	3	CH 223 (or 227) Organic Chemistry II	3
CH 222 (or 226) Organic Chemistry I Lab	1	CH 224 (or 228) Organic Chemistry II Lab	1
CHE 205 Chemical Proc Prin ^{1b}	4	CHE 225 Chemical Proc Systems ^{1b}	3
MA 242 Calculus III ^{1b}	4	MA 341 Applied Differential Eq ^{1b}	3
GEP Requirement*	3	PY 208 Physics Engr & Scientists II	3
	15	PY 209 Physics Engr & Scientists II	1
		GEP Requirement*	3
			17
Fall Semester	Credit	Spring Semester	Credit
PSE 335 Principles of Green Chemistry	4	CH *** Chemistry Elective ²	4
CHE 311 Transport Processes I ^{1b}	3	CHE 312 Transport Processes II	3
CHE 315 Chem Process Thermo ^{1b}	3	CHE 316 Thermo of Chem & Phase Eq	3
CHE 497 Chem Engr. Proj.	3	CHE 330 Chem Engr Lab I	4
Free Elective	3	GEP Requirement*	4 <u>3</u>
	16		17
Fall Semester	Credit	Spring Semester	Credit
CHE 331 Chem Engr Lab II	2	CHE 435 Proc System Analy & Control	3
CHE 446 Des & Analy Chem Reactors	3	CHE 451 CHE Design II	3
CHE 450 CHE Design I	3	Concentration Elective ³	3
Concentration Elective ³	3	GEP Requirement *	3
GEP Requirement*	3	Remove GEP Requirement, Enn	
	1		12
CHE 395 Professional Dev Seminar	1		14
CHE 393 Professional Dev Seminar	1 15		14

Major/Program requirements and footnotes:

^{la} Must be completed with grade of (C) or higher.

^{1b} Must be completed with grade of (C-) or higher.

²Chemistry electives include: CH 437 Physical Chemistry; BCH 351 General Biochemistry; BCH 451 Princ of Biochemistry; FS 402 Chem of Food & Bioprocessed Materials; WPS 301: Introduction to Wood Chemistry; PCC 461/464 Chem of Polymeric Materials

³ Concentration electives include: CE 373; Principles of Environmental Engineering; CE 476: Air Pollution Control; CE 484: Water and Waste Systems; CE 456: Air Quality; CE 477: Solid Waste Management; CE 478: Energy and Climate; PSE 425 Bioenergy and Biomaterials Engineering; PSE(WPS) 476: Environmental Life Cycle Analysis; BAE 528: Biomass to Renewable Energy Processes; CHE 596 special topics courses (Emerging Energy Frontiers; Biofuels; Green Engineering; as offered and approved by advisor)

*General Education Program (GEP) requirements:

To complete the requirements for graduation and the General Education Program, the following credit hours and co-requisites must be satisfied. University approved GEP course lists for each category can be found at http://oucc.ncsu.edu/gep-courses.

⁴The GEP Interdisciplinary Perspectives requirement must be satisfied from this list:

- ES 100 Introduction to Environmental Sciences; (Global Knowledge, GK)
- ES 200 Climate Change and Sustainability; (GK)
- ES 300 Energy and Environment; (GK)
- IDS 201 Environmental Ethics; (GK)
- SMT 201 Sustainable Materials for Green Housing (fall only)
- SMT 232 Recycling to Create a Sustainable Environment (spring only)
- PCC 401 Impact of Industry on the Environment and Society

PHYSICAL EDUCATION - 2 hours to be selected from the approved GEP Physical Education list.

a. One fitness and wellness course (any PE 100-level course).

b. One additional credit hour of PE activity courses.

<u>HUMANITIES</u> - 6 credits to be selected in two different disciplines (two different course prefixes) from the approved GEP Humanities list.

<u>SOCIAL SCIENCES</u> - 3 credits to be selected in a discipline other than economics from the approved GEP Social Sciences list. EC 205 (or EC 201 or ARE 201) taken as part of the Major requirements satisfies 3 credit hours of the 6 credit hours needed to fulfill the GEP Social Sciences requirement.

<u>ADDITIONAL BREADTH</u> - 3 credits to be selected from the approved GEP Humanities, Social Sciences or Visual and Performing Arts lists.

<u>INTERDISCIPLINARY PERSPECTIVES</u> - 5 credits to be selected from the approved GEP Interdisciplinary Perspectives list.

Co-requisites:

U.S. Diversity and Global Knowledge co-requisites must be satisfied to complete the General Education requirements. Choose course(s) that are identified on the approved GEP course lists as meeting the U.S. Diversity and Global Knowledge co-requisites.

GEP FORMAT B – CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Chemical Engineering, Sustainable Engineering, Energy & the Environment

Current Degree Key: 14CHEBS-14CHESEE

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math		
MA 141 (C-), MA 241(C-), MA 242	12	Mathematics (6 hours)
GRP 030 Differential Equations (MA 341 or MA 301)(C-)	3	
	1 ž -	
Sciences		
CH 101(C-), CH 102(C-)	4	Natural Sciences (4 hours)
PY 205(C-), PY 208	8	Natural Sciences (4 hours)
CH 201(C-), CH 202	4	
GRP 020 Organic Chemistry 1 with Lab (CH 221 and CH 222)	4	
GRP 025 Organic Chemistry 2 with Lab (CH 223 and CH 224)	4	
CH 315		
GRP 033 Chemistry Elective (BCH 451; CH 437; TC 461; CH	4	
401and 402; CH 415 and (CH 230 or CH 232); CH 461; CH		
610; CH 615); F\$ 402		
CHE Malor		
CHE 205(C-)		
CHE 225(C-)	4	
	3	
CHE 311(C-)	3	
CHE 312	3	
CHE 315(C-)	3	
CHE 316	3	
CHE 330	4	
CHE 331	2	
CHE 395	1	
CHE 435	3	
CHE 446	3	
CHE 450	3	
CHE 451	3	
CHE 475	3	
GPP 022 (ECE 221 or MSE 201)		
GRP 032 (ECE 331 or MSE 201) GRP 034 Concentration Electives (CE 373, 456, 475, 477,	3	
GRP 034 Concentration Electives (CE 373, 456, 476, 477, 484; PCC 401; BAE (BBS) 425, WPS 425)	3	
-0-1, FCC +01, OME (003) 463, 88F3 463)		
Concentration Courses/Groups/Electives:		
Free Electives:		10
EXC 901 Free Elective EXCEPT NOT		
CH 111, ECI 105, ENG 110, FLC 1**, FLE 1**, FLF 1**, FLG		
1**, FLH 1**, FLI 1**, FLI 1**, FLK 1**, FLN 1**, FLP 1**, FLR	3	
1**, FLS 1**, GRK 1**, LAT 1**, MA 100, MA 101, MA 103,	3	
MA 107, MA 108, MA 111, MA 121, MA 131, MA 231, PY 211,		
PY 212)		
Total credit hours under Major Field of Study:	1.1.1.1.2.1.1.1	
Minimum 27 hours required in program area.	97 hours	

COLLEGE REQUIREMENTS:		
Orientation Course(s): E 101 , E102 and E115	4	Technology Fluency Requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 hours	

NCSU GENERAL EDUCATION PROGRAM REQUIREMEN	NTS	At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category.	
Courses in the Major and/or Minor may also fulfill a General Educ requirement; however, a GEP category may not be subset to requ specific course from the category list. Required courses must be li the Major/College requirements. Specific courses should not be listed in any of the fields below of than ENG 101.	³ Minimum requirements are satisfied by Major/College cours requirements. ³ Major/College course requirement satisfies X credit hrs of the requirement. Remaining hours required must be chosen from University Approved GEP course list for the category. ⁴ Co-requisite is satisfied by a Major/College course requirem ⁵ Choose course(s) from the University Approved GEP course for the Humanities, Social Sciences, or Visual & Performing A ⁶ Choose course(s) from the University Approved GEP course for the Natural and Mathematical Sciences.		
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)	
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.		Minimum requirements are satisfied by Major course requirements	
Natural Sciences (minimum of 7 credits) (at least 1 loborotory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements	
English 101 (C-)		ENG 101	
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) In the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category	
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) In the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.		Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chose from the University Approved GEP course list for the category.	
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Glabol Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts	
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category	
Physical Education/Healthy Living (Including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category	
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	21 hours		
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity® o Global Knowledge®® co-requisite ore marked an course lists with asterisis as indicated.	
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category	
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category	
Foreign Language Proficiency	n/a	FL_102	

DUAP June 2008 - GEP Format 8 EXAMPLE

The following requirements must be satisfied within the College/Program:		
Advanced Communication	X	Satisfied by College/Program Requirements
Technology Fluency	X	Satisfied by College/Program Requirements

Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	125 Total hours	Graduation requirements include: (1) 2.0 overall GPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all CHE designated courses, or a (C-) or higher in all CHE designated courses.
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www.engr.ncsu.edu

Campus Box 7904 21 Current Drive, Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Rudi Seracino, Departmental Curriculum Chair, Civil Engineering Department

RE: Curriculum Revision for 14CEBS to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Civil Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

SIGNATURES

	0 0 0	
RECOMMENDED BY:	HEAD DEPARTMENT/PROGRAM	12/06/17 DATE
ENDORSED BY:	CHAIR, COLLEGE COURSES & CURRICULA COMMITTEE	7 Dec (7 DATE
	COLLEGE DEAN . Favelle	12/07/17 DATE
PPROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

Civil Engineering [14CEBS Req Term Spring 13]

			Freshman				
		Fall Semester	Credits			Spring Semester	Credi
H		Chemistry, A Molecular Science	3	CSC		Intro to Comp - Fortran	3
H	102	General Chemistry Lab ¹	1	EC	205	Economics (GEP Soc Sci Req*)	3
		Introduction to Engr & Prob Solv ^{1,2}	1	MA		Calculus II ¹	4
	115	Intro to Computing Environ ^{1,2}	1	PY	205	Physics for Engr & Sc I ¹	3
NG		Academic Writing and Research ^{1,2}	4	PY	206	Physics for Engr & Sc I Lab ¹	1
1A	141	Calculus I ¹	4	HES	***	Health & Exercise Studies	1
ESF !	1**	Fitness & Wellness	1				
		Semeste	r Total 15			Semester Tota	ıl 15
			Sophomore	Year			
		Fall Semester	Credits			Spring Semester	Credi
E	214	Engr Mech - Statics ²	3	CE	313	Mechanics of Solids	3
DE	220	Civil Engineering Graphics (or GC 120)) 3	CE	382	Hydraulics	3
IA		Calculus III	4	MA		Appl Differential Eq or	
Y	208	Physics for Engr & Sc II	3	MA	305	Elem Linear Algebra	3
Y		Physics for Engr & Se II Lab	1	MSE		Mech Prop of Struct Mat	3
** *		GEP Requirement*	3	***		GEP Requirement*	3
			r Total 17			Semester Tota	I 15
			Junior Y	ear			
		Fall Semester	Credits			Spring Semester	Credi
L	***	CE Area Intro Elective ³	3	CE	***	CE Area Intro Elective ³	3
E *	***	CE Area Intro Elective ³	3	CE	***	CE Area Intro Elective ³	3
E *	***	CE Area Intro Elective ³	3	CE	***	CE Elective I ⁴	3
E	390	Engineering Economics	1	***	***	Basic Science Elect ⁵	3
Г	370	Prob & Stat for Engr	3	CE	***	CE Lab, if needed (CE 324 or CE 381) 0
** *	***	GEP Requirement*	3	***	***	GEP Requirement*	3
		Semeste	r Total 16			Semester Tota	ıl 15
			Senior Y	ear			
		Fall Semester	Credits			Spring Semester	Credi
E *	***	CE Elective ⁴	3	CE	***	CE Elective ⁴	3
E *		CE Elective ⁴	3	CE	***	CE Elective ⁴	3
E *	***	CE Elective ⁴	3	***	***	CE Elective ⁴	3
kak al	***	CE/MA/Science Elective	3	***	***	GEP Requirement*	3
k* *	***	COM 110 or ENG 331	3	***	***	GEP Requirement*	2-3
** *	***	ECE 331 or MAE 301	3				
		Semeste	r Total 18			Semester Tota	1 14-1
						dit Hours Required for Graduation	

Courses required for Change of Degree Audit (CODA). CH 101, 102, MA 141, 241; PY 205, 206 must be completed with C or higher.

²Minimum grade of C-, E 115 requires satisfactory completion (S).

CE Area Intro Electives to be selected following approved list CE 305, CE 327, CE 332, CE 339, CE 342, CE 367, CE 373, CE 383, CE 426, CE 437, CE 463, CE 466, CE 487

3

⁴CE Electives to be selected following approved list: CE 215, CE 261, CE 305, CE 324, CE 327, CE 367, CE 381, CE 383, CE 413, CE 426, CE 447 CE 466, CE 476, CE 477, CE 484, CE 488, CE 400, CE 402, CE 403, CE 413, CE 420, CE 421, CE 440, CE 476, CE 477, CE 480, CE 484, CE 488 CE 301, CE 235, CE 401, CE 425, CE 435, CE 479, CE 487, CE 504, CE 509, CE 537, CE 305, CE 327, CE 332, CE 337, CE 339, CE 342, CE 373 CE 367, CE 383, CE 426, CE 463, CE 466, CE 487

5Basic Science elective - Select one: BIO 181, BIO 183 or MEA 101.

One CE elective must be a capstone design from the list: CE 400, CE 420, CE 421, CE 440, CE 480,

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at

http://oucc.ncsu.edu/gep-courses.

Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list .

Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics. Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement.

Health & Exercise Studies (2 credit hours - must include one HESF 100-level course)

Choose from the University approved GEP Health & Exercise Studies course list.

Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities/Social Sciences/Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

U.S. Diversity (USD) I.

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

J. Global Knowledge (GK) Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

K. Foreign Language proficiency - Proficiency at the FL 102 level is required for graduation.

Civil Engineering [14CEBS Req Term Spring 2018]

			Freshman				a. a
		Fall Semester	Credit			Spring Semester	Credit.
CH		Chemistry, A Molecular Scie		CSC		Intro to Comp - Python	3
CH		General Chemistry Lab ¹	1	E		Engr in the 21st Century (GEP IP)	2
Е		Introduction to Engr & Prob		EC		Economics (GEP Soc Sci Req*)	3
E		Intro to Computing Environ ¹		MA		Calculus II ¹	4
ENG		Academic Writing and Resea		PY		Physics for Engr & Sc I ¹	3
MA		Calculus I ¹	4	PY		Physics for Engr & Sc I Lab	1
HESH	7 1**	Fitness & Wellness	1	HES	***	Health & Exercise Studies	1
			Semester Total 15			Semester Total	17
			Sophomor	e Year			
		Fall Semester	Credit	S		Spring Semester	Credit.
CE	214	Engr Mech - Statics ²	3	CE	313	Mechanics of Solids	3
TDE	220	Civil Engineering Graphics	3	CE	382	Hydraulics	3
MA		Calculus III	4	MA	341	Appl Differential Eq or	
PY	208	Physics for Engr & Sc II	3	MA		Elem Linear Algebra	3
PY		Physics for Engr & Sc II Lab	0 1	MSE		Mech Prop of Struct Mat	3
***	***	GEP Requirement*	3	***	***	GEP Requirement*	3
			Semester Total 17			Semester Total	15
			Junior Y	fear			
		Fall Semester	Credit	S		Spring Semester	Credit
CE	***	CE Area Intro Elective ³	3	CE	***	CE Area Intro Elective ³	3
CE	***	CE Area Intro Elective ³	3	CE	***	CE Area Intro Elective ³	3
CE	***	CE Area Intro Elective ³	3	CE	***	CE Elective I ⁴	3
CE	390	Engineering Economics	1	***	***	Basic Science Elect ⁵	3
ST	370	Prob & Stat for Engr	3	CE	***	CE Lab, if needed (CE 324 or CE 381)	0
***	***	GEP Requirement*	3	***	***	GEP Requirement*	3
			Semester Total 16			Semester Total	15
			Senior Y	lear			
		Fall Semester	Credit	S		Spring Semester	Credit
CE	***	CE Elective ⁴	3	CE	***	CE Elective ⁴	3
CE	***	CE Elective ⁴	3	CE	***	CE Elective ⁴	3
***	***	CE/MA/Science Elective	3	CE	***	CE Elective ⁴	3
***	***	COM 110 or ENG 331	3	***	***	CE Elective ⁴	3
***	***	ECE 331 or MAE 201	3	***	***	GEP Requirement*	3
			Semester Total 15			Semester Total	15
			Minter	man and	10	lit House Dequired for Creduction	125

Minimum Total Credit Hours Required for Graduation 125

Major/Program requirements and footnotes:

¹Courses required for Change of Degree Audit (CODA). CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher. ²Minimum grade of C-, E 115 requires satisfactory completion (S).

³CE Area Intro Electives to be selected following approved list: CE 263, CE 305, CE 327, CE 332, CE 339, CE 342, CE 367, CE 373, CE 383, CE 426, CE 487

⁴CE Electives to be selected following approved list: CE 215, CE 301, CE 305, CE 324, CE 325, CE 327, CE 332, CE 339, CE 342, CE 367, CE 37. CE 381, CE 383, CE 400, CE 401, CE 402, CE 403, CE 413, CE 420, CE 421, CE 425, CE 426, CE 435, CE 437, CE 440, CE 443, CE 444, CE 450 CE 463, CE 466, CE 476, CE 477, CE 479, CE 480, CE 484, CE 487, CE 488

⁵Basic Science elective - Select one: BIO 181, BIO 183 or MEA 101.

One CE elective must be a capstone design from the list: CE 400, CE 420, CE 421, CE 450, CE 480.

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at

http://oucc.ncsu.edu/gep-courses.

Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list.

Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics.

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill

the GEP Social Sciences requirement.

Health & Exercise Studies (2 credit hours - must include one HESF 100-level course)

Choose from the University approved GEP Health & Exercise Studies course list.

Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities/Social Sciences/Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite. Global Knowledge (GK)

- J. <u>Global Knowledge (GK)</u> Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.
- K. Foreign Language proficiency Proficiency at the FL_102 level is required for graduation.

GEP FORMAT B - CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Civil Engineering

Current Degree Key: 14CEBS

Effective Date of Revision: 1/2018

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math		
MA 141 (C-), MA 241 (C-), MA 242, MA 302	13	Mathematics (6 hours)
GRP 033 (MA 341 or MA 305)	3	
Sciences		
CH 101(C-), CH 102(C-),	4	Natural Sciences (4 hours)
PY 205(C-), PY 208	8	Natural Sciences (3 hours)
GRP 039 – Basic Science Elective	U U	indianal sciences (s nours)
(BIO 181 or BIO 183, MEA 101, MEA 110)	3	
CE Major		
GRP 030 (CE 214 or MAE 206) (C-),	3	
GRP 031 (CE 215 or MAE 208)	3	
GRP 032 (CE 313 or MAE 314)	3	
CE 382	3	
CE 390	1	
GRP 033 CE/Science/Math Elective	3	
GRP 034 – CE Area Intro Electives I, II, III, IV, V	15	
CE 305, CE 327, CE 332, CE 337, CE 339, CE 342, CE 373, CE		
367, CE 383, CE 426, CE 463, CE 466, CE 487		
GRP 035 - CE Electives I, II, III, IV, V, VI, VII	18	
CE215, CE 261, CE 305, CE 324 CE 327, CE 367, CE 381, CE		
383, CE 413, CE 426, CE 443, CE 466, CE 476, CE 477, CE 484,		
CE 488, CE 400, CE 402, CE403, CE 413, CE 420, CE 421, CE		
440, CE 476, CE 477, CE 480 , CE 484, CE 488, CE 301, CE 325,		
CE 401, CE 425, CE 435, CE 479, CE 487, CE 504, CE 509, CE		
537, CE 305, CE 327, CE 332, CE 337, CE 339, CE 342, CE 373,		
CE 367, CE 383, CE 426, CE 463, CE 466, CE 487		
GRP 036 – CE 400, CE 420, CE 421, CE 440, CE 480	3	
GRP 038 - CE 324, CE381, CE 332, CE 342	0	Meets Lab requirements
GRP 038 - ECE 331 or MAE 301	3	
Other Major		
CSC 112	3	
MSE 200	3	
ST 370	3	
GC 120	3	

8

Concentration Courses/Groups/Electives:		
Free Electives:	0	
Total credit hours under Major Field of Study: Minimum 27 hours required in program area.	101 hours	
COLLEGE REQUIREMENTS:		· · · · · · · · · · · · · · · · · · ·
<u>Orientation Course(s):</u> E 101, E 115 an <mark>d E102</mark>	4	E115 satisfies Technology Fluency Requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 hours	

NCSU GENERAL EDUCATION PROGRAM REQUIREMENTS Courses in the Major and/or Minor may also fulfill a General Education requirement; however, a GEP category may not be subset to require a specific course from the category list. Required courses must be listed in the Major/College requirements. Specific courses should not be listed in any of the fields below other than ENG 101.		At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category. ² Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴ Co-requisite is satisfied by a Major/College course requirement ⁵ Choose course(s) from the University Approved GEP course list for the Humanities, Social Sciences, or Visual & Performing Arts ⁶ Choose course(s) from the University Approved GEP course list for the Natural and Mathematical Sciences.		
General Education Program Requirements: <u>Minimum 39-40 hrs</u>	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)		
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites. X		Minimum requirements are satisfied by Major course requirements		
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements		
English 101	4	ENG 101		
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.		Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.		
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course list for this category		
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts		
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category		
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category		
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	18 hours			

GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity® or Global Knowledge®® co-requisite ore marked on course lists with asterisks as indicated.
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category
Foreign Language Proficiency	n/a	FL_102
The following requirements must be satisfied within the College/Program:		
Advanced Communication	X	Satisfied by College/Program Requirements
Technology Fluency	X	Satisfied by College/Program Requirements

Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	126 Total hours	Graduation requirements include: (1) 2.0 overall GPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all CE designated courses, or a (C-) or higher in all CE designated courses.
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www.engr.ncsu.edu

Campus Box 7904 21 Current Drive, Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Michael Escuiti, Departmental Curriculum Chair, Computer Engineering Department

RE: Curriculum Revision for 14CPEBS to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Computer Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

	SIGNATURES	
RECOMMENDED BY:	Bril Maril HEAD DEPARTMENT ROGRAM	11/17/17 DATE
ENDORSED BY:	CHAIR, COLLEGE COURSES & CURRICULA COMMITTEE	17NOV 17 DATE
	COLLEGE DEAN . Javelle	12/04/17 DATE
APPROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

6

			Fresh	man Year		
		Fall Semester	Credi	ts	Spring Semester	Credits
CH	101 CI	hemistry, A Molecular Science	3	ECE	109 Intro to Computer Systems ²	3
CH	102 G	eneral Chemistry Lab	1	MA	241 Calculus II1	4
E	101 ln	troduction to Engr & Prob Solv12	1	PY	205 Physics for Engr & Sc 1'	3
E	115 In	tro to Computing Environ12	1	PY	206 Physics for Engr & Sc I' Lab	1
ENG	101 Ac	cademic Writing and Research ^{1,2}	4	***	*** Economics EC 201/205, ARE 201(GEP*)	3
MA	141 Ca	alculus I ¹	4	HESF	10* Fitness & Wellness	1
***	*** GI	EP Requirement*	3			
			and the Control of Section			

Semester Total 17

Semester Total 15

Semester Total 14

		Sohur	more real		
	Fall Semester	Cred	ils	Spring Semester	Credits
ECE	200 Intro. to ECE Laboratory'	4	COM	110 Public Speaking	3
ECE	209 Computer Systems Programming ²	3	CSC	226 Discrete Mathematics ²	3
MA	242 Calculus III	4	ECE	211 Electric Circuits ²	4
PY	208 Physics for Engr & Sc II	3	ECE	212 Fund of Logic Des ²	3
PY	209 Physics for Engr & Sc II' Lab	1	ECE	220 Analytical Found. Of ECE*	3
	Semester	Total 15		Semester Total	16

Sonhomore Vear

		Juni	or Year		
	Full Semester	Credit	7	Spring Semester	Credits
ECE	301 Linear Systems	3	ECE	309 Object-Oriented Programming	3
ECE	302 Intro. to Microelectronics	4	ECE	380 Engr Profession for ECE'	1
ECE	306 Intro. to Embedded Systems	3	ECE	310 Design of Complex Digital Sys	3
ST	371 Intro to Prob and Dist Theory	3	***	*** Open/Technical Elective*	3
***	*** GEP Requirement*	3	ENG	331 Comm for Engr & Tech	3
			HES	*** Health & Exercise Studies	1

Semester Total 16

		Senio	r Year			
	Fall Semester	Credit	5		Spring Semester	Credits
ECE	484 ECE Senior Design Project I	3	ECE	485	ECE Senior Design Project II	3
ECE	4** CPE Elective'	3	ECE	4**	ECE Elective*	3
ECE	4** CPE Elective'	3	ECE	4**	ECE Elective*	3
***	*** GEP Requirement*	3	***	***	GEP Requirement*	3
***	*** GEP Requirement*	3	***	***	GEP Requirement*	2-3
	Semest	ter Total 15			Sem	ester Total 14-15

Semester Total 15

Minimum Total Credit Hours Required for Graduation 122

Major/Program requirements and footnotes: (Courses required for Change of Degree Audin (CODA) CH 101, 102, MA 141, 241, PY 205, 206 must be completed with C or higher 'Grade of C- or better lequired. E 115 requires satisfactory completion (S) 'Students in the entrepretieurs program should take ECE 383/ECE 482/ECE 483 instead of ECE 380/ECE 484/ECE 485 'Open/Technical electives E 304, ECE 305, ECE 308, any ECE 4** elective; CE 214 or MAE 206, ISE 311, MAE 208, MAE 301, MAE 302, MSE 2000 er MSE 701 200 or MSE 201 'ECE 4** electives (Choose 2 courses) (Comp Arch Sys) ECE 463, ECE 464; (Embed Sys) ECE 461, (Network Sys) ECE 407, ECE 470, (Software

555) ECE 466 'ECE 4** electives (Choose 2) ECE 402, ECE 403, ECE 404, ECE 407, ECE 420, ECE 421, ECE 422, ECE 423, ECE 434, ECE 436, ECE 442, 'ECE 4** electives (Choose 2) ECE 402, ECE 403, ECE 404, ECE 407, ECE 420, ECE 421, ECE 422, ECE 423, ECE 434, ECE 436, ECE 442, 'ECE 4** electives (Choose 2) ECE 402, ECE 403, ECE 404, ECE 407, ECE 420, ECE 421, ECE 422, ECE 423, ECE 434, ECE 436, ECE 442, ECE 445, ECE 4

ECE 445. ECE 451. ECE 452. ECE 453. ECE 455. ECE 456. ECE 461. ECE 463. ECE 464. ECE 465. ECE 492 (Special Topics Classes) Students with major GPAs greater than 3.2 can also take ECE 5** courses

*General Education Program (GEP) requirements and GEP Footnotes: To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at

approved GEP course instant of each of the following categories can be found at http://www.mastedu.exe-courses <u>Humanities</u> (6 credit hours selected from two different disciplines/course prefixes) <u>Choose from the University approved GEP Humanities course hst</u> <u>Social Sciences</u> (6 credit hours selected from two different disciplines/course prefixes) <u>Choose 3 credits from the University approved GEP Notial Sciences course list in a discipline after than Economics</u> <u>Fromonies 205 (or EC 201 or ARE 201)</u>, taken as part of the Major requirements, satisfies 3 credit hours needed in fulfill

the GEP Social Sciences requirement.

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course) Choose from the University approved GEP Health and Exercise Studies course list. Additional Brendth - (3 credit hours to be selected from the following University approved GEP course lists) Choose from the Humanities Social Sciences Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours) Chouse from the University approved GEP Interdisciplinary Perspectives course list

The following Co-Requisites must be satisfied to complete the General Education Program requirements.

I. U.S. Diversity (USD)

Chaose from the University approved GEP U.S. Diversity course has or chaose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite

J. Glubal Knowledge (GK) Charasefrom the University approved GEP Glubal Knowledge course list or chanse a course identified on the approved GEP course has as meeting the Glubal Knowledge (GK) co-requirate K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation

Computer Engineering [14CPEBS Reg Term Spring 2018]

		Fresh	iman Year		
	Fall Semester	Cred	its	Spring Semester	Credits
CH	101 Chemistry, A Molecular Science	3	ECE	109 Intro to Computer Systems ²	3
CH	102 General Chemistry Lab ¹	1	MA	241 Calculus II ¹	4
E	101 Introduction to Engr & Prob Solv ^{1,2}	1	PY	205 Physics for Engr & Sc I ¹	3
Е	115 Intro to Computing Environ ^{1,2}	1	PY	206 Physics for Engr & Sc I1 Lab	1
ENG	101 Academic Writing and Research ^{1,2}	4	E	102 Engineering in the 21st Century (IP - C	GEP) 2
MA	141 Calculus I ¹	4	HESF	10* Fitness & Wellness	1
***	*** Economics EC 201/205, ARE 201(GEP*)	3			
	Semester Tota	1 17		Semester T	otal 14
		Sopho	more Year		
	Fall Semester	Cred	its	Spring Semester	Credits
ECE	200 Intro. to ECE Laboratory ²	4	COM	110 Public Speaking	3
ECE	209 Computer Systems Programming ²	3	CSC	226 Discrete Mathematics ²	3
MA	242 Calculus III	4	ECE	211 Electric Circuits ²	4
PY	208 Physics for Engr & Sc II	3	ECE	212 Fund of Logic Des ²	3
PY	209 Physics for Engr & Sc II' Lab	1	ECE	220 Analytical Found. Of ECE ²	3

Semester Total 15

Junior Year Fall Semester Credits Spring Semester Credits ECE 301 Linear Systems ECE 309 Object-Oriented Programming 3 3 302 Intro. to Microelectronics 380 Engr Profession for ECE3 ECE 4 ECE 1 ECE 306 Intro. to Embedded Systems 3 ECE 310 Design of Complex Digital Sys 3 ST 371 Intro to Prob and Dist Theory *** 3 *** Open/Technical Elective4 3 *** *** GEP Requirement* 3 ENG 331 Comm for Engr & Tech 3 HES *** Health & Exercise Studies 1 Semester Total 16 14

Semester Total

Semester Total 16

				Senio	or Year			
		Fall Semester		Credits	5		Spring Semester	Credits
ECE	484	ECE Senior Design Project I		3	ECE	485	ECE Senior Design Project II	3
ECE	4**	CPE Elective ⁵		3	ECE	4**	ECE Elective ⁶	3
ECE	4**	CPE Elective ⁵		3	ECE	4**	ECE Elective ⁶	3
***	***	GEP Requirement*		3	***	***	GEP Requirement*	3
***	***	GEP Requirement*		3	***		GEP Requirement*	3
			Semester Total	15			Semester Total	15

Minimum Total Credit Hours Required for Graduation 122

Major/Program requirements and footnotes: ¹Courses required for Change of Degree Audit (CODA). CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher.

²Grade of C- or better required, E 115 requires satisfactory completion (S).

³Students in the entrepreneurs program should take ECE 383/ECE 482/ECE 483 instead of ECE 380/ECE 484/ECE 485. ⁴Open/Technical electives: E 304; ECE 305; ECE 308; any ECE 4** elective; CE 214 or MAE 206; ISE 311; MAE 208, MAE 201, MAE 302, MSE

200 or MSE 201. ⁵ECE 4** electives (Choose 2 courses): (Comp Arch Sys) ECE 463, ECE 464; (Embed Sys) ECE 461; (Network Sys) ECE 407, ECE 470; (Software Sys) ECE 466.

⁶ECE 4** electives (Choose 2): ECE 402, ECE 403, ECE 404, ECE 407, ECE 420, ECE 421, ECE 422, ECE 423, ECE 434, ECE 436, ECE 442,

ECE 445, ECE 451, ECE 452, ECE 453, ECE 455, ECE 456, ECE 461, ECE 463, ECE 464, ECE 465, ECE 492 (Special Topics Classes). Students with major GPAs greater than 3.2 can also take ECE 5** courses.

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at http://oucc.ncsu.edu/gep-courses

Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list. Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics. Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill

the GEP Social Sciences requirement.

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list. <u>Additional Breadth</u> - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities Social Sciences/Visual and Performing Arts Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list. The following **Co-Requisites** must be satisfied to complete the General Education Program requirements:

U.S. Diversity (USD) L

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

Global Knowledge (GK) J.

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Computer Engineering

Current Degree Key: 14CPEBS

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math	1.1	
MA 141 (C)-wall, MA 241 (C)-wall, MA 242	12	Mathematics (6 hours)
ST 371	3	
Sciences		
CH 101 (C)-wall, CH 102 (C)-wall	4	Natural Sciences (4 hours)
PY 205 (C)-wall, PY 208	8	Natural Sciences (4 hours)
CPE Major		
ECE 109 (C-)-wall	3	
ECE 200 (C-)-wall	4	
ECE 209 (C-)-wall	3	
ECE 211 (C-)-wall	4	
ECE 212 (C-)-wall	3	
ECE 220 (C-)-wall	3	
ECE 301	3	
ECE 302	4	
ECE 306	3	
ECE 309	3	
ECE 310	3	
ECE 380	1	
ECE 484	3	
ECE 485	3	
GRP 030 CPE Elective (Pick any 2)		
GRP 031 ECE 461, GRP 032 (ECE 463, ECE 464), GRP 033 ECE 466,	6	
GRP 034 (ECE 407, ECE 470)		
GRP 040 ECE Elective (Pick 2)	-	
ECE 402, ECE 403, ECE 404, ECE 407, ECE 420, ECE 421, ECE 422,	6	
ECE 423, ECE 434, ECE 436, ECE 442, ECE 445, ECE 451, ECE 452,		
ECE 453, ECE 455, ECE 456, ECE 461, ECE 463, ECE 464, ECE 466,		
ECE 470		
GRP 050 Open/Technical Elective (Pick 1)		
GRP 040, E 304, ECE 305, ECE 308, GRP051 (CE 214, MAE 206),	3	
MAE 208, MAE 301, MAE 302, ISE 311, GRP 052(MSE 201, MSE 200)		
Other Major		
CSC 226	3	
COM 110	3	
ENG 331	3	
Concentration Courses/Groups/Electives:		
Free Electives:		
Total credit hours under Major Field of Study:	94 hours	

COLLEGE REQUIREMENTS:		
Orientation Course(s): E 101 (C-)-wall and E 115 (C-)-wall and E102	4	E115 satisfies Technology Fluency requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 hours	

NCSU GENERAL EDUCATION PROGRAM REQUIREMEN	At least one of the following must be listed: ³ Choose course(s) from the University Approved GEP course list for this category.		
Courses in the Major and/or Minor may also fulfill a General Edu requirement; however, a GEP category may not be subset to requ specific course from the category list. Required courses must be l the Major/College requirements. Specific courses should not be listed in any of the fields below o than ENG 101.	 ¹Minimum requirements are satisfied by Major/College course requirements. ³Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴Co-requisite is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences. 		
General Education Program Requirements:	Credit	How will the GEP requirement be met?	
Minimum 39-40 hrs	hours	(choose applicable statement from 1-6 listed above)	
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) In the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements	
Natural Sciences (minimum of 7 credits) (at least 1 loboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements ore satisfied by Major course requirements	
English 101	4	ENG 101 (C-)-wall	
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category	
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.	
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts	
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) In the Major may double-count to satisfy this requirement.	5	Choose course(s) from the University Approved GEP course list for this category	
Health Exercise Studies (including one Fitness course)	2	Choose course(s) from the University Approved GEP course list for this category	
Total credit hours needed to complete GEP that are <u>not</u> satisfied as part of the Major/College requirements.	23 hours		
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity* or Global Knowledge** co-requisite are marked on course lists with asterisks as Indicated.	
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category	
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category	

Foreign Language Proficiency		FL_102		
The following requirements must be satisfied within the College/Program:				
Advanced Communication		Satisfied by College/Program Requirements		
Technology Fluency		Satisfied by College/Program Requirements		
Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	122	As applicable, indicate here the overall GPA requirement for degree completion including course completion.		



www.engr.ncsu.edu

Campus Box 7904 21 Current Drive, Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student AffairsFROM: Dr. Rudi Seracino, Departmental Curriculum Chair, Environmental Engineering Department

RE: Curriculum Revision for 14ENEBS to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Environmental Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

 SIGNATURES

 RECOMMENDED BY:
 Had DEPHRUMENT/PROFERENT

 HEAD DEPHRUMENT/PROFERENT
 11/12/14

 HEAD DEPHRUMENT/PROFERENT
 20 Nov 17

 ENDORSED BY:
 CHAIR, COLLEGE COURSES & CURRICULA COMMITTEE
 20 Nov 17

 OLLEGE DEAN
 DATE

 APPROVED BY:
 CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE
 DATE

 DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS
 DATE

Environmental Engineering [14ENEBS Req Term Spring 13]

				man Y	ear		
1.11		Fall Semester	Credi			Spring Semester	Credits
CH		Chemistry, A Molecular Science ¹	3	CH	201	Chemistry - A Quantitative Science	3
CH		General Chemistry Lab ¹	1	EC	205	Econ (ARE/EC 201; GEP Soc Sci Reg'ment*)	3
E		Introduction to Engr & Prob Solv ^{1,2}	1	MA	241	Calculus II ¹	4
E		Intro to Computing Environ ^{1,2}	1	PY	205	Physics for Engr & Sc I'	3
ENG	101	Academic Writing and Research ^{1,2}	4	PY	206	Physics for Engr & Sc I Lab ¹	1
MA	141	Calculus I ¹	4	HES	***	Health & Exercise Studies	1
HESF	10*	Fitness & Wellness Course*	1				
		Semester Tota	1 15			Semester Total	15
			Sopho	more Y	ear		
		Fall Semester	Credi	ts		Spring Semester	Credits
CE	214	Engr Mech - Statics	3	BIO	183	Intro. Biol: Cell & Mol Biol	4
CE	373	Fundamentals of Envr Engr	3	CE	313	Mechanics of Solids	3
CHE	205	Chem Proc Principles	4	CSC	111	Intro to Computing Python	3
MA	242	Calculus III	4			Earth System Chemistry	3
***	***	COM 110 (preferred) or GC 120 (GEP) ³	3	MA		Appl Differential Equations 1	3
		Semester Tota	17			Semester Total	16
			Juni	ior Yea	r		
		Fall Semester	Credit	ts		Spring Semester	Credits
CE	378	Environ Chem & Microbiology	4	CE	342	Engr Behavior of Soils & Found	4
CE	390	Engineering Economics	1	CE		Hydraulics Sys Meas Lab	1
CE	339	Civil Engineering Systems	3	CE	383	Hydrology & Urban Water Sys	3
CE	382	Hydraulics	3	MAE	301	Engr Thermodynamics I	3
PΥ	208	Physics for Engr & Sc II	3			Graphics/Communication Elective3	3
PΥ	209	Physics for Engr & Sc II Lab	1	PS	320	US Environ Law and Politics or	
ST	370	Probability & Statistics for Engr	3	PS	336	Global Envir Pol (GEP Soc Sci Req*)	3
		Semester Tota	1 18			Semester Total	
			Seni	ior Yea	r		

CE	476	Air Pollution Control or		CE	477 Solid Waste Engineering	3
CE	479	Air Quality	3	CE	481 Environmental Engineering Project	3
CE	484	Water Supply & Waste Water Sys	3	***	*** Environmental Engr Elect ⁴	3
CE	488	Water Resources Engineering	3	***	*** GEP Requirement*	3
***	***	GEP Requirement*	3	***	*** GEP Requirement (Interdisciplinary Persp)*	2-3
***	***	GEP Requirement*	3			
		Semester Total	15		Semester Total	14-15
						1

Minimum Total Credit Hours Required for Graduation 127

Major/Program requirements and footnotes:

¹Courses required for Change of Degree Audit (CODA). CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher. ²Minimum grade of C-, E 115 requires satisfactory completion (S).

³Graphics/Communication Elective: If select COM 110, take GIS 410 or TDE 220; if select GC 120, take ENG 331 or COM 110. ⁴Select from CE(MEA) 435 (Spring only), CE 476 (Fall only), CE(MEA) 479 (Spring only) or CE 487 (Spring only). <u>*General Education Program (GEP) requirements and GEP Footnotes:</u>

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at http://oucc.ncsu.edu/gep-courses.

Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list.

Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requiremen; and PS 320 or PS 336

taken as part of the Major requirement satisfies 6 credit hours needed to fulfill the GEP Social Sciences requirement from two different disciplines.

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list.

Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists) Choose from the Humanities/Social Sciences/Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

J. Global Knowledge (GK)

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

Environmental Engineering [14ENEBS Req Term Spring 2018]

		5 4 6		iman Y	ear		
СН	101	Fall Semester	Credi		201	Spring Semester	Credits
CH	101	Chemistry, A Molecular Science ¹	3	CH		Chemistry - A Quantitative Science	3
E		General Chemistry Lab ¹ Introduction to Engr & Prob Solv ^{1,2}	1	EC		Econ (ARE/EC 201; GEP Soc Sci Req'ment*)	3
Ē		Intro to Computing Environ ^{1,2}	1	MA PY		Calculus II ¹ Devices for Energy & So I ¹	4
EN		Academic Writing and Research ^{1,2}	4	PY		Physics for Engr & Sc I'	3
MA		Calculus I ¹	4			Physics for Engr & Sc I Lab ¹ Health & Exercise Studies	1
		Fitness & Wellness Course*	1	E		Engineering in the 21st Century (GEP-IP)	1
	01 10	Semester Tota		L	102	Semester Tota	
			Sanha	monaV			
		Fall Semester	Credi	more Y	ear	Spring Semester	Credits
CE	214	Engr Mech – Statics	3	BIO	183	Intro. Biol: Cell & Mol Biol	4
CE		Fundamentals of Envr Engr	3	CE	313	Mechanics of Solids	3
CH		Chem Proc Principles	4			Intro to Computing Python	3
MA		Calculus III	4	MEA	323	Earth System Chemistry	3
***	***	COM 110 (preferred) or GC 120 (GEP) ³	3	MA	341	Appl Differential Equations I	3
		Semester Tota	al 17			Semester Tota	1 16
			Jun	ior Yea	r		
		Fall Semester	Credi			Spring Semester	Credits
CE		Environ Chem & Microbiology	4	CE		Engr Behavior of Soils & Found	4
CE		Engineering Economics	1	CE		Hydraulics Sys Meas Lab	1
CE		Civil Engineering Systems	3	CE		Hydrology & Urban Water Sys	3
CE		Hydraulics	3		201	Engr Thermodynamics I	3
PY		Physics for Engr & Sc II	3	***	***	Graphics/Communication Elective3	3
PY		Physics for Engr & Sc II Lab	1	PS		US Environ Law and Politics or	
ST	370	Probability & Statistics for Engr	3	PS	336	Global Envir Pol (GEP Soc Sci Req*)	3
		Semester Tota	al 18			Semester Tota	l 17
10.44			Sen	ior Yea			
CE		Air Pollution Control or		CE		Solid Waste Engineering	3
CE		Air Quality	3	CE		Environmental Engineering Project	3
CE		Water Supply & Waste Water Sys	3	***		Environmental Engr Elect ⁴	3
CE		Water Resources Engineering	3	***	***	GEP Requirement*	3
***		GEP Requirement*	3			Removing IP GEP requirement	
A. 16.16		GEP Requirement*	3				-
***	4 4 4	0				Semester Tota	1 12
***		Semester Tota		nimum	Tota		
		Semester Tota		nimum	Tota	I Credit Hours Required for Graduation	
	ajor/Pro	gram requirements and footnotes: s required for Change of Degree Audit (CODA).	Mi CH 101	, 102; MA			127
	ajor/Pro ¹ Course: ² Minimu ³ Graphic	gram requirements and footnotes: s required for Change of Degree Audit (CODA). Im grade of C-, E 115 requires satisfactory comp cs/Communication Elective: If select COM 110,	Mi CH 101 letion (S take GIS	, 102; MA). 5 410 or T	A 141, DE 2	1 Credit Hours Required for Graduation 241: PY 205, 206 must be completed with C or hig 20; if select GC 120, take ENG 331 or COM 110.	127
М	lajor/Pro ¹ Course: ² Mínimu ³ Graphic ⁴ Select f	gram requirements and footnotes: s required for Change of Degree Audit (CODA). Im grade of C-, E 115 requires satisfactory comp cs/Communication Elective: If select COM 110, rom CE(MEA) 435 (Spring only), CE 476 (Fall 4	Mi CH 101 eletion (S take GIS only), CE	, 102; MA). 5 410 or T E(MEA) 4	A 141, DE 2	1 Credit Hours Required for Graduation 241: PY 205, 206 must be completed with C or hig 20; if select GC 120, take ENG 331 or COM 110.	127
<u>M</u> <u>*(</u> Tc	lajor/Pro ¹ Course: ² Minimu ³ Graphia ⁴ Select f General F o complet	gram requirements and footnotes: s required for Change of Degree Audit (CODA). im grade of C-, E 115 requires satisfactory comp cs/Communication Elective: If select COM 110, rom CE(MEA) 435 (Spring only), CE 476 (Fall ducation Program (GEP) requirements and (e the requirements for graduation and the Genera	Mi CH 101 eletion (S take GIS only), CE <u>SEP Foo</u> al Educat	, 102; MA). 5 410 or T 6(MEA) 4 tnotes: ion Progr	A 141, DE 2. 79 (Sj am, th	1 Credit Hours Required for Graduation 241; PY 205, 206 must be completed with C or hip 20; if select GC 120, take ENG 331 or COM 110. pring only) or CE 487 (Spring only).	127
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M <u>*(</u> Tc cc htt	ajor/Pro ¹ Course: ² Minimu ³ Graphia ⁴ Select f <u>General F</u> o complet o-requisit tp://oucc.	gram requirements and footnotes: s required for Change of Degree Audit (CODA). im grade of C-, E 115 requires satisfactory comp cs/Communication Elective: If select COM 110, rom CE(MEA) 435 (Spring only), CE 476 (Fall ducation Program (GEP) requirements and (e the requirements for graduation and the Genera	Mi CH 101 bletion (S take GIS only), CE <u>SEP Foo</u> al Educat ourse list	, 102; MA). 5 410 or T 5 (MEA) 4 <u>tnotes:</u> ion Progr s for each	A 141, DE 2. 79 (Sj am, th of the	1 Credit Hours Required for Graduation 241; PY 205, 206 must be completed with C or hip 20; if select GC 120, take ENG 331 or COM 110. pring only) or CE 487 (Spring only).	127
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Degree Title: Bachelor of Science in Environmental Engineering

Current Degree Key: 14ENEBS

; :

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a	1.1.1	List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math		
MA 141, MA 241, MA 242	12	Mathematics (6 hours)
MA 341	3	
ST 370	3	
Sciences		
CH 101, CH 102	4	Natural Sciences (4 hours)
PY 205, PY 208	8	Natural Sciences (3 hours)
CH 201	3	
BIO 183	4	
MEA 323	3	
ENE Major		
CE 214	3	
CE 313	3	
CE 342	4	
CE 373	3	
CE 374	2	
CE 375	3	
CE 381	1	
CE 382	3	
CE 383	3	
CE 477		
	3	
CE 481	3	
CE 484	3	~
CE 488	3	
Other Major		
ENG 331	3	Humanian, GEP Advanced Writing and
CPD 025 (CE 476 of 470)		Speaking co-requisite
GRP 035 (CE 476 or 479)	3	
GRP 037 (CE 435, 476, 479, or 487)	3	
CSC 116	3	
CHE 205	4	
	19	
MAE 301	3	
GRP 320 (PS 320 or 336)	3	Social Science Requirement
PRT 462	3	
Concentration Courses/Groups/Electives:		
Free Electives:		
	102	
Total credit hours under Major Field of Study: Minimum 27 hours required in program area.	hours	
COLLEGE REQUIREMENTS:		

Orientation Course(s):		
E 101, E 115 an <mark>d E102</mark>	4	E115 satisfies Technology Fluency Requirement
Other: (ex: Adv Communication courses)		
Economics Elective (EC 205, 201; ARE 201)	3	Satisfies Social Science Requirement
Total credit hours under College Requirements:	7hours	

NCSU GENERAL EDUCATION PROGRAM REQUIREMEN	ITS	At least one of the following must be listed: ³ Choose course(s) from the University Approved GEP course list for this category.
Courses in the Major and/or Minor may also fulfill a General Educ requirement; however, a GEP category may not be subset to requ specific course from the category list. Required courses must be li the Major/College requirements. Specific courses should not be listed in any of the fields below ot than ENG 101.	² Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴ Co-requisite is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.	
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Major may double-count to satIsfy this requirement and also satIsfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	×	Minimum requirements are satisfied by Major course requirements
English 101	4	ENG 101
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	#6	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Required College course satisfies 6 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course list for this category
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category
Total credit hours needed to complete GEP that are not 18 satisfied as part of the Major/College requirements.	TOUR.	la est
GEP Co-Requisites:		Courses taken in the Major,GEF ¹ or Minor may double-count to fulfill the co-requisites. Courses that Satisfy the U.S. Diversity* or Global Knowledge** co-requisite are marked on course lists with asterisks as indicated.
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category
Foreign Language Proficiency	n/a	FL_102

The following requirements must be satisfied within the College/Program:	1	
Advanced Communication	X	Satisfied by College/Program Requirements
Technology Fluency	X	Satisfied by College/Program Requirements

Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	1277 Total hours	Graduation requirements include: (1) 2.0 overall GPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all CE designated courses, or a (C-) or higher in all CE designated courses.



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Campus Box 7904 21 Current Drive. Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Michael Escuiti, Departmental Curriculum Chair, Electrical Engineering Department

RE: Curriculum Revision for 14EEBS to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Electrical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

	SIGNATURES	
RECOMMENDED BY:	HEAD, DEPARTMENT/PROGRAM	11/17/17 DATE
ENDORSED BY:	CHAIR, COLLEGE COURSES & CURRICULA COMMITTEE	17 NOV 17 DATE
	COLLEGE DEAN P. Gavelle	12/04/17 Date
APPROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	Date
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

Electrical Engineering [14EEBS Req Term Spring 13]

			Freshma	an Year		
		Fall Semester	Credits		Spring Semester (Credits
CH	101	Chemistry, A Molecular Science'	3	ECE	109 Intro to Computer Systems2	3
CH		General Chemistry Lab	1	MA	241 Calculus II1	4
E		Introduction to Engr & Prob Solv12	1	PY	205 Physics for Engr & Sc 1	3
E		Intro to Computing Environ12	1	PY	206 Physics for Engr & Sc I Lab1	1
ENG		Academic Writing and Research12	4	***	*** Economics EC 201/205, ARE 201(GEP*)	3
MA		Calculus I'	4	HESF	10* Fitness & Wellness	1
***	***	GEP Requirement*	3			
		Semester Total	17		Semester Total	15

Semester Total 17

		Sophome	ore Year			
	Fall Semester	Credits	F	Spring Semester	(redits
ECE	200 Intro. to ECE Laboratory2	4	COM	110 Public Speaking		3
ECE	209 Computer Systems Programming ²	3	ECE	211 Electric Circuits ²		4
MA	242 Calculus III	4	ECE	212 Fund of Logic Des		3
PY	208 Physics for Engr & Sc II	3	ECE	220 Analytical Found. Of ECE2		3
PY	209 Physics for Engr & Sc II Lab	1	***	*** GEP Requirement*		3
	Semester Tota	1 15			Semester Total	16

		Junio	r Year		
	Fall Semester	Credit	S	Spring Semester	Credits
ECE	301 Linear Systems	3	ECE	303 Electromagnetic Fields	3
ECE	302 Intro. to Microelectronics	4	ECE	380 Engr Profession for EE4	1
ECE	3** ECE Foundation Elective ³	3	ECE	3** ECE Foundation Elective3	3
ST	371 Intro to Prob and Dist Theory	3	***	*** Open/Technical Elective5	3
HES*	*** Health & Exercise Studies	T	ENG	331 Comm for Engr & Tech	3
Creat.			***	*** GEP Requirement*	3

Semester Total 14

Senior Year Credits Spring Semester Fall Semester Credits 485 ECE Senior Design Project II 484 ECE Senior Design Project I 3 ECE 3 ECE 3 3 4** ECE Elective ECE 4** EE Elective FCF 3 4** EE Elective 3 ECE 4** ECE Elective ECE 3 *** GEP Requirement* 3 *** *** *** Open/Technical Elective *** GEP Requirement* 2-3 *** 3 *** *** GEP Requirement* Semester Total 14-15 Semester Total 15

Minimum Total Credit Hours Required for Graduation 122

Major/Program requirements and footnotes:

Courses required for Change of Degree Audit (CODA). CH 101, 102: MA 141, 241; PY 205, 206 must be completed with C or higher. Grade of C- or better required, E 115 requires satisfactory completion (S).

³ECE foundation electives: E 304; ECE 305; ECE 308; ECE 435 or either ECE 306 or ECE 310

¹ Students in the entrepreneurs program should take ECE 383 ECE 482-ECE 483 instead of ECE 380 ECE 484 ECE 485. ²Open Technical electives (Choose 2): any ECE 3** or ECE 4**; CE 214 or MAE 206; ISE 311: MAE 208, MAE 301, MAE 302, MAE 308; MSE 200 or MSE 201. *EE 4** electives (Choose 2 courses from within any one of the following lists): (Comm. Sig Proc Sys) ECE 402, ECE 420; ECE 421; (Control Sys)

ECE 436, ECE 455, ECE 456, (Circ, E&M Sys) ECE 403, ECE 422; (Nano Sys) ECE 404, ECE 442, ECE 445; (Power Sys) ECE 434, ECE 451, ECE 452, ECE 453, ECE 552.

ECE 4** electives (Choose 2): ECE 402, ECE 403, ECE 404, ECE 407, ECE 420, ECE 421, ECE 422, ECE 423, ECE 434, ECE 436, ECE 442, ECE 445, ECE 445, ECE 451, ECE 453, ECE 453, ECE 455, ECE 456, ECE 461, ECE 463, ECE 464, ECE 465, ECE 492 (Special Topics Classes). Students with major GPAs greater than 3.2 can also take ECE 5** courses.

General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at

http://oucc.ncsu.edu.gep-courses Humanities (6 credit hours selected from (wo different disciplines course prefixes)

Choose from the University approved GEP Humantries course list

Social Sciences (6 credit hours selected from two different disciplines course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill

the GEP Social Sciences requirement

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list Choose from the Humanities Social Sciences Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

- I. U.S. Diversity (USD)
 - Choose from the University approved GEP U.S. Diversity course last or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.
- J. Global Knowledge (GK) Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-regulate
- K. Foreign Language proficiency Proficiency at the FL 102 level

Semester Total 16

Electrical Engineering [14EEBS Reg Term Spring 2018]

		Freshm	nan Year		
	Fall Semester	Credit	ts	Spring Semester	Credits
CH	101 Chemistry, A Molecular Science ¹	3	ECE	109 Intro to Computer Systems ²	3
CH	102 General Chemistry Lab ¹	1	MA	241 Calculus II ¹	4
E	101 Introduction to Engr & Prob Solv ^{1,2}	1	PY	205 Physics for Engr & Sc 11	3
Е	115 Intro to Computing Environ ^{1,2}	1	PY	206 Physics for Engr & Sc I Lab ¹	1
ENG	101 Academic Writing and Research ^{1,2}	4	E	102 Engineering in the 21st Century (GEP-IP)	2
MA	141 Calculus I ¹	4	HESF	10* Fitness & Wellness	1
***	*** Economics EC 201/205, ARE 201(GEP*)	3			
	Semester Tot	al 17		Semester Total	14
		Sophom	ore Year		

	Fall Semester	Credi	s	Spring Semester	Credits	
ECE	200 Intro. to ECE Laboratory ²	4	COM	110 Public Speaking	3	
ECE	209 Computer Systems Programming ²	3	ECE	211 Electric Circuits ²	4	
MA	242 Calculus III	4	ECE	212 Fund of Logic Des ²	3	
PY	208 Physics for Engr & Sc II	3	ECE	220 Analytical Found. Of ECE ²	3	
PY	209 Physics for Engr & Sc II Lab	1	***	*** GEP Requirement*	3	
	Semester	Total 15		Semester Total	16	

			Junio	r Year				
		Fall Semester	Credit:	5	Spring Semester	(Credits	
ECE	301	Linear Systems	3	ECE	303 Electromagnetic Fields		3	
ECE	302	Intro. to Microelectronics	4	ECE	380 Engr Profession for EE ⁴		1	
ECE	3**	ECE Foundation Elective ³	3	ECE	3** ECE Foundation Elective ³		3	
ST	371	Intro to Prob and Dist Theory	3	***	*** Open/Technical Elective ⁵		3	
HES*	***	Health & Exercise Studies	1	ENG	331 Comm for Engr & Tech		3	
				***	*** GEP Requirement*		3	
		Semester Total	14			Semester Total	16	

			Senio	r Year		
		Fall Semester	Credit.	s	Spring Semester	Credits
ECE	484	ECE Senior Design Project I	3	ECE	485 ECE Senior Design Project II	3
ECE	4**	EE Elective ⁶	3	ECE	4** ECE Elective ⁷	3
ECE	4**	EE Elective ⁶	3	ECE	4** ECE Elective ⁷	3
***	***	Open/Technical Elective ⁵	3	***	*** GEP Requirement*	3
***		GEP Requirement*	3	***	*** GEP Requirement*	3
		Sem	nester Total 15		Semester Tot	al 15

Minimum Total Credit Hours Required for Graduation 122

Major/Program requirements and footnotes:

Courses required for Change of Degree Audit (CODA). CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher. ²Grade of C - or better required, E 115 requires satisfactory completion (S).

³ECE foundation electives: E 304; ECE 305; ECE 308; ECE 435 or either ECE 306 or ECE 310.

⁴ Students in the entrepreneurs program should take ECE 383/ECE 482/ECE 483 instead of ECE 380/ECE 484/ECE 485. ⁵Open/Technical electives (Choose 2): any ECE 3** or ECE 4**; CE 214 or MAE 206; ISE 311: MAE 208, MAE 201, MAE 302, MAE 308; MSE

200 or MSE 201. ⁶EE 4** electives (Choose 2 courses from within any one of the following lists): (Comm. Sig Proc Sys) ECE 402, ECE 420; ECE 421; (Control Sys) ECE 436. ECE 455. ECE 456: (Circ, E&M Sys) ECE 403, ECE 422; (Nano Sys) ECE 404, ECE 442. ECE 445; (Power Sys) ECE 434. ECE 451. ECE 452, ECE 453, ECE 552.

7ECE 4** electives (Choose 2): ECE 402. ECE 403. ECE 404. ECE 407. ECE 420. ECE 421. ECE 422. ECE 423. ECE 434. ECE 436. ECE 442. ECE 445, ECE 451, ECE 452, ECE 453, ECE 455, ECE 456, ECE 461, ECE 463, ECE 464, ECE 465, ECE 492 (Special Topics Classes). Students with major GPAs greater than 3.2 can also take ECE 5** courses.

General Education Program (GEP) requirements and GEP Footnotes: To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at

http://oucc.ncsu.edu/gep-courses

Humanitles (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list .

Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics.

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement.

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list.

Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities/Social Sciences/Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

U.S. Diversity (USD)

- Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.
- Global Knowledge (GK) J. Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) corequisite.

K. Foreign Language proficiency - Proficiency at the FL_102 level

CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Electrical Engineering

Current Degree Key: 14EEBS

MAJOR FIELD OF STUDY REQUIREMENTS:	Con dia 11	CCD 1 11 11 11
Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math		
MA 141 (C)-wall, MA 241 (C)-wall, MA 242	12	Mathematics (6 hours)
ST 371	3	
Sciences	1.4	hand a state to be
CH 101 (C)-wall, CH 102 (C)-wall	4	Natural Sciences (4 hours)
PY 205 (C)-wall, PY 208	8	Natural Sciences (4 hours)
EE Major		
ECE 109 (C-)-wall	3	
ECE 200 (C-)-wall	4	
ECE 209 (C-)-wall	3	
ECE 211 (C-)-wall	4	
ECE 212 (C-)-wall	3	
ECE 220 (C-)-wall	3	
ECE 301	3	
ECE 302	4	
ECE 303	3	
ECE 380	1	
ECE 484	3	
ECE 485	3	
	-	
GRP 020 ECE 3xx Elective (Pick 2)	6	
E304, ECE305, ECE 308, GRP 021(ECE 306, ECE 310)		
GRP 030 EE 4xx Elective (Pick 2 from any group)	1 - I	
GRP 031 (ECE 402, ECE 420, ECE 421), GRP 032 (ECE 403, ECE 422),	6	
GRP 033 (ECE 404, ECE 423, ECE 442, ECE 445), GRP 034 (ECE 436,	-	
ECE 455, ECE 456), GRP 035 (ECE 434, ECE 451, ECE 452, ECE 453)		
GRP 040 ECE Elective (Pick 2)	1	
CE 402, ECE 403, ECE 404, ECE 407, ECE 420, ECE 421, ECE 422,	6	
CCE 423, ECE 434, ECE 436, ECE 442, ECE 445, ECE 451, ECE 452,		
CE 453, ECE 455, ECE 456, ECE 461, ECE 463, ECE 464, ECE 466,		
CE 470		
GRP 050 Open/Technical Elective (Pick 2)		
GRP 040, GRP 020, GRP 051 (CE 214, MAE 206),	6	
GRP052 (MSE200, MSE 201), ISE311, MAE 208, MAE 301,		
MAE 302		
COM 110	3	
NG 331	3	
Concentration Courses/Groups/Electives:		
ree Electives:		

Total credit hours under Major Field of Study: Minimum 27 hours required in program area.	94 hours	
COLLEGE REQUIREMENTS:		
Orientation Course(s): E 101 (C-)-wall, E 115 (C-)-wall and E102	4	E115 satisfies Technology Fluency requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 hours	

NCSU GENERAL EDUCATION PROGRAM REQUIREMEN	At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP course list for this category. ³ Minimum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴ Co-requisite is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.		
Courses in the Major and/or Minor may also fulfill a General Edu requirement; however, a GEP category may not be subset to requ specific course from the category list. Required courses must be l the Major/College requirements. Specific courses should not be listed in any of the fields below o than ENG 101.			
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)	
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) In the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements	
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements	
English 101	4	ENG 101 (C-)-wall	
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category	
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.	
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts	
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category	
Health Exercise Sciences (including one Fitness course)	2	Choose course(s) from the University Approved GEP course list for this category	
Total credit hours needed to complete GEP that are <u>not</u> satisfied as part of the Major/College requirements.	21 hours		
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity* or Global Knowledge** co-requisite are marked on course lists with asterisks as indicated.	
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category	

Global Knowledge co-requisite**		Choose course(s) from the University Approved GEP cou list for this category	
Foreign Language Proficiency		FL_102	
The following requirements must be satisfied within the College/Program:			
Advanced Communication		Satisfied by College/Program Requirements	
Technology Fluency	Fechnology Fluency X		
Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	122	As applicable, indicate here the overall GPA requirement for degree completion including course completion.	



www.engr.ncsu.edu

Campus Box 7904 21 Current Drive, Page Half Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student AffairsFROM: Dr. Kanton Reynolds, Departmental Curriculum Chair, Industrial Engineering Department

RE: Curriculum Revision for 14IEBSto specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Industrial Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

	SIGNATURES	
RECOMMENDED BY:	Jah Kim HEAD DEPARTMENT/PROKIRAM	11/15/17
ENDORSED BY:	CHAR, COLLEGE COURSES & CURRICULA COMMITTEE	15 NOV 17 DATE
	COLLEGE DEAN . Favelle	12/04/17 DATE
APPROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

Industrial Engineering [14IEBS Req Term Spring 14]

		Fall Semester		shman Ye	ar	G · · · G		
CH	101	Chemistry, A Molecular Science	Crea 3	uus		Spring Semester		Credits
CH			1	EC	205		11.41	
E		General Chemistry Lab ¹ Introduction to Engr & Prob Solv ^{1,2}	1	EC MA		Economics (or EC 201 or ARE 20	<u>/1*)</u>	3
E		Intro to Computing Environ ^{1,2}	1			Calculus II'		4
ENG			1	PY		Physics for Engr & Sc I		3
		Academic Writing and Research ^{1,2} Calculus I ¹	4	PY		Physics for Engr & Sc I Lab		1
MA			4	HES ***	***	Health & Exercise Studies		1
HESI	- 10*	Fitness & Wellness	1	***	***	GEP Requirement*	a series	3
		Semester Tota	al 15			Seme	ster Total	15
		5.4.5		omore Ye	ar			Gene
LICE	200	Fall Semester	Crea			Spring Semester		Credits
ASE		Mech Prop Struc Mat	3	ECE		Prin of Elect Engr		3
SE		Comp Model for Engrs ³	3	ISE	215	Found of Design & 3D Model for	Engr	1
1A		Calculus III	4	ISE		Mfg Engr Practicum		3
Y		Physics for Engr & Sc II	3	MA		Linear Analysis		3
Y		Physics for Engr & Sc II Lab	1	ST	372	Intro Stat Infer & Regres		3
Т	371	Intro Prob & Dist Theory ²	3	***	***	Engr Science Elect ⁴		3
		Semester Tota	al 17			Semes	ster Total	16
			Ju	nior Year				
		Fall Semester	Crea	lits		Spring Semester		Credits
ING	331	Tech Writing	3	ISE	352	Work Anal & Design		3
SE		Intro to Computer-Aided Manufacturing	1	ISE		Stochastic Models in IE		3
SE		Mfg Engr I - Processes	3	ISE		Quality Control		3
SE		Deter Models in IE	3	***	***	Technical Elect ⁶		3
SE		Intro to Simulation	3	CE		Engr Mech - Statics		3
**	***	Ethics (GEP Req*) ⁵	3	CL.	211	Engl moon states		5
		Semester Tota	al 16			Semes	ster Total	15
				nior Year				
		Fall Semester	Crea	lits		Spring Semester		Credits
SE		Engr Economic Analysis	3	ISE	498	Sr Design Proj		3
SE		Cont of Prod & Ser Sys	3	***	***	Technical Elect ⁶		3
SE	453	Design of Prod, Logistics & Serv Syst	3	***	***	GEP Requirement*		3
**	***	Technical Elect ⁶	3	***	***	GEP Requirement*		3
**	***	GEP Requirement*	3	***	***	GEP Requirement*		2-3
		Semester Tota	al 15				ster Total	14-15
				Minimu	m Tot	al Credit Hours Required for Gr	aduation	124
						ar ereat from a required for Gr	uuuuuu	124
Cour	ses requ	am requirements and footnotes: ired for Change of Degree Audit (CODA). CH 101, 10	2; MA 1	41, 241, PY	205, 206	must be completed with C or higher.		
ISE I	10 must	or better required, E 115 requires satisfactory completio be completed with a grade of C or higher.						
5 Ethie	es electiv	science electives: CE 313, MAE 208, MAE 301, MAE ve: IDS 201, IDS(NR) 303, STS 214, STS 302, STS 30 ective: ISE 416, 417, 452, 462, 495; MSE 445, 465, 48	4, STS 3	22, or STS(F	PHI) 325			
		ucation Program (GEP) requirements and GEP Foo		0, 101				
To co Unive	mplete t rsity ap	he requirements for graduation and the General Educati proved GEP course lists for each of the following catego	on Progr		wing cal	egory credit hours and co-requisites must b	e satisfied	
Hum	anities (su edu/gep-courses 6 credit hours selected from two different disciplines/co the University approved GEP Humanities course list. ⁴ 0			Thange o	f Degree Audit (CODA) CH 101 102 M	A 141 241-1	DV 205
must ² Grad	be comp e of C- o	leted with C or higher. or better required, E 115 requires satisfactory completio	n (S).		anange 0	- Segree Andri (CODA), CH 101, 102, M	. 191, 291, 1	1 203
Choo	se 3 cre	es (6 credit hours selected from two different discipline dits from the University approved GEP Social Sciences	course	list in a disci				
the G	EP Soci	5 (or EC 201 or ARE 201), taken as part of the Major 1 al Sciences requirement.						
		xercise Studies (2 credit hours – must include one HES the University approved GEP Health and Exercise Stud			nd one a	dditional HES course)		

Choose from the University approved GEP Health and Exercise Studies course list. Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists) Choose from the Humanities Social Sciences Visual and Performing Arts

Choose from the Anamatic Berton Exception of the Control of the Co

I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course

Choose from the University approved GEP 0.5. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.
 Global Knowledge (GK) Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.
 Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

Industrial Engineering [14IEBS Req Term Spring 2018]

L L	Fall Semester		man Ye	ar	C		
	, A Molecular Science ¹	Credi 3	EC	205	Spring Semester Economics (or EC 201 or	ADE DOTA	Credit.
CH 102 General C	'hemistry I ab ¹	1	MA		Calculus II ¹	FARE 201*)	3
	on to Engr & Prob Solv ^{1,2}	î	PY		Physics for Engr & Sc I ¹		4
	omputing Environ ^{1,2}	1	PY		Physics for Engr & Sc I I	ab	1
And a second sec	Writing and Research ^{1,2}	4	HES		Health & Exercise Studie		1
A 141 Calculus I		4	E		Engineering in the 21st C		2
IESF 10* Fitness &		1	-	.04	Removing GEP	cincury (OEI -II)	4
	Semester Tota	al 15				Semester Total	14
		Sopho	more Ye	ar			
	all Semester	Credi			Spring Semester		Credit:
ISE 200 Mech Proj		3	ECE		Prin of Elect Engr		3
SE 110 Comp Mo		3	ISE	215	Found of Design & 3D N	lodel for Engr	1
IA 242 Calculus I		4	ISE		Mfg Engr Practicum		3
Y 208 Physics fo		3	MA		Linear Analysis		3
	or Engr & Sc II Lab	1	ST		Intro Stat Infer & Regres		3
Г 371 Intro Prob	& Dist Theory ²	3	***	***	Engr Science Elect ⁴		3
	Semester Tota	al 17				Semester Total	16
		Jun	ior Year				
	all Semester	Credit			Spring Semester		Credits
NG 331 Tech Writ		3	ISE		Work Anal & Design		3
	omputer-Aided Manufacturing	1	ISE	362	Stochastic Models in IE		3
E 316 Mfg Engr		3	ISE	443	Quality Control		3
E 361 Deter Mod		3	***	***	Technical Elect6		3
E 441 Intro to Si		3	CE	214	Engr Mech - Statics		3
* *** Ethics (GE		3					
	Semester Tota	al 16				Semester Total	15
		Seni	ior Year				
	all Semester	Credit	s		Spring Semester		Credits
E 311 Engr Econ		3	ISE		Sr Design Proj		3
E 408 Cont of Pr		3	***		Technical Elect6		3
	Prod, Logistics & Serv Syst	3	***	***	GEP Requirement*		3
* *** Technical * *** GEP Requ		3	***		GEP Requirement*		3
* *** GEP Requ		3	***	***	GEP Requirement*		3
	Semester Tota	1 15				Semester Total	15
		1	Minimun	n Tota	I Credit Hours Required	for Graduation	123
Grade of C- or better requ	nents and footnotes: nge of Degree Audit (CODA). CH 101 irred, E 115 requires satisfactory compl d with a grade of C or higher.	. 102: MA					
Ethics elective: IDS 201,	ives: CE 313, MAE 208, MAE 201, M IDS(NR) 303, STS 214, STS 302, STS	S 304, ST	\$ 322. or S	4 TS(PHI) 325		
	116, 417, 452, 462, 495; MSE 445, 465,	, 485; ST	430, 431				
Technical elective: ISE 4	gram (GEP) requirements and GEP 1	Footnotes	1				
Technical elective: ISE 4 General Education Prog	nts for andustion and the Constal Edu			C. 11	P.4.	Constraining and the stants of the	
Technical elective: ISE 4 General Education Prog o complete the requireme	ents for graduation and the General Edu	lowing ca	ogram, the ategories ca	followir an be fo	ng category credit hours and co und at	-requisites must be	
Technical elective: ISE 4 General Education Prog o complete the requireme atisfied. University appro ttp://oucc.ncsu.edu/gep-cc	ents for graduation and the General Edu oved GEP course lists for each of the fo ourses	llowing ca	ategories ca	followir an be fo	ng category credit hours and co und at	-requisites must be	
Technical elective: ISE 4 General Education Prog to complete the requirement attisfied. University approt ttp://ouce.ncsu.edu/gep-cc lumanities (6 credit hour.	ents for graduation and the General Edu oved GEP course lists for each of the fo ourses s selected from two different discipline	llowing ca	ategories ca refixes)	an be fo	und at	é.	1
Technical elective: ISE 4 <u>General Education Prog</u> o complete the requirement tisfied. University appro- tip://ouce.ncsu.edu/gep-ec- <u>lumanities</u> (6 credit hour. <i>hoose from the Universitj</i> 41; PY 205 must be comp	ents for graduation and the General Edu wed GEP course lists for each of the fo ourses s selected from two different discipline y approved GEP Humanities course list oleted with C or higher.	ellowing ca es/course p at . ¹ Course	ategories ca refixes)	an be fo	und at	é.	Ι,
Technical elective: ISE 4 General Education Prog o complete the requirement tisfied. University appro- tip://ouce.ncsu.edu/gep-co- umanities (6 credit hour, hoose from the University 1; PY 205 must be comp Grade of C- or better requi	ents for graduation and the General Edu wed GEP course lists for each of the fo ourses s selected from two different discipline y approved GEP Humanities course list sleted with C or higher. ired, E 115 requires satisfactory compli-	ellowing ca s/course p t . ¹ Course etion (S).	ategories c: refixes) s required	an be fo for Cha	und at	é.	Ι,
Fechnical elective: ISE 4 General Education Prog o complete the requirement tisfied. University appro- tp://ouce.ncsu.edu/gep-ca umanities (6 credit hours hoose from the University H1; PY 205 must be com- grade of C- or better requi- pcial Sciences (6 credit h	ents for graduation and the General Edu wed GEP course lists for each of the for ourses is selected from two different discipline by approved GEP Humanities course list pleted with C or higher. irred, E 115 requires satisfactory compli- ours selected from two different discipline	ellowing ca es/course p t - ¹ Course etion (S). lines/cour	ategories ca prefixes) es required se prefixes	an be fo for Cha	und at nge of Degree Audit (CODA).	é.	1,
General Education Prog o complete the requirement tisfied. University appro- tisfied. University appro- tip://oucc.ncsu.edu/gep-cc. umanities (6 credit hour hoose from the University 11; PY 205 must be comp trade of C- or better requ point Sciences (6 credit house hoose 3 credits from the conomics 205 (or EC 201	ents for graduation and the General Edu wed GEP course lists for each of the fo ourses s selected from two different discipline y approved GEP Humanities course list oleted with C or higher. irred, E 115 requires satisfactory compli- ours selected from two different disciple to university approved GEP Social Scien- tor ARE 201), taken as part of the Maj	ellowing ca es/course p t - ¹ Course etion (S). lines/course nces course	ategories ca prefixes) es required se prefixes se list in a	an be fo for Cha) disciplir	und at nge of Degree Audit (CODA). ne other than Economics	é.	I,
Cechnical elective: ISE 4 General Education Prog to complete the requirement tisfied. University appro- tisfied. University appro- tip://oucc.ncsu.edu/gep-co- umanities (6 credit hour- tio from the University 11; PY 205 must be comp irade of C- or better requi- point Sciences (6 credit hour- thoose 3 credits from the conomics 205 (or EC 201) the GEP Social Sciences r	ents for graduation and the General Edu wed GEP course lists for each of the fo ourses s selected from two different discipline y approved GEP Humanities course list oleted with C or higher. irred, E 115 requires satisfactory compl- ours selected from two different disciple e University approved GEP Social Scient for ARE 201), taken as part of the Maj requirement.	Illowing ca es/course p t - ¹ Course etion (S). lines/cours nces course for require	ategories ca prefixes) es required se prefixes se list in a a ments, sat,	an be fo for Cha) disciplir isfies 3 o	und at nge of Degree Audit (CODA). ne other than Economics. credit hours needed to fulfill	é.	1,
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K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

GEP FORMAT B - CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Industrial Engineering

Current Degree Key: 14iEBS

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate If course or course groupings have a	1	List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math	1	
MA 141(C), MA 241(C), MA 242	12	Mathematics (6 hours)
MA 303	3	
ST 371(C-), ST 372	6	
Sciences		
CH 101(C), CH 102(C)	4	Natural Sciences (3 hours)
PY 205(C), PY 208	8	Natural Sciences (4 hours)
ISE Major		
ISE 110(C)	3	
ISE 215	1	
ISE 216	3	
ISE 315	1	
ISE 316	3	
ISE 311	3	
ISE 352	4	
ISE 361	3	
ISE 362	3	
ISE 408	3	
ISE 443		
ISE 498	3	
Other Major		
GRP 035 (ISE 441 or CSC 441)	3	
GRP 030 (CE 214 or MAE 206)	3	
ECE331	3	
MSE 200	3	
ENG 331	3	
	3	
GRP 033 (CE 215, CE 313, MAE 208, MAE 301, MAE 308, MAE 314)	3	Humanities (3 hours); GEP co-requisite for
GRP206 (IDS 201, IDS 303, STS 214, STS 302, STS 304, STS 320, STS	3	Advanced Communications
322, STS 325)	3	Interdisciplinary Perspective (3 hours)
Concentration Courses/Groups/Electives:		
Technical Electives: ISE 416, ISE 417, ISE 452, ISE 462, ISE 495, MA		
105, ST 430, ST 431, MSE 465, MSE 485	9	
ree Electives:	3	
Total credit hours under Major Field of Study:	1021	
Minimum 27 hours required in program area.	102 hours	
COLLEGE REQUIREMENTS:		

Orientation Course(s): E 101 (C-) E 115 and E102	4	Technology Fluency requirement and IP
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science (3 hours)
Total credit hours under College Requirements:	7 hou	rs
NCSU GENERAL EDUCATION PROGRAM REQUIREMEN Courses in the Major and/or Minar may also fulfill a General Edu requirement; however, a GEP category may not be subset to requ specific course from the category list. Required courses must be in the Major/College requirements. Specific courses should not be listed in any of the fields below of than ENG 101.	cation vire a isted in	At least one of the following must be listed: ¹ Choose course(s) from the University Approved GEP sourse list for this category. ³ Minimum requirements are satisfied by Mojor/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁴ Co-requisite Is satisfied by a Major/College course requirement. ⁵ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁵ Choose course(s) from the University Approved GEP course lists
General Education Program Requirements:	Credit	for the Natural and Mathematical Sciences. How will the GEP requirement be met?
Minimum 39-40 hrs Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Major may double-count to sotisfy this requirement and also satisfy both the Global Knowledge and Diversity co-reguisites.	hours X	(choose applicable statement from 1-6 listed abave) Minimum requirements are satisfied by Major course requirements
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements
English 101(C-)	4	ENG 101
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites. Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Major requirement (ENG 331) satisfies 3 credit hours of this requirement. Remaining hours must be chosen from the University Appraved GEP course list for this cotegory College requirement (EC 205 or EC 201 or ARE 201) satisfies 3 credit hours of this requirement. Remaining hours must be chosen from the University Approved GEP course list for this category
Additional Breadth (minimum of 3 credits) Choose AB course list that is different from the approach of the Major) Mojor/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity to challettes.	3	Choose caurse(s) from the University Appraved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Majar may double-count to satisfy this requirement.	•	Major requirement (Ethics-GRP 203) satisfies 3 credit hours of this requirement. E102 satisfies 2 Credit Hours I
Physical Education/Healthy Living Including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	18 hours	•
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity* or Global Knowledge** co-requisite are marked an course lists with asterisks as indicated.
J.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category
Slobal Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this cotegory
Foreign Language Proficiency	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	FL_102

The following requirements must be satisfied within the College/Program:		
Advanced Communication	X	Satisfied by College/Program Requirements
Computer Literacy	x	Satisfied by College/Program Requirements
Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	23 Total nours	Graduation requirements include: (a) 2.0 overall GPA or higher on all courses attempted at NCSU and (b) 2.0 GPA or higher in all ISE designated courses, or a C- or higher in all ISE designated courses.



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DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Cheryl Cass, Departmental Curriculum Chair, Materials Science Engineering Department

RE: Curriculum Revision for 14MSEBS to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Materials Science Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E10: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

RECOMMENDED BY: August Ment/PROXIMAN II/1-7/17 HHAD, DEPAREMENT/PROXIMAN DATE ENDORSED BY: CHAIR COLLEGE COURSES & CURRICULA COMMETTEE DATE		SIGNATURES	
ENDORSED BY: CHAIR COLLEGE COURSES & CURRICULA COMMUTTEE DATE	COMMENDED BY:	HEAD DEPAREMENT/PROXIMAN	11/1-7/17 DATE
	IDORSED BY:	CHAIR COLLEGE COURSES & CURRICULA COMMUTTEE	
COLLEGE DEAN . Favelle 12/04/17			
APPROVED BY: CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE DATE	PROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS DATE		DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

Materials Science & Engineering [14MSEBS Reg Term Summer 1 13]

		Freshr	nan Yea	r	
	Fall Semester	Credit	8	Spring Semester	Credits
CH	101 Chemistry, A Molecular Science	3	CH	201 Chemistry, A Quant Science	2
CH	102 General Chemistry Lab	1	CH	202 Quantitative Chemistry Lab	5
E	101 Introduction to Engr & Prob Solv	1	MA	241 Calculus II	1
E	115 Intro to Computing Environ12	i	PY	205 Physics for Engr & Sc I'	4
ENG	101 Academic Writing and Research	4	PY		3
MA	141 Calculus I	4	HESF	206 Physics for Engr & Sc I Lab	1
EC	205 Economics (or EC 201 or ARE 201)*	-	HESF	10* Fitness & Wellness Course*	1
		3	***	*** GEP Requirement*	3
	Semester Total	17		Semester Total	16

		Sophor	more Ye	ar	
	Fall Semester	Credi	ts	Spring Semester	Credits
CSC	112 Intro Comp: Fortran (or CSC 116: Java)	3	CH	220 Intro to Organic Chemistry	creans
MA	242 Calculus III	4	MA	341 Applied Diff Equations I	4
MSE	201 Struct & Prop Engr Materials	3	MSE	255 Exp Meth Struct Analysis of Matis	3
PY	208 Physics for Engr & Sc II	3	MSE	260 Math Math do Co Manysis of Maris	2
PY	209 Physics for Engr & Sc II Lab	1	MSE	260 Math Methods for Material Engineers	3
HES*	*** Health & Exercise Studies		MSE ###	270 MSE Seminar	1
	the Excitise Studies	1		*** GEP Requirement*	3
	Semester Tot	al 15		Semester Total	16

Jun	lior	Year
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	1.2.1	Fall Semester	Credits			Spring Semester	Credits
MSE		Structure of Matls at Nanoscale	3	MSE	355	Elect. Mag & Opt Prop of Matis	creans
MSE	301	Intro Thermodynamics of Matls	3	MSE		Kinetic Process in Matls	3
MSE		Intro Defects in Solids	3	MSE		Microstructure of Inorganic Matis	3
MSE	335	Exp Meth Analysis of Matls Properties	2	MSE	380	Microstructure of marganic Maris	3
***	***	GEP Requirement*	2			Microstructure of Organic Matls	3
***	***	GEP Requirement*	3			Engineering Elective	3

Semester Total 17

Semester Total 15

Seni	or Year			
		480 *** ***	Materials Forensics and Degradation Tech Elect ⁴ Tech Elect ⁴	Credits 3 3 3 2-3
		I MSE 3 MSE 3 MSE	Credits 3 MSE 470 1 MSE 480 3 MSE *** 3 MSE ***	Credits Spring Semester 3 MSE 470 Matl Sci & Engr Design Project 1 MSE 480 Materials Forensics and Degradation 3 MSE *** Tech Elect ⁴ 3 MSE *** Tech Elect ⁴

Semester Total 16

Semester Total 14-15

Minimum Total Credit Hours Required for Graduation 126

Major/Program requirements and footnotes:

- 110

Courses required for Change of Degree Audit (CODA) CH 101, 102; MA 141, 241, PY 205, 206 must be completed with C or higher ²Minimum grade of C-, E 115 requires satisfactory completion (S)

Millihan grade of C-, E-15 requires satisfactory completion (S) ¹Choose any course from the following list: CE 214 or MAE 206, CE 215 or MAE 208, CE 313 or MAE 314, CSC 200, ECE 331, ISE 311, MSE 350, MSE(NE) 409, NE 202, TE 205, CHE 455, MSE 440, MSE 445, MSE 455, MSE 456, MSE 460 ¹Choose any course from the following list: BCH 451, CH 221, CH 223, CH 315, CH 401, CH 437, MA 305, MA 351, MA 401, MA 402, MA 405, MEA 463, PY 328, PY 407, PY 411, PY 412, PY 414, PY 415, PY 403, ST 370, CE 214or MAE 206, CE 215 or MAE 208, CE 313 or MAE 314, CSC 200, ECE 331, ISE 311, MSE 350, MSE(NE) 409, NE 202, TE 205, CHE 455, MSE 440, MSE 445, MSE 455, MSE 456, MSE 460 ¹Choose any course from the following list: CHE 455, MSE 202, CE 215, CHE 455, MSE 440, MSE 445, MSE 455, MSE 456, MSE 460

CSC 200, ECE 331, ISE 311, MSE 350, MSE(NE) 409, NE 202, 1E 205, CHE 455, MSE 440, MSE 445, MSE 445, MSE 440, MSE 445, MSE 440, 445, 455, 460, 456. ³Choose any course from the following list: CHE 455, MSE 440, 445, 455, 460, 456. "Ethics course must be chosen from the following list: IDS 201, STS 302, 324, 325 (PHI 325); PHI 214, 221 or 375. <u>"General Education Program (GEP) requirements and GEP Footnotes:</u> To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied University amount GEP course lists for each of the following categories can be found at University approved GEP course lists for each of the following categories can be found at Humanities (6 credit hours selected from two different disciplines course prefixes) Social Sciences (6 credit hours selected from two different disciplines course prefixes) Chaose from the University approved (*EP* Humanities course hat Social Sciences (6 credit hours selected from two different disciplines course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill

the GEP Social Sciences requirement

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course) Chorse from the University approved GEP Health and Exercise Studies course list. Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities Social Sciences Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list

The following Co-Requisites must be satisfied to complete the General Education Program requirements

L U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-regulate

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation

Materials Science & Engineering [14MSEBS Req Term Spring 2018]

CH CH	Fall Semester	Fresh Cred	man Yea	r	Carling Carried	<i>a</i> . 11
	101 Chemistry, A Molecular Science	3	CH	201	Spring Semester Chemistry, A Quant Science	Credits
	102 General Chemistry Lab	1	CH		Quantitative Chemistry Lab	3
E	101 Introduction to Engr & Prob Solv ^{1,2}	1	MA		Calculus II ¹	4
E	115 Intro to Computing Environ ^{1,2}	1	PY		Physics for Engr & Sc I ¹	3
ENG	101 Academic Writing and Research ^{1,2}	4	PY	206	Physics for Engr & Sc I Lab	1
MA	141 Calculus I ¹	4	HESF		Fitness & Wellness Course*	1
EC	205 Economics (or EC 201 or ARE 201)*	3	E	102	Engineering in the 21st Century (GEP - IP)	2
	Semester Total	17				15
			more Yea	r		
MOD	Fall Semester	Cred			Spring Semester	Credits
MSE MA	201 Struct & Prop Engr Materials ² 242 Calculus III	3	CH		Introductory Organic Chemistry	3
ST	370 Prob & Statistics for Engineers	4	CH MA		Organic Chemistry I Lab	1
PY	208 Physics for Engr & Sc II	3	MSE		Applied Diff Equations I Exp Meth Struct Analysis of Matls	3 2
PY	209 Physics for Engr & Sc II Lab	1	MSE		Math Methods for Material Engineers	3
HES*		1	MSE		MSE Seminar	1
	Semester Total	15	***	***	GEP Requirement*	3
		Tuni	ior Year		Semester Tota	1 16
	Fall Semester	Credi			Spring Semester	Credits
MSE	300 Structure of Matls at Nanoscale	3	MSE	355	Elect, Mag & Opt Prop of Matls	Creans 3
MSE	301 Intro Thermodynamics of Matls	3	MSE		Kinetic Process in Matls	3
MSE	320 Intro Defects in Solids	3	MSE	370	Microstructure of Inorganic Matls	3
MSE	335 Exp Meth Analysis of Matls Properties	2	MSE		Microstructure of Organic Matls	3
***	*** Tech Elect ^{3,4,5} *** GEP Requirement*	3	***	***	Engineering Elective ^{3,5}	3
	Semester Total				Semester Tota	1 15
						5. Or
	Fall Semester	Seni Credi	ior Year		Spring Semester	0 1.
MSE	420 Mechanical Prop of Matls	3	MSE	470	Matl Sci & Engr Design Project	Credits 3
MSE	423 Intro to Matls Engr Design	1	MSE		Materials Forensics and Degradation	3
MSE	*** MSE Processing Elective ⁵	3	MSE		Tech Elect ^{3,4,5}	3
MSE	*** Tech Elect ^{3,4,5}	3	***	***	GEP Requirement* ⁶	3
ENG	331 Technical Writing (or ENG 333) *** GEP Requirement*	3	***	***	GEP Requirement*	3
	*** GEP Requirement* Semester Total	3			Semester Tota	15
Main	r/Program requirements and footnotes:		Minimum	Tota	I Credit Hours Required for Graduation	126
³ Choo ISE 3 ⁴ Choo MEA CSC 5 ⁵ Choo ⁶ Ethic: *Gend To con satisfic http:/// Huma Choos Social Choo.	mum grade of C-, E 115 requires satisfactory completion (S). se any course from the following list: CE 214 or MAE 206, 1 11, MSE 350, MSE(NE) 409, NE 202, TE 205, CHE 455, MS se any course from the following list: BCH 451, CH 221, CH 463, PY 328, PY 407, PY 411, PY 412, PY 414, PY 415, PY 200, ECE 331, ISE 311, MSE 350, MSE(NE) 409, NE 202, T se any course from the following list: CHE 455, MSE 440, 4 s course must be chosen from the following list: IDS 201, ST eral Education Program (GEP) requirements and GEP Fo mplete the requirements for graduation and the General Educated. University approved GEP course lists for each of the following endities (6 credit hours selected from two different disciplines/ e from the University approved GEP Humanities course list. Sciences (6 credit hours selected from two different disciplines/ e from the University approved GEP Humanities course list. Sciences (6 credit hours selected from two different disciplines/ e from the University approved GEP Humanities course list. Sciences (201 or ARE 201), taken as part of the Major EP Social Sciences requirement. h and Exercise Studies (2 credit hours – must include one HI e from the University approved GEP Health and Exercise Sta- tional Breadth - (3 credit hours to be selected from the follow e from the Humanities/Social Sciences/Visual and Performing	SE 440, 223, Cl 463, S' E 205, 45, 455 S 302, otnote thion Pr owing c course nes/course requir ESF 10 dies co ving Un g Arts	, MSE 445, H 315,CH 4 T 370, CE 2 CHE 455, N 5, 456, 460. 304, 325 (P <u>Si</u> rogram, the ' categories ca prefixes) rse prefixes) rse prefixes) rse prefixes, rse list in a c rements, sati 0-level cour nurse list. niversity app	MSE 4 01, CH 14or M MSE 44 PHI 325 followin in be fo disciplini sfies 3 se and proved	55, MSE 456, MSE 460 (437, MA 305, MA 351, MA 401, MA 402, MA 40 (AE 206, MAE 208, CE 313 or MAE 214, 10, MSE 445, MSE 455, MSE 456, MSE 460 (); PHI 214, 221 or 375. ng category credit hours and co-requisites must be pund at <i>the other than Economics.</i> <i>credit hours needed to fulfill</i> one additional HES course) GEP course lists)	5,
the G. Healtl Choos Additi Choos Interd Choos The fo	 lisciplinary Perspectives (5-6 credit hours) e from the University approved GEP Interdisciplinary Perspective and the University approved GEP Interdisciplinary Perspective (USD) U.S. Diversity (USD) Choose from the University approved GEP U.S. Diversity 	eral Ed				
the G. Healtl Chooss Additi Chooss Interd Chooss The fo I J	e from the University approved GEP Interdisciplinary Perspective Illowing Co-Requisites must be satisfied to complete the Gen U.S. Diversity (USD)	eral Ed y cours vledge d equisite	se list or cho course list o e.	oose a c r choos	course identified on the approved GEP course se a course identified on the approved GEP	

3. List of requirements (Format B)

CURRICULUM REQUIREMENTS B BS IN MATERIALS SCIENCE AND ENGINEERING

Format B

ring Plan SIS Code: 14MSEBS
Subplan SIS Code:
Proposed Effective Semester: Spring 2018
idered critical path courses which represent specific ram/plan. Place the (CP) next to the credit hours for the

MAJOR FIELD OF STUDY REQUIREMENTS:		
Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate if course or course groupings have a C-wall or MGPA requirement and which are considered Critical Path courses – indicate with (CP) next to applic. course.		List GEP category and hours satisfied by a Major requirement
<u>Math</u> MA 141 (CP), MA 241 (CP), MA 242 (CP), MA 341, ST 370 <u>Sciences</u>	18	Mathematics (6 hours)
CH 101 (CP), CH 102 (CP), CH 201, CH 202, CH 220	12	Natural Sciences (8 hours)
PY 205 (CP), PY 208 (CP) EC 205	8	Social Sciences (3 hours)
Required courses MSE 201 (CP), MSE 255, MSE 260, MSE 270, MSE 300, MSE 301, MSE 320, MSE 335, MSE 355, MSE 360, MSE 370, MSE 380, MSE 420, MSE 423, MSE 470, MSE 480	42	
Concentration <u>Courses/Groups/Electives:</u> GRP 080 – MSE Processing Elective (choose 1 course)	_	
MSE 440, MSE 445, MSE 455, MSE 456, MSE 460 GRP 061 Engineering Elective (choose 1 course) Any MSE processing elective, MSE 350, MSE/NE 409, MSE 490B, CE 214, CE 251, CE 313, MAE 206, MAE 208, MAE 314, ECE 331, ISE/GC 210, ISE 311, NE 202, TE 205 GRP 071 – Technical Electives (choose 3 courses) Any MSE processing elective, any engineering elective, BCH 451, CH 221, CH 223, CH 315, CH 401, CH 437, MA 305, MA 351, MA 401, MA 402, MA 405, PY 328, PY 407, PY 411, PY 412, PY 414, PY 415, MEA/PY 463	15	

Page 7

Free Electives:		
Total credit hours under Major Field of Study: Minimum 27 hours required In program area.	98	
COLLEGE REQUIREMENTS:		
Orientation <u>Course(s):</u> E 101, E 115 and E102	4	
Other: ENG 331	3	Satisfies Communication in the Major GEP co-requisite
Total credit hours under College Requirements:	7	

	NCSU GENERAL EDUCATION PROGRAM REQUIREMEN Courses in the Major and/or Minor may also fulfill a General Educ requirement; however, a GEP category <u>may</u> not be subset to requi specific course from the category list. Required courses must be list the Major/College requirements. Specific courses should not be listed in any of the fields below of than ENG 101.	 At least one of the following must be listed: Choose course(s) from the University Approved GEP course list for this category Minimum requirements are satisfied by Major/College course requirements. Major/College course requirement satisfies <u>X</u> credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. Co-requisite is satisfied by a Major/College course requirement. Choose course(s) from the University Approved GEP course lists for the Humanities/ Social Sciences/ Visual & Performing Arts. Choose course(s) from the University Approved GEP course lists for Natural Sciences/Mathematical Sciences. 	
1	General Education Program Requirements:	Credit	How will the GEP requirement be met?
	Minimum 39-40 his	hours	(Choose applicable statement from 1-6 listed above)
	Mathematical Sciences (6 credits) (At least 1 course with MA or ST prefix) (6 credits) Course(s) In the Major may double-count ta satisfy this requirement and also satisfy either the Global Knowledae or U.S. Diversity co-requisites.	x	(Choose statement 1, 2 or 3) 2. Minimum requirements are satisfied by Major/College course requirements.
	Natural Sciences (7 credits) (At least 1 lab course or course with a lab) (7 credits) Course(s) in the Major may double-count to satisfy this requirement and also satisfy either the Global Knowledge or U.S. Diversity co-requisites.	x	(Choose statement 1, 2 or 3) 2. Minimum requirements are satisfied by Major/College course requirements.
-	English 101 (C- or better required) (4 credits)	4	ENG 101
	Humanities (6 credits) (Courses from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy either the Global Knowledae or U.S. Diversity co-requisites.	6	(Choose statement 1, 2 or 3) 1. Choose course(s) from the University Approved GEP course list for this category.
	Social Sciences (6 credits) (Courses from two different disciplines) Caurse(s) in the Major may double-count to satisfy this requirement and also satisfy either the Global Knowledge or U.S. Diversity co-requisites.	3	(choose statement 1, 2 or 3) 3. Course in the Major (EC 205) satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
	Additional Breadth (3 credits) (Choose approach that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge or U.S. Diversity co-reaulsites.	3	(Choose statement 5 or 6) 5. Choose course(s) from the University Approved GEP course lists for the Humanities/Social Sciences/Visual and Performing Arts
	Interdisciplinary Perspectives (5 credits) Course(s) in the Major may double-count to satisfy this requirement and also satisfy either the Global Knowledge or U.S. Diversity co-requisites.	3	(Choose statement 1, 2 or 3) 1. Choose course(s) from the University Approved GEP course list for this category.
	Physical Education/Healthy Living (2 credits) (Including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category.
ĺ	Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	21	

Page 8

GEP Co-Requisites:			Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity or Global Knowledge co-requisite are marked on course lists with a "USD" or "GK" indicator.
U.S. Diversity co-requisite	(USD)	n/a	(Chaase statement I or 4)
Global Knowledge co-requisite (GK)		n/a	(Lnoase statement I or a)
Foreign Language Proficiency		n/a	Proficiency at the FL_102 level required.
The following requirements must be satisfied within the College/Program:			Place an X in the credit hour box to indicate below that the requirement is "Satisfied by College/Program Requirements"
Communication in the Major (Advanced Communicat	tion)	X	Satisfied by College/Program Requirements
Technology Fluency		Х	Satisfied by College/Program Requirements
Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	126		As applicable, indicate here the overall GPA requirement for degree completion including course completion.

Page 9

4. Catalog description of proposed curriculum

The Department of Materials Science and Engineering (MSE) offers programs to qualify graduates for positions in industry, R & D laboratories, educational institutions and governmental agencies. This basic education involves design, development, selection and processing of engineered materials. Industries served by graduates in materials science and engineering are aerospace, automotive, chemical and chemical processing, communications, electronics, energy production, manufacturing, nuclear and transportation. This program has been accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202; phone: (410) 347-7700.

The MSE program at NCSU prepares their B.S. graduates to achieve the following career and professional goals:

- To apply their knowledge of materials science and engineering to problems and challenges encountered in their professional careers.
- To use modern analytical equipment and methods as needed for materials testing, design, processing, development and research.
- To communicate well orally and in writing, interact professionally and work effectively on multidisciplinary teams to achieve design and project objectives.
- To engage in lifelong learning in their profession and practice professional and ethical responsibility.

Opportunities

The continuing industrial and technological growth of the United States, the southeast region, and the state of North Carolina has been marked by a particularly strong and increasing demand for materials engineers and scientists. Modern technological advances require new materials and novel processing and/or fabrication methods. At the national level, materials research is prominently mentioned in most lists of critical or enabling technologies. As our understanding of materials science advances, common features and elements tend to unite many different industries. As an example, consider that our current knowledge of silicon is necessary in the electronics, photovoltaics, optical fiber technology, lasers, pollution control, and biomedical industries. Advanced understanding of polymers also crosses and unites several different industries such as plastics, textiles, electronics, biomaterials and recycling.

Education in materials science and engineering provides career opportunities in a wide range of industries from those that produce and/or use metals, glass, polymers, or ceramics, to those which use such materials in an integrated fashion such as the microelectronics industry. These opportunities include careers in research and development of new materials, new processes for producing them, failure analysis, product design, testing and reliability, and technical management at all levels of business. The importance and growth potential of the materials science and engineering discipline is reflected by a recent U.S. Department of Labor study which predicts that over the next decade the demand for materials engineers and scientists will exceed that of any other engineering discipline.

Curriculum

The materials scientist and engineer must understand the wide range of phenomena that occur in all classes of materials: metals, ceramics, polymers, composites and electronic materials. The MSE undergraduate curriculum achieves this by integrating concepts common to all classes of materials into each course as much as possible. This approach differs from the traditional MSE curriculum in which separate courses are devoted to each class of material. The integrated approach provides students with a better understanding of the differences between the various classes of materials by comparing them in each course. Students are then better prepared to design and select the right material for various applications.

The MSE curriculum includes fundamental courses in thermodynamics, kinetics and structure, followed by more applied courses that cover mechanical, thermal, electrical, magnetic and optical properties of materials. Two intensive laboratory courses introduce students to analytical methods used to characterize the structure of materials at all length scales and to measure properties of all classes of materials. Cutting-edge technologies in materials science and engineering such as nanotechnology, biomaterials, computer modeling and forensics (materials degradation and failure analysis) are covered. Five technical electives are included which allow students to select from a broad range of courses in materials processing, engineering, chemistry, physics, mathematics and other disciplines. The flexibility afforded by these technical electives allows students to customize their education to prepare them for careers in industry or for graduate school.

The required 2-semester capstone senior design sequence provides a bridge between concepts learned in the classroom and practical application of these concepts in an industrial setting. The fall semester course covers open-ended classroom exercises, design methodologies, critical thinking skills, group dynamics, team formation and preparation of team project proposals. In the spring semester course, teams of students work on real-world materials problems submitted by industrial sponsors. The remaining required courses in the MSE curriculum are distributed among mathematics, physical sciences, and the humanities and social sciences.

Biomaterials Concentration

The Biomaterials Concentration in the MSE department provides undergraduate students with a comprehensive materials science and engineering background, while introducing elements of biology that will afford students an understanding of how materials interact with the body and how they can enhance quality of life. Students who graduate with a biomaterials concentration in MSE will be well-suited for a career in medical device and medical technology industries that require sufficient understanding of materials selection, processing, and characterization.

Nanomaterials Concentration

The Nanomaterials Concentration in MSE provides undergraduate students with a comprehensive materials science and engineering background, while emphasizing concepts for understanding materials

Page 11

at length scales approaching the size of a few individual atoms or molecules of a material in the form of ultra-thin films, nanowires and nanoparticles. Properties from materials at these scales can differ from those observed in bulk specimens, while material structure engineering at the nanoscale can influence bulk structural and functional properties. Students who graduate with a Nanomaterials Concentration in MSE will be well prepared for a career working with materials that support nanotechnology industries including electronics, structural materials, and pharmaceuticals.

The materials science and engineering program, which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), leads to the degree Bachelor of Science in Materials Science and Engineering. An accelerated 5-year BS/MS program is available for advanced study and further specialization. Graduate degrees are also offered; consult the online Graduate Catalog: http://www.fis.ncsu.edu/grad_catalog/catalog.htm.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Minor in Materials Science and Engineering

The Materials Science and Engineering minor is designed to provide undergraduate engineering and science majors in curricula other than MSE with the fundamentals of modern materials science and engineering. Students may select between two tracks in the MSE minor. One track focuses on inorganic materials and requires 17 hours of MSE courses The second track focuses on organic (soft) materials and requires one semester of organic chemistry plus 14 hours of MSE courses. A cumulative GPA of 2.0 or higher is required in the minor courses. Further information regarding a Minor in Materials Science and Engineering is available from the MSE Director of Undergraduate Programs.

5. Enrollment history in Materials Science and Engineering for the past five years

The table below contains undergraduate enrollment information for the MSE-BS degree during the last five years. Note that MSE-U and EFY-MSEI students are not included in these numbers.

Year	Total 14MSE-BS Enrollment
2014	139
2013	118
2012	78
2011	57
2010	54

6. Projected enrollment in Materials Science and Engineering

Our total projected enrollment per year over the next 4 years will approach 150 students. The MSE department has an enrollment cap of 50 students per year for engineering first year students and internal and external transfer students.

Year	Total 14MSE-BS Enrollment
2015	140
2016	150
2017	150
2018	150



College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive. Page Hall Raleigh. NC 27695-7804 P 919 515 3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Jack Edwards, Departmental Curriculum Chair, Mechanical Engineering Department

RE: Curriculum Revision for 14MEBS to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Mechanical Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

	SIGNATURES	
RECOMMENDED BY:	HLAD DEPARTMENT PROCEAM	11/15/17 DATE
ENDORSED BY:	CHAR, COLLEGE COURSES & CURRICULA COMMITTEE	15 NOU 17
	COLLEGEDEAN P. Javelle	12/04/17 DATE
APPROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

APPROVAL DATE

Mechanical Engineering |14MEBS Req Term Summer 2 2015|

	Freshman Year					
	Fall Semester	Credits		Spring Semester	Credits	
CH	101 Chemistry, A Molecular Science ¹	3	CSC	113 Intro Comp MATLAB	3	
CH	102 General Chemistry Lab ¹	1	MA	241 Calculus II ¹	4	
E	101 Introduction to Engr & Prob Solv ^{1,2}	I	PY	205 Physics for Engr & Sc 11	3	
E	115 Intro to Computing Environ ^{1,2}	1	PY	206 Physics for Engr & Sc 1 ¹ Lab	1	
ENG	101 Academic Writing and Research ^{1,2}	4	GC	120 Foundations of Graphics	3	
MA	141 Calculus 1 ¹	4	HESF	10* Fitness & Wellness Course*	1	
EC	205 Economics (or EC 201 or ARE 201)*	3				
HES	*** Health & Exercise Studies	I				

Semester Total 18

Semester Total 18

Sophomore Year Fall Semester Credits Spring Semester Credits 242 Calculus III 341 Appl Differential Eq 3 4 MA 201 Engr Thermodynamics I² MAE 200 Introduction to ME Design MAE 3 1 206 Engineering Statics^{2.3} 205 ME Lab I 3 MAE 1 208 Physics for Engr & Sc II 3 MAE 208 Engineering Dynamics^{2,3} 3 214 Solid Mechanics^{2,3} 209 Physics for Engr & Sc II1 Lab 3 1 MAE 370 Prob & Stat for Engineers (or ST 371) 3 *** *** GEP Requirement* 3 *** GEP Requirement* 3

Semester Total 16

Junior Year						
	Fall Semester	Credits		Spring Semester (Credits	
ENG	331 Comm Engr & Tech	3	ECE	331 Principles of Elec. Engr. 1	3	
MAE	302 Engr Thermodynamics II	3	MAE	310 Heat Transfer Fundamentals	3	
MAE	306 ME Lab 11	1	MAE	316 Strength of Mech Comp	3	
MAE	308 Fluid Mechanics	3	MSE	200 Mech. Prop. Engr. Materials	3	
MAE	315 Dynamics of Machines	3	**E	*** Tech Elective ⁴	3	
***	*** GEP Requirement*	3	***	*** GEP Requirement* (Inter Persp)	2-3	
		Semester Total 16		Semester Total	16-17	

Semester Total 16

Senior Year Fall Semester Spring Semester Credits Credits *** Tech Elective4 MAE 405 Controls Lab **E 3 1 MAE 435 Prin of Auto Control 3 MAE 416 ME Senior Design 4 *** GEP Requirement* *** MAE 4** Mech Engr Design Elective⁵ 3 3 **E *** Tech Elective⁴ *** Ethics (GEP Req*)6 3 3 ISE. 311 Engr Econ Analysis 3 Semester Total 13 Semester Total 13

Minimum Total Credit Hours Required for Graduation 126

Major/Program requirements and footnotes:

¹Courses required for Change of Degree Audit (CODA). CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher.

²Minimum grade of C-, E 115 requires satisfactory completion (S).

³Students must have a 2.5 GPA to enroll in this course

⁴Technical electives must be selected from the following list (when offered): MAE 320, MAE 403, MAE 406, MAE407, MAE 408, MAE 410, MAE 42 MAE 426, MAE 430, MAE 442, MAE 472, MAE 495, MAE 496 (with permission of the instructor, limited to 3 credit hours), MAE 5** (with permission the instructor, 3.5 GPA), up to 3 hours outside of MAE with permission of MAE advisor.

⁵Choose one: MAE 412, 415, 485

MA

MAE

PY

PY

ST ***

6Select from IDS 201, STS 302, STS 304, STS(PHI) 325, PHI 214 or PHI 375.

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied.

University approved GEP course lists for each of the following categories can be found at

http://oucc.ncsu.edu/gep-courses.

Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list.

Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics.

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement.

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list.

Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists) Choose from the Humanities/Social Sciences/Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

I. U.S. Diversity (USD)

- Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.
- J. Global Knowledge (GK) Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

Semester Total 15

Mechanical Engineering [14MEBS Req Term Spring 2018]

			nan Year		
	Fall Semester	Credit	s	Spring Semester	Credits
CH	101 Chemistry, A Molecular Science ¹	3	CSC	113 Intro Comp MATLAB	3
CH	102 General Chemistry Lab ¹	1	MA	241 Calculus II ¹	4
E	101 Introduction to Engr & Prob Solv ¹²	1	PY	205 Physics for Engr & Sc I ¹	3
E	115 Intro to Computing Environ ^{1,2}	1	PY	206 Physics for Engr & Sc I ¹ Lab	1
ENC	6 101 Academic Writing and Research ^{1,2}	4	E	102 Engineering in the 21st Century	2
MA	141 Calculus 1 ¹	4	GC	120 Foundations of Graphics	3
EC	205 Economics (or EC 201 or ARE 201)*	3	HESF	10* Fitness & Wellness Course*	1
HES	*** Health & Exercise Studies	1			
	Semester To	otal 18		Semester	· Total <mark>17</mark>
		Sophon	nore Yea	r	
	Fall Semester	Credit	's	Spring Semester	Credits
MA	242 Calculus III	4	MA	341 Appl Differential Eq	3
MA	E 200 Introduction to ME Design	1	MAE	201 Engr Thermodynamics 1 ²	3
MA	E 206 Engineering Statics ^{2,3}	3	MAE	205 ME Lab 1	1
PY	208 Physics for Engr & Sc 11	3	MAE	208 Engineering Dynamics ^{2,3}	3
PY	209 Physics for Engr & Sc 11'Lab	1	MAE	214 Solid Mechanics ^{2,3}	3
ST	370 Prob & Stat for Engineers (or ST 371)	3	***	*** GEP Requirement*	3
***	*** GEP Requirement*	3			
	Semester To	otal 18		Semester	· Total 16
		Junio	or Year		
	Fall Semester	Credit	s	Spring Semester	Credits
ENC	331 Comm Engr & Tech	3	ECE	331 Principles of Elec. Engr. 1	3
MA	E 302 Engr Thermodynamics 11	3	MAE	310 Heat Transfer Fundamentals	3
MA	E 306 ME Lab 11	1	MAE	316 Strength of Mech Comp	3
MA	E 308 Fluid Mechanics	3	MSE	200 Mech. Prop. Engr. Materials	3
MA	E 315 Dynamics of Machines	3	**E	*** Tech Elective ⁴	3
***	*** GEP Requirement*	3		Removing IP GEP requirement	
	Semester To	tal 16		- ·	· Total <mark> 15</mark>
		Senio	or Year		
	Fall Semester	Credit	s	Spring Semester	Credits
MA	E 405 Controls Lab	1	**E	*** Tech Elective ⁴	3

			1	Minimum	Tota	al Credit Hours Required	for Graduation 126
			Semester Total 13				Semester Total 13
ISE	311	Engr Econ Analysis	3				
E	*	Tech Elective ^₄	3	***	***	Ethics (GEP Req*)6	3
MAE	4**	Mech Engr Design Elective	3	***	***	GEP Requirement*	3
MAE	435	Prin of Auto Control	3	MAE	416	ME Senior Design	4
MAE	405	Controls Lab	1	**E	***	Tech Elective ^₄	3
		I un Semester	Creun	3		Spring Semester	Creans

Major/Program requirements and footnotes:

¹Courses required for Change of Degree Audit (CODA). CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher.

²Minimum grade of C-, E 115 requires satisfactory completion (S).

³Students must have a 2.5 GPA to enroll in this course

⁴Technical electives must be selected from the following list (when offered): MAE 320, MAE 403, MAE 406, MAE407, MAE 408, MAE 410, MAE 42 MAE 426, MAE 430, MAE 442, MAE 472, MAE 495, MAE 496 (with permission of the instructor, limited to 3 credit hours), MAE 5** (with permissio the instructor, 3.5 GPA), up to 3 hours outside of MAE with permission of MAE advisor. ⁵Choose one: MAE 412, 415, 485

6Select from IDS 201, STS 302, STS 304, STS(PHI) 325, PHI 214 or PHI 375.

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied.

University approved GEP course lists for each of the following categories can be found at

http://oucc.ncsu.edu/gep-courses.

Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list .

Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics. Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill the GEP Social Sciences requirement.

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list.

Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities/Social Sciences/Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

- I. U.S. Diversity (USD) Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.
 Clobel Knowledge (GK)
- J. <u>Global Knowledge</u> (GK) Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

GEP FORMAT B – CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Mechanical Engineering

Current Degree Key: 14MEBS

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Effective Date of Revision: 1/2018

MAJOR FIELD OF STUDY REQUIREMENTS: Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Required Courses/Groups/ Electives:	creat trours	
		List GEP category and hours satisfied by a Major requirement
Math		Major requirement
MA 141(C-), MA 241(C-), MA 242	12	Mathematics (6 hours)
GRP 020 Differential Equations (MA 341 or MA 301)	3	
Sciences		
CH 101 (C-), CH 102(C-)	4	Natural Sciences (3 hours)
PY 205 (C-), PY 208	8	Natural Sciences (4 hours)
ME Major		
GRP 030 (MAE 206 (C-) or CE 214 (C-))	3	
GRP 031 (MAE 208 (C-) or CE 215 (C-))	3	
GRP 032 (MAE 314 (C-) or CE 313 (C-))	3	
MAE 301(C-)	3	
MAE 302	3	
MAE 305	1	
MAE 306	1	
MAE 308	3	
MAE 310	3	
MAE 315	3	
MAE 316	3	
MAE 412	3	
MAE 415	3	
MAE 416	4	
MAE 43S	3	
MAE 469	1 6	
GRP 033 (ISE 31 1, MAE 403, MAE 406, MAE 408, MAE 421, Mを407, MAE 442, MAE 495, MAE 496, MAE 5**)	0	
110401, MAE 442, MAE 495, MAE 496, MAE 5 **)		
Other Major		
CSC 112	3	
MSE 200	3	
ST 370	3	
GC 120	3	
ECE 331	3	
ISE 311	3	
GRP 040 Engineering Ethics (STS 302, STS 304, STS 320, PHI 214,	3	Humanities or Interdisciplinary Perspectives (3
or PHI 375)		hours).
ENG 331	3	
		Advanced Communication co-requisite.
Concentration Courses/Groups/Electives:		
Free Electives:		
e and the second s		

PV 212)		
Total credit hours under Major Field of Study: Minimum 27 hours required in program area.	109 hours	
COLLEGE REQUIREMENTS:		
Orientation_Course(s); E101 (C-) ,E 115 & E102	4	E 115 satisfies Technology Fluency Requirement
<u>Other</u> : (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	5 hours	

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NCSU GENERAL EDUCATION PROGRAM REQUIREMENT Courses in the Major and/or Minor may also fulfill a General Educ requirement; however, a GEP category moy not be subset to require specific course from the category list. Required courses must be in the Major/College requirements. Specific courses should not be listed in any of the fields below of than ENG 101.	At least one of the following must be listed: ³ Choose course(s) from the University Approved GEP course list for this category. ³ Malnmum requirements are satisfied by Major/College course requirements. ³ Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. ⁶ Co-requisite is satisfied by a Major/College course requirement. ³ Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. ⁶ Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.	
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)
Mathematical Sciences (minimum of 6 credits) (at least one with MA or ST prefix) Course(s) in the Major may double-count to sotisfy this requirement and also sotisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements ore satisfied by Major course requirements
Natural Sciences (minimum of 7 credits) (at least 1 loborotory) Course(s) in the Mojor may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements ore satisfied by Major course requirements
English 101 (C-)	4	ENG 101
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Mojor may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	6	
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Required College course (EC 205) satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and on AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual ond Performing Arts
Interdisciplinary Perspective (minimum of 5-6 credits) Only course(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	2 18 hour	Required Departmentol course in engineering ethics will sotisfy 3 hours of Humonities or Interdisciplinory Perspectives cotegory.
GEP Co-Requisites:		Courses token in the Mojor, GEP, or Minor may double-count to fulfill the co-requisites. Courses that sotisfy the U.S. Diversity* or Global Knowledge** co-requisite ore marked on course lists

		with asterisks as indicated.
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this category
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category
Foreign Language Proficiency	n/a	FL_102
The following requirements must be satisfied within the College/Program:		
Advanced Communication	X	Satisfied by College/Program Requirements (ENG 331)
Technology Fluency	X	Satisfied by College/Program Requirements

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Total credit hours required to complete Degree: 125 Total hours Total must be within 120-128 credit hours. 125 Total hours	Graduation requirements include: (1) 2.0 overall GPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all MAE designated courses, or a (C-) or higher in all MAE designated courses.
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College of Engineering Office of Academic Affairs

www.engr.ncsu.edu

Campus Box 7904 21 Current Drive, Page Hall Raleigh, NC 27695-7904 P: 919.515.3263

DATE: September 28, 2017

TO: Dr. Michael D. Mullen, Vice Provost and Dean of Academic and Student Affairs

FROM: Dr. Lisa Marshall, Departmental Curriculum Chair, Nuclear Engineering Department

RE: Curriculum Revision for 14NEBS to specify the GEP (IP) Course, E102: Engineering In the 21st Century

By means of this memorandum and the attached documents, the Nuclear Engineering Department proposes to modify the 2nd semester of their engineering curriculum to add the GEP (Interdisciplinary) course E102: Engineering in the 21st Century.

This revision specifies a 2-hour, interdisciplinary perspective, general education elective in the second semester. The course, E102: Engineering in the 21st Century, is designed as an early exploration class intended to introduce students to the Engineering Grand Challenges. The course will be open to the campus. There is no change in the number of credit hours. Resources are being allocated from the college to accomplish this change. Attached is a semester-by-semester display with the revision shown in blue. The course was approved by UCCC and officially added to all of the Engineering First Year curricula (EFY) in 2017.

SIGNATURES

RECOMMENDED BY:	HEAD DEPARTMENT/PROGRAM	11/15/17 DATE
ENDORSED BY:	Chain, College Courses & Curricula Committee	17 NOV 17 DATE
	COLLEGE DEAN P. Gavelle	12/04/17 DATE
APPROVED BY:	CHAIR, UNIVERSITY COURSES & CURRICULA COMMITTEE	DATE
	DEAN OF UNDERGRADUATE ACADEMIC PROGRAMS	DATE

APPROVAL DATE

Nuclear Engineering [14NEBS Req Term Spring 13]

		Fresh	man Yea		
	Fall Semester	Credit	s	Spring Semester	Credits
CH	101 Chemistry, A Molecular Science	3	CSC	112 Intro to Computing - FORTRAN	3
CH	102 General Chemistry Lab	1	MA	241 Calculus II'	4
E	101 Introduction to Engr & Prob Solv ^{1,2}	1	PY	205 Physics for Engr & Sc I	3
Ē	115 Intro to Computing Environ12	1	PY	206 Physics for Engr & Sc I Lab	1
ENG	101 Academic Writing and Research12	4	EC	205 Economics (or EC 201 or ARE201)*	3
MA	141 Calculus I	4	***	*** GEP Requirement*	3
HESF		1			
	Semester Total	15		Semester Total	17

			Sophon	lore Ye	ar	
		Fall Semester	Credits		Spring Semester	Credits
MAE	206	Engineering Statics	3	MAE	208 Engineering Dynamics	3
MA		Calculus III	4	MA	341 Appl Differential Eq	3
NE		Intro to Nuclear Engr	2	NE	202 Rad. Sources, Interact & Detect2	4
PY		Physics for Engr & Sc II	3	***	*** GEP Requirement*	3
PY		Physics for Engr & Sc II Lab	1	***	*** GEP Requirement*	3
***		Advanced Communication Elect	3			
		Semester Total	16		Semester Total	16

Semester Total 16

				Junio	or Year		
		Fall Semester		Credits		Spring Semester C	redits
MAE	301	Engr Thermo I		3	MAE	308 Fluid Mechanics	3
MA		Appl Diff Equations II		3	MSE	201 Struct Prop of Engr Mat	3
NE		Fund of Nuclear Engr		4	NE	400 Nuclear React Ener Conver	4
ISE		Engr Ec Analysis		3	NE	401 React Analysis & Des	4
***		GEP Requirement*		3	HES*	*** Health & Exercise Studies	1
		our mequinities	Semester Total	16		Semester Total	15

				Seni	ior Year	5 C				
		Fall Semester		Credit	S		Spring Semester		Credits	
NE	402	Reactor Engr		4	NE	405	Reactor Systems		3	
NE		Rad Safety & Shielding		3	NE	408	Nucl Engr Des Proj		3	
NE		Nuclear Engr Senior Design	Prep	1	***	***	Engr Tech Elective		3	
NE	***	NE Elective ⁴	a rate	3	***	***	GEP Requirement*		3	
***	***	Tech Elective		3	***	***	GEP Requirement*		2-3	
		Teen Electric	Semester Total	14				Semester Total	14-15	
			ormester rota.		Minimu	m Tot	al Credit Hours Require	d for Graduation	123	

Major/Program requirements and footnotes: Courses required for Change of Degree Audit (CODA). CH 101, 102, MA 141, 241, PY 205, 206 must be completed with C or higher

Courses required for Change of Degree Audit (CODA). CH 101, 102 MA 141, 241, 241, 242, 250 must be completed while of might Grade of C- or better required. E 115 requires satisfactory completion (S) Advanced Communication Elective: COM 110, COM 112, COM 211, ENG 288, ENG 289, ENG 316, ENG 331, ENG 332, ENG 333, FLA 201, FLA 202, FLF 201, FLF 202, FLJ 201, FLJ 202, FLJ 203, FLJ 204, FLR 201, FLR 202, FLS 201, FLS 202, GRK 201, GRK 202, LAT 201, LAT 202, If any of the listed courses are taken to satisfy this requirement, must take another course for any of the GEP requirements Nuclear Engineering Electives: NE 409, NE 412, NE 418, NE 509, NE 512, NE 528. Technical Electives: BUS 370, 420; CSC 302; CH 315, 331; ECE 331, 421; MA 405, 427; MAE 301, 310, 316, 410, 421; MSE 301; PY 341, 411, 414, 415, 525, 527, 527, 521, 521.

525, 528; ST 361, 371

"Engineering Technical Electives: Any course from (2) or any College of Engineering course at the 300-level or above.

*General Education Program (GEP) requirements and GEP Footnotes: To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied University approved GEP course lists for each of the following categories can be found at

http://oucc.ncsu.edu/gep-courses.

Humanities (6 credit hours selected from two different disciplines/course prefixes) Choose from the University approved GEP Humanities course list

Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics.

Economics 205 for EC 201 or ARE 201), taken us part of the Major requirements, satisfies 3 credit hours needed to fulfill

the GEP Social Sciences requirement

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list.

Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities Social Sciences Visual and Performing Aris Interdisciplinary Perspectives (5-6 credit hours) Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements

1. U.S. Diversity (USD)

J. Global Knowledge (GK)
 Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.
 K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

Nuclear Engineering [14NEBS Req Term Spring 2018]

			Fres	hman Yea	ar		
		Fall Semester	Crea	its		Spring Semester	Credits
CH	101	Chemistry, A Molecular Science'	3	CSC	113	Intro to Computing - MATLAB	3
CH	102	General Chemistry Lab	1	MA	241	Calculus II ¹	4
Ξ	101	Introduction to Engr & Prob Solv ^{1,2}	1	PY	205	Physics for Engr & Sc I	3
Ξ		Intro to Computing Environ ^{1,2}	1	PY	206	Physics for Engr & Sc I Lab ¹	1
ENG		Academic Writing and Research ^{1,2}	4	EC		Economics (or EC 201 or ARE201)*	3
AN		Calculus I ¹	4	E		Engineering in the 21st Century (GEP IP)	2
IESF	10*	Fitness & Wellness Course*	1				
		Semester Tota	15			Semester Tota	1 16
			Soph	omore Ye	ar		
		Fall Semester	Cred			Spring Semester	Credit.
AAE	206	Engineering Statics	3	MAE	208	Engineering Dynamics	3
AA		Calculus III	4	MA		Appl Differential Eq	3
JE		Intro to Nuclear Engr	2	NE		Rad. Sources, Interact & Detect ²	4
Y		Physics for Engr & Sc II	3	***		GEP Requirement*	3
Y		Physics for Engr & Sc II Lab	1	***		GEP Requirement*	3
**	***	Advanced Communication Elect ³	3				5
		Semester Tota	16			Semester Tota	1 16
			Ju	nior Year			
		Fall Semester	Cred	its		Spring Semester	Credit
MAE	201	Engr Thermo I	3	MAE	308	Fluid Mechanics	3
AN		Appl Diff Equations II	3	MSE	201	Struct Prop of Engr Mat	3
NE		Fund of Nuclear Engr ²	4	NE		Nuclear React Ener Conver	4
SE	311	Engr Ec Analysis	3	NE	401	React Analysis & Des	4
**		GEP Requirement*	3	HES*	***	Health & Exercise Studies	1
		Semester Tota	16			Semester Tota	I 15
			Se	nior Year			
		Fall Semester	Cred	its		Spring Semester	Credit.
NE.	402	Reactor Engr	4	NE	405	Reactor Systems	3
NE		Rad Safety & Shielding	3	NE		Nucl Engr Des Proj	3
NE		Nuclear Engr Senior Design Prep	1	***		Engr Tech Elective ⁶	3
NE		NE Elective ⁴	3	***		GEP Requirement*	3
**	***	Tech Elective ⁵	3	***		GEP Requirement*	3
		Semester Tota	14			Semester Tota	
		Semiciter Fou		Minimum	Toto	I Credit Hours Required for Graduation	

¹Courses required for Change of Degree Audit (CODA). CH 101, 102; MA 141, 241; PY 205, 206 must be completed with C or higher. ²Grade of C- or better required, E 115 requires satisfactory completion (S).

¹Advanced Communication Elective: COM 110, COM 112, COM 211, ENG 288, ENG 289, ENG 316, ENG 331, ENG 332, ENG 333, FLA 201, FLA 202, FLF 201, FLF 202, FLJ 201, FLJ 202, FLJ 203, FLJ 204, FLR 201, FLR 202, FLS 201, FLS 202, GRK 201, GRK 202, LAT 201, LAT 202. If any of the listed courses are taken to satisfy this requirement, must take another course for any of the GEP requirements.

¹Nuclear Engineering Electives: NE 409, NE 412, NE 418, NE 509, NE 512, NE 528.

⁵Technical Electives: CSC 302; CH 315, 331; MA 405, 427; PY 341, 411, 414, 415, 525, 528; ST 361, 370, 371.

⁶Engineering Technical Electives: Any course from (4) or any College of Engineering course at the 300-level or above, except CSC classes.

*General Education Program (GEP) requirements and GEP Footnotes:

To complete the requirements for graduation and the General Education Program, the following category credit hours and co-requisites must be satisfied. University approved GEP course lists for each of the following categories can be found at http://oucc.ncsu.edu/gep-courses.

Humanities (6 credit hours selected from two different disciplines/course prefixes)

Choose from the University approved GEP Humanities course list.

Social Sciences (6 credit hours selected from two different disciplines/course prefixes)

Choose 3 credits from the University approved GEP Social Sciences course list in a discipline other than Economics.

Economics 205 (or EC 201 or ARE 201), taken as part of the Major requirements, satisfies 3 credit hours needed to fulfill

the GEP Social Sciences requirement.

Health and Exercise Studies (2 credit hours - must include one HESF 100-level course and one additional HES course)

Choose from the University approved GEP Health and Exercise Studies course list.

Additional Breadth - (3 credit hours to be selected from the following University approved GEP course lists)

Choose from the Humanities/Social Sciences/Visual and Performing Arts

Interdisciplinary Perspectives (5-6 credit hours)

Choose from the University approved GEP Interdisciplinary Perspectives course list.

The following Co-Requisites must be satisfied to complete the General Education Program requirements:

I. U.S. Diversity (USD)

Choose from the University approved GEP U.S. Diversity course list or choose a course identified on the approved GEP course lists as meeting the U.S. Diversity (USD) co-requisite.

J. Global Knowledge (GK)

Choose from the University approved GEP Global Knowledge course list or choose a course identified on the approved GEP course lists as meeting the Global Knowledge (GK) co-requisite.

K. Foreign Language proficiency - Proficiency at the FL_102 level is required for graduation.

GEP FORMAT B – CURRICULUM REQUIREMENTS

Degree Title: Bachelor of Science in Nuclear Engineering

Current Degree Key: 14NEBS

Effective Date of Revision: 1/2018

Required Courses/Groups/ Electives:	Credit Hours	GEP category, if applicable
Indicate If course or course groupings have a		List GEP category and hours satisfied by a
C-wall or MGPA requirement		Major requirement
Math	1.2	
MA 141, MA 241, MA 242	12	Mathematics (6 hours)
MA 341	3	
MA 401	3	
Sciences		
CH 101, CH 102	4	Natural Sciences (4 hours)
PY 205, PY 208	8	Natural Sciences (3 hours)
NE Major		
	2	
NE 201 NE 202 - C-wall	2	
NE 202 - C-WOL	4	
NE 301-c- wall	4	
NE 400	4	
NE 401	4	
NE 402	4	
NE 404	3	
NE 406	1	
NE 405	3	
NE 408	3	
Other Major		
MAE 206	3	
MAE 208	3	
MAE 301	3	
MAE 308	3	
GRP 011 Writing/Com/FL Elective(COM 110, COM 112, COM	3	Advanced Communications
146, COM 211, ENG 215, ENG 288, ENG 289, ENG 322, ENG		
331, ENG 332, ENG 333, FLF 201, FLF 202, FLF 208, FLJ 201,		
FLI 202, FLI 203, FLI 203, FLI 204, FLI 205, FLK 201, FLK 202,		
FLR 201, FLR 202, FLS 201, FLS 202, FLS 208, GRK 201, GRK		
202, LAT 201, LAT 202)		
IE 311	3	
CSC 112	3	
MSE 201	3	
GRP 036 (NE 409, NE 412, NE 418, NE 509, NE 512, or NE 528)	3	
GRP 037 Technical Elective (BUS 370, BUS 420, CH 315, CH 331, CSC	3	
302, ECE 331, ECE 421, MA 405, MA 427, MAE 302, MAE 310, MAE		
316, MAE 410, MAE 421, MSE 301, PY 341, PY 341, PY 411, PY 414,		
PY 415, PY 525, PY 528, ST 361, ST 371)		
GRP 038 Engineering Technical Elective (BME 3**, CE 3**, CHE	3	
3**, . ECE 3**, EH 3**, IE 3**, MAE 3**, MAT 3**, OR 3**,		
or GRP 036)		
Concentration Courses/Groups/Electives:		
Free Electives:		

Total credit hours under Major Field of Study: Minimum 27 hours required in program area.	イ5 雪 hours	
COLLEGE REQUIREMENTS:		
O <u>rientation Course(s):</u> E 101 , 115 an <mark>d E102</mark>	4	E115 satisfies Technology Fluency requirement
Other: (ex: Adv Communication courses) Economics Elective (EC 205, 201; ARE 201)	3	Social Science
Total credit hours under College Requirements:	7 hours	

NCSU GENERAL EDUCATION PROGRAM REQUIREMENTS Courses in the Major and/or Minor may also fulfill a General Education requirement; however, a GEP category may not be subset to require a specific course from the category list. Required courses must be listed in the Major/College requirements. Specific courses should not be listed in any of the fields below other than ENG 101.		At least one of the following must be listed: Choose course(s) from the University Approved GEP course list	
		for this category. Minimum requirements are satisfied by Major/College course requirements. Major/College course requirement satisfies X credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category. Co-requisite is satisfied by a Major/College course requirement. Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences, or Visual & Performing Arts. Choose course(s) from the University Approved GEP course lists for the Natural and Mathematical Sciences.	
General Education Program Requirements: Minimum 39-40 hrs	Credit hours	How will the GEP requirement be met? (choose applicable statement from 1-6 listed above)	
Mathematical Sciences (minimum of 6 credits) [at least one with MA or ST prefix) Course(s) in the Major may double-count ta satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	x	Minimum requirements ore satisfied by Major course requirements	
Natural Sciences (minimum of 7 credits) (at least 1 laboratory) Caurse(s) in the Major may double-count to satisfy this requirement and also satisfy bath the Global Knowledge and Diversity co-requisites.	x	Minimum requirements are satisfied by Major course requirements	
English 101	4	ENG 101	
Humanities (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy bath the Global Knowledge and Diversity co-requisites.	6	Choose course(s) from the University Approved GEP course list for this category	
Social Sciences (minimum of 6 credits) (from two different disciplines) Course(s) in the Major may double-count to satisfy this requirement and also satisfy both the Global Knowledge and Diversity co-requisites.	3	Required College course satisfies 3 credit hrs of this requirement. Remaining hours required must be chosen from the University Approved GEP course list for the category.	
Additional Breadth (minimum of 3 credits) (Choose AB course list that is different from the approach of the Major) Major/College requirements cannot satisfy this requirement and an AB course cannot be double-counted except in satisfying the Global Knowledge and Diversity co-requisites.	3	Choose course(s) from the University Approved GEP course lists for the Humanities, Social Sciences or Visual and Performing Arts	
Interdisciplinary Perspective (minimum of 5-6 credits) Only caurse(s) in the Major may double-count to satisfy this requirement.	3	Choose course(s) from the University Approved GEP course list for this category	
Physical Education/Healthy Living (including one Fitness and Wellness course)	2	Choose course(s) from the University Approved GEP course list for this category	
Total credit hours needed to complete GEP that are not satisfied as part of the Major/College requirements.	2 I hours		
GEP Co-Requisites:		Courses taken in the Major, GEP, or Minor may double-count to fulfill the co-requisites. Courses that satisfy the U.S. Diversity® or Global Knowledge®® co-requisite are marked an course lists with asterisks as indicated.	
U.S. Diversity co-requisite*	n/a	Choose course(s) from the University Approved GEP course list for this cotegory	
Global Knowledge co-requisite**	n/a	Choose course(s) from the University Approved GEP course list for this category	

Foreign Language Proficiency		n/a	FL_102	
The following requirements must be satisfied within the College/Program:	e			
Advanced Communication		X	Satisfied by College/Program Requirements	
Technology Fluency		X	Satisfied by College/Program Requirements	
Total credit hours required to complete Degree: Total must be within 120-128 credit hours.	123 196 T	otal hours	Graduation requirements include: (1) 2.0 overall GPA or higher in all courses attempted at NCSU and (b) 2.0 GPA or higher in all NE designated courses, or a (C-) or higher in all NE designated courses.	

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