

# CHANGE UNDERGRADUATE PROGRAM FORM

## 1. General Information

College: <u>Engineering</u>		Department: <u>Chemical and Materials Engineering</u>	
Current Major Name:	<u>Materials Engineering</u>	Proposed Major Name:	<u>Materials Engineering</u>
Current Degree Title:	<u>Bachelor of Science in Materials Engineering</u>	Proposed Degree Title:	<u>Bachelor of Science in Materials Engineering</u>
Formal Option(s):	<u>N/A</u>	Proposed Formal Option(s):	<u>N/A</u>
Specialty Field w/in Formal Option:	<u>N/A</u>	Proposed Specialty Field w/in Formal Options:	<u>N/A</u>
Date of Contact with Associate Provost for Academic Administration <sup>1</sup> :		<u>9/1/15</u>	
Bulletin (yr & pgs):	<u>2015-2016: Pages 250-51</u>	CIP Code <sup>1</sup> :	<u>14.1801</u>
		Today's Date:	<u>9/21/15</u>
Accrediting Agency (if applicable): <u>ABET</u>			
Requested Effective Date: <input checked="" type="checkbox"/> Semester following approval.    OR <input type="checkbox"/> Specific Date <sup>2</sup> : _____			
Dept. Contact Person: <u>T. John Balk</u>		Phone: <u>257-4582</u>	Email: <u>john.balk@uky.edu</u>

## 2. General Education Curriculum for this Program:

The new General Education curriculum is comprised of the equivalent of 30 credit hours of course work. There are, however, some courses that exceed 3 credits & this would result in more than 30 credits in some majors.

- There is no foreign language requirement for the new Gen Ed curriculum.
- There is no General Education Electives requirement.

**Please list the courses/credit hours currently used to fulfill the University Studies/General Education curriculum:**

Intellectual Inquiry in Arts and Creativity: Choose one course from approved list [3]  
Intellectual Inquiry in the Humanities: Choose one course from approved list [3]  
Intellectual Inquiry in the Social Sciences: Choose one course from approved list [3]  
Intellectual Inquiry in the Natural, Physical, and Mathematical Sciences: CHE 105 [4] and CHE 111 [1]  
Composition and Communication I: CIS/WRD 110 [3]  
Composition and Communication II: CIS/WRD 111 [3]  
Quantitative Foundations: MA 113 [4]  
Statistical Inferential Reasoning: STA 210 [3]  
Community, Culture and Citizenship in the USA: Choose one course from approved list [3]  
Global Dynamics: Choose one course from approved list [3]

**Please identify below the suggested courses/credit hours to fulfill the General Education curriculum.**

General Education Area	Course	Credit Hrs
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<sup>1</sup> Prior to filling out this form, you MUST contact the Associate Provost for Academic Administration (APAA). If you do not know the CIP code, the (APAA) can provide you with that during the contact.

<sup>2</sup> Program changes are typically made effective for the semester following approval. No program will be made effective until all approvals are received.

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<b>I. Intellectual Inquiry (one course in each area)</b>			
Arts and Creativity		<i>choose from list</i>	<u>3</u>
Humanities		<i>choose from list</i>	<u>3</u>
Social Sciences		<i>choose from list</i>	<u>3</u>
Natural/Physical/Mathematical		<i>CHE 105 &amp; 111</i>	<u>5</u>
<b>II. Composition and Communication</b>			
Composition and Communication I		CIS or WRD 110	3
Composition and Communication II		CIS or WRD 111	3
<b>III. Quantitative Reasoning (one course in each area)</b>			
Quantitative Foundations <sup>3</sup>		<i>MA 113</i>	<u>4</u>
Statistical Inferential Reasoning		<i>STA 381</i>	<u>3</u>
<b>IV. Citizenship (one course in each area)</b>			
Community, Culture and Citizenship in the USA		<i>choose from list</i>	<u>3</u>
Global Dynamics		<i>choose from list</i>	<u>3</u>
<b>Total General Education Hours</b>			<u>33</u>

**3. Explain whether the proposed changes to the program (as described in sections 4 to 12) involve courses offered by another department/program. Routing Signature Log must include approval by faculty of additional department(s).**

Proposed curriculum includes elimination of CS 221 (First Course in Computer Science for Engineers) and addition of EGR 101, 102 and 103.  
 STA 381 will now be a required course, replacing STA 210.

**4. Explain how satisfaction of the University Graduation Writing Requirement will be changed.**

Current	Proposed
<input type="checkbox"/> Standard University course offering. List: _____	<input type="checkbox"/> Standard University course offering. List: _____
<input checked="" type="checkbox"/> Specific course – list: <u>MSE 407</u>	<input checked="" type="checkbox"/> Specific course) – list: <u>MSE 407</u>

**5. List any changes to college-level requirements that must be satisfied.**

Current	Proposed
<input type="checkbox"/> Standard college requirement. List: _____	<input type="checkbox"/> Standard college requirement. List: _____
<input type="checkbox"/> Specific required course – list: _____	<input type="checkbox"/> Specific course – list: _____

**6. List pre-major or pre-professional course requirements that will change, including credit hours.**

Current	Proposed
<u>CIS/WRD 110 [3]</u>	<u>CIS/WRD 110 [3]</u>
<u>CIS/WRD 111 [3]</u>	<u>CIS/WRD 111 [3]</u>
<u>CHE 105 [4]</u>	<u>CHE 105 [4]</u>
<u>CHE 107 [3]</u>	<u>CHE 107 [3]</u>

<sup>3</sup> Note that MA 109 is NOT approved as a Quantitative Foundations course. Students in a major requiring calculus will use a calculus course (MA 113, 123, 137 or 138) while students not requiring calculus should take MA 111, PHI 120 or another approved course.

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<u>CHE 111 [1]</u> <u>CHE 113 [2]</u>  <u>MA 113 [4]</u> <u>MA 114 [4]</u> <u>MA 213 [4]</u> <u>PHY 231 [4]</u> <u>PHY 241 [1]</u>	<u>CHE 111 [1]</u> <u>CHE 113 [2]</u>  <u>MA 113 [4]</u> <u>MA 114 [4]</u> <u>MA 213 [4]</u> <u>PHY 231 [4]</u> <u>PHY 241 [1]</u>  <u>MSE 201 [3]</u> <u>MSE 202 [1]</u> <u>EGR 101 [1]</u> <u>EGR 102 [2]</u> <u>EGR 103 [2]</u>  <u>EM 221 [3]</u>
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**7. List the major's course requirements that will change, including credit hours.**

Current	Proposed
<u>MSE 101 [1]</u>	
<u>CHE 236 [3]</u>	<u>CHE 236 [3]</u>
<u>CS 221 [2]</u>	
<u>CME 200 [3]</u>	<u>CME 200 [3]</u>
<u>EM 221 [3]</u>	
<u>MA 214 [3]</u>	<u>MA 214 [3]</u>
<u>PHY 232 [4]</u>	<u>PHY 232 [4]</u>
<u>MSE 202 [1]</u>	
<u>MSE 301 [3]</u>	<u>MSE 301 [3]</u>
<u>MSE 351 [3]</u>	<u>MSE 351 [3]</u>
<u>EM 302 [3]</u>	<u>EM 302 [3]</u>
<u>EE 305 [3]</u>	<u>EE 305 [3]</u>
<u>PHY 361 [3]</u>	<u>PHY 361 [3]</u>
<u>MSE 401G [3]</u>	<u>MSE 401G [3]</u>
<u>MSE 402G [3]</u>	<u>MSE 402G [3]</u>
<u>MSE 403G [3]</u>	<u>MSE 403G [3]</u>
<u>MSE 404G [3]</u>	<u>MSE 404G [3]</u>
<u>MSE 407 [3]</u>	<u>MSE 407 [3]</u>
<u>MSE 408 [3]</u>	<u>MSE 408 [3]</u>
<u>MSE 436 [3]</u>	<u>MSE 436 [3]</u>
<u>MSE 480 [3]</u>	<u>MSE 480 [3]</u>
<u>MSE 535 [3]</u>	<u>MSE 535 [3]</u>
<u>MSE 538 [3]</u>	<u>MSE 538 [3]</u>
<u>MSE 585 [3]</u>	<u>MSE 585 [3]</u>
	<u>STA 381 [3]</u>

**8. Does the pgm require a minor AND does the proposed change affect the required minor?**  N/A     Yes     No  
 If "Yes," indicate current courses and proposed changes below.

Current	Proposed

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9. Does the proposed change affect any option(s)?

N/A     Yes     No

If "Yes," indicate current courses and proposed changes below, including credit hours, and also specialties and subspecialties, if any.

Current	Proposed

10. Does the change affect pgm requirements for number of credit hrs outside the major subject in a related field?

Yes     No

If so, indicate current courses and proposed changes below.

Current	Proposed

11. Does the change affect pgm requirements for technical or professional support electives?

Yes     No

If so, indicate current courses and proposed changes below.

Current	Proposed

12. Does the change affect a minimum number of free credit hours or support electives?

Yes     No

If "Yes," indicate current courses and proposed changes below.

Current	Proposed

13. Summary of changes in required credit hours:

	Current	Proposed
a. Credit Hours of Premajor or Preprofessional Courses:	<u>36</u>	<u>45</u>
b. Credit Hours of Major's Requirements:	<u>68</u>	<u>64</u>
c. Credit Hours for Required Minor:	<u>N/A</u>	<u>N/A</u>
d. Credit Hours Needed for a Specific Option:	<u>N/A</u>	<u>N/A</u>
e. Credit Hours Outside of Major Subject in Related Field:	<u>N/A</u>	<u>N/A</u>
f. Credit Hours in Technical or Professional Support Electives:	<u>6</u>	<u>6</u>
g. Minimum Credit Hours of Free/Supportive Electives:	<u>3</u>	<u>3</u>
h. Total Credit Hours Required by Level:	100: <u>25</u>	<u>29</u>
	200: <u>34</u>	<u>29</u>
	300: <u>15</u>	<u>18</u>
	400-500: <u>33</u>	<u>33</u>
i. Total Credit Hours Required for Graduation:	<u>131*</u> Credit hrs. by level do not include UK core or elective requirements where level is	<u>130*</u>

## CHANGE UNDERGRADUATE PROGRAM FORM

	unknown.	
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14. Rationale for Change(s) – if rationale involves accreditation requirements, please include specific references to that.

See attached cover memo for a detailed description. The proposed changes include adding the new College of Engineering first-year engineering courses EGR 101, 102 and 103, removing MSE 101 and CS 221, and replacing STA 210 with STA 381.

15. List below the typical semester by semester program for the major. If multiple options are available, attach a separate sheet for each option.

<b>YEAR 1 – FALL:</b> (e.g. "BIO 103; 3 credits")	<u>CIS/WRD 110 [3]</u> <u>MA 113 [4]</u> <u>EGR 101 [1]</u> <u>EGR 102 [2]</u> <u>CHE 105 [4]</u> <u>CHE 111 [1]</u>	<b>YEAR 1 – SPRING:</b>	<u>CIS/WRD 111 [3]</u> <u>MA 114 [4]</u> <u>EGR 103 [2]</u> <u>PHY 231 [4]</u> <u>PHY 241 [1]</u> <u>UK Core [3]</u>
<b>YEAR 2 - FALL :</b>	<u>MSE 201 [3]</u> <u>MSE 202 [1]</u> <u>MA 213 [4]</u> <u>CHE 107 [3]</u> <u>CHE 113 [2]</u> <u>EM 221 [3]</u>	<b>YEAR 2 – SPRING:</b>	<u>MSE 301 [3]</u> <u>MSE 351 [3]</u> <u>MA 214 [3]</u> <u>PHY 232 [4]</u> <u>CHE 236 [3]</u>
<b>YEAR 3 - FALL:</b>	<u>MSE 401G [3]</u> <u>MSE 404G [3]</u> <u>CME 200 [3]</u> <u>EM 302 [3]</u> <u>STA 381 [3]</u> <u>UK Core [3]</u>	<b>YEAR 3 - SPRING:</b>	<u>MSE 402G [3]</u> <u>MSE 403G [3]</u> <u>MSE 407 [3]</u> <u>MSE 535 [3]</u> <u>PHY 361 [3]</u>
<b>YEAR 4 - FALL:</b>	<u>MSE 408 [3]</u> <u>MSE 436 [3]</u> <u>MSE 585 [3]</u> <u>EE 305 [3]</u> <u>MSE Elective [3]</u> <u>UK Core [3]</u>	<b>YEAR 4 - SPRING:</b>	<u>MSE 480 [3]</u> <u>MSE 538 [3]</u> <u>MSE Elective [3]</u> <u>Supportive Elective [3]</u> <u>UK Core [3]</u>

CHANGE UNDERGRADUATE PROGRAM FORM

Signature Routing Log

**General Information:**

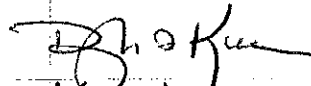

Current Degree Title and Major Name: Bachelor of Science in Materials Engineering

Proposal Contact Person Name: T. John Balk Phone: 257-4582 Email: john.balk@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

**Internal College Approvals and Course Cross-listing Approvals:**

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
CME Faculty	8/26/15	Douglass Kalika / 7-5507 / douglass.kalika@uky.edu	
COE Faculty	10/22/15	Kimberly Anderson / 7-1864 / kimberly.anderson@uky.edu	
		/ /	
		/ /	
		/ /	

**External-to-College Approvals:**

Council	Date Approved	Signature	Approval of Revision <sup>4</sup>
Undergraduate Council	12/15/15	Joanie Ett-Mims	
Graduate Council			
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

<sup>4</sup> Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

**Fall 2015**

**PROPOSED CHANGE IN UNDERGRADUATE PROGRAM  
BACHELOR OF SCIENCE IN MATERIALS ENGINEERING  
SUBMITTED BY: PROF. JOHN BALK**

**ENGINEERING STANDING REQUIREMENTS**

Current Requirements:

Materials Engineering: Completion of CHE 105, CHE 107, CHE 111, CHE 113, MA 113, MA 114, MA 213, PHY 231, PHY 241, CIS/WRD 110 with a minimum cumulative grade-point average of 2.50 in these courses. Completion of MSE 201 with a grade of C or better. University repeat options may be applied as appropriate.

Proposed Requirements:

Materials Engineering: Completion of CHE 105, CHE 107, CHE 111, CHE 113, MA 113, MA 114, MA 213, PHY 231, PHY 241, CIS/WRD 110 with a minimum cumulative grade-point average of 2.50 in these courses. Completion of MSE 201 with a grade of C or better. University repeat options may be applied as appropriate.

*(no change)*

September 11, 2015

**PROPOSED CHANGE IN UNDERGRADUATE PROGRAM  
BACHELOR OF SCIENCE IN MATERIALS ENGINEERING  
SUBMITTED BY: PROF. T. JOHN BALK**

**OVERVIEW:**

The Department of Chemical and Materials Engineering submits proposed curriculum changes to the Bachelor of Science degree in Materials Engineering. The proposed changes have been initiated to incorporate the components of the College of Engineering's first-year sequence, which is comprised of a total of five credits at the 100-level, as follows:

EGR 101 Engineering Exploration I [1 credit]

EGR 102 Fundamentals of Engineering Computing [2 credits]

EGR 103 Engineering Exploration II [2 credits]

The incorporation of EGR 101, 102 and 103 will result in the elimination of MSE 101 – *Materials Engineering*, as much of the content in this course will be covered in EGR 101. Similarly, the faculty have elected to remove CS 221 - *First Course in Computer Science for Engineers*, as this content will be addressed in EGR 102.

Also, STA 381 (*Engineering Statistics*) will now be a requirement for satisfaction of the UK Core component in Statistical Inferential Reasoning. This will replace the prior requirement of STA 210 (*Making Sense of Uncertainty: An Introduction to Statistical Reasoning*).

The introduction of the changes outlined above will result in an increase of two credits in the total number of hours required for the BS degree in Materials Engineering, which will increase from 131 hours to 133 hours.

**DETAILS OF THE PROPOSED CHANGES:**

Please refer to the proposed (semester-by-semester) course sequence, attached.

The following required courses will be added to the BS materials engineering curriculum:

EGR 101 Engineering Exploration I	[1]
EGR 102 Fundamentals of Engineering Computing	[2]
EGR 103 Engineering Exploration II	[2]
STA 381 Engineering Statistics	[3]



The following required courses will be removed from the BS materials engineering curriculum:

MSE 101	Materials Engineering	[1]
CS 221	First Course in Computer Science for Engineers	[2]
STA 210	An Introduction to Statistical Reasoning	[3]

**Impact of Proposed Changes on Accreditation:**

ABET accreditation requires the following with respect to the curriculum:

The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The faculty must ensure that the program curriculum devotes adequate attention and time to each component, consistent with the outcomes and objectives of the program and institution. The professional component must include:

- (a) **one year** of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.
- (b) **one and one-half years of engineering topics**, consisting of engineering sciences and engineering design appropriate to the student's field of study.
- (c) a **general education component** that complements the technical content of the curriculum and is consistent with the program and institution objectives.

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

One year is the lesser of 32 semester hours (or equivalent) or one-fourth of the total credits required for graduation.

The proposed BSMAE curriculum readily satisfies all aspects of the ABET curriculum requirement (re: Table).

	Math/Science	Engineering	Gen. Education	Other
<b>ABET Requirement</b>	32	48	N/A	N/A
<b>Current BSMAE Curriculum</b>	40	62	24	5
<b>Proposed BSMAE Curriculum</b>	43	64	21	5

**Impact of Proposed Changes on Total Credits for BS Materials Engineering Degree:**

**Current curriculum: 131 credits**

**Proposed curriculum: 133 credits**

## Bachelor of Science In Materials Engineering Curriculum

[Proposed]

<b>FRESHMAN YEAR</b>				
<u>First Semester</u>			<u>Second Semester</u>	
CIS/WRD 110 Comp. and Commun. I	3		CIS/WRD 111 Comp. and Commun. II	3
MA 113 Calculus I	4		MA 114 Calculus II	4
EGR 101 Engineering Exploration I	1		EGR 103 Engineering Exploration II	2
EGR 102 Fundamentals of Eng. Computing	2		PHY 231 General University Physics I	4
CHE 105 General College Chemistry I	4		PHY 241 General University Physics Lab I	1
CHE 111 Chemistry Lab I	1		UK Core	3
<b>TOTAL HRS</b>	<b>15</b>		<b>TOTAL HRS</b>	<b>17</b>
<b>SOPHOMORE YEAR</b>				
<u>First Semester</u>			<u>Second Semester</u>	
MSE 201 Materials Science	3		MSE 301 Materials Science II	3
MSE 202 Materials Science Laboratory	1		MSE 351 Material Thermodynamics	3
MA 213 Calculus III	4		MA 214 Calculus IV	3
CHE 107 General College Chemistry II	3		PHY 232 General University Physics II	4
CHE 113 Chemistry Lab II	2		CHE 236 Survey of Organic Chemistry	3
EM 221 Statics	3		<b>TOTAL HRS</b>	<b>16</b>
<b>TOTAL HRS</b>	<b>16</b>			
<b>JUNIOR YEAR</b>				
<u>First Semester</u>			<u>Second Semester</u>	
MSE 401G Metal and Alloys	3		MSE 402G Electronic Materials & Processing	3
MSE 404G Polymeric Materials	3		MSE 403G Ceramic Engineering & Processing	3
CME 200 Process Principles	3		MSE 407 Materials Laboratory I	3
EM 302 Mechanics of Deformable Solids	3		MSE 535 Mechanical Properties of Materials	3
STA 381 Engineering Statistics	3		PHY 361 Principles of Modern Physics	3
UK Core	3		UK Core	3
<b>TOTAL HRS</b>	<b>18</b>		<b>TOTAL HRS</b>	<b>18</b>
<b>SENIOR YEAR</b>				
<u>First Semester</u>			<u>Second Semester</u>	
MSE 408 Materials Laboratory II	3		MSE 480 Materials Design	3
MSE 436 Material Failure Analysis	3		MSE 538 Metals Processing	3
MSE 585 Materials Characterization Techniques	3		MSE Technical Elective	3
EE 305 Electrical Circuits and Electronics	3		Supportive Elective	3
MSE Technical Elective	3		UK Core	3
UK Core	3		<b>TOTAL HRS</b>	<b>15</b>
<b>TOTAL HRS</b>	<b>18</b>			

**TOTAL HOURS = 133**

## Bachelor of Science In Materials Engineering Curriculum

[Proposed]

<b>FRESHMAN YEAR</b>			
<u>First Semester</u>		<u>Second Semester</u>	
CIS/WRD 110 Comp. and Commun. I	3	CIS/WRD 111 Comp. and Commun. II	3
MA 113 Calculus I	4	MA 114 Calculus II	4
EGR 101 Engineering Exploration I	1	EGR 103 Engineering Exploration II	2
EGR 102 Fundamentals of Eng. Computing	2	PHY 231 General University Physics I	4
CHE 105 General College Chemistry I	4	PHY 241 General University Physics Lab I	1
CHE 111 Chemistry Lab I	1	UK Core	3
<b>TOTAL HRS</b>	<b>15</b>	<b>TOTAL HRS</b>	<b>17</b>
<b>SOPHOMORE YEAR</b>			
<u>First Semester</u>		<u>Second Semester</u>	
MSE 201 Materials Science	3	MSE 301 Materials Science II	3
MSE 202 Materials Science Laboratory	1	MSE 351 Material Thermodynamics	3
MA 213 Calculus III	4	MA 214 Calculus IV	3
CHE 107 General College Chemistry II	3	PHY 232 General University Physics II	4
CHE 113 Chemistry Lab II	2	CHE 236 Survey of Organic Chemistry	3
EM 221 Statics	3	<b>TOTAL HRS</b>	<b>16</b>
<b>TOTAL HRS</b>	<b>16</b>		
<b>JUNIOR YEAR</b>			
<u>First Semester</u>		<u>Second Semester</u>	
MSE 401G Metal and Alloys	3	MSE 402G Electronic Materials & Processing	3
MSE 404G Polymeric Materials	3	MSE 403G Ceramic Engineering & Processing	3
CME 200 Process Principles	3	MSE 407 Materials Laboratory I	3
EM 302 Mechanics of Deformable Solids	3	MSE 535 Mechanical Properties of Materials	3
STA 381 Engineering Statistics	3	PHY 361 Principles of Modern Physics	3
UK Core	3	<b>TOTAL HRS</b>	<b>15</b>
<b>TOTAL HRS</b>	<b>18</b>		
<b>SENIOR YEAR</b>			
<u>First Semester</u>		<u>Second Semester</u>	
MSE 408 Materials Laboratory II	3	MSE 480 Materials Design	3
MSE 436 Material Failure Analysis	3	MSE 538 Metals Processing	3
MSE 585 Materials Characterization Techniques	3	MSE Technical Elective	3
EE 305 Electrical Circuits and Electronics	3	Supportive Elective	3
MSE Technical Elective	3	UK Core	3
UK Core	3	<b>TOTAL HRS</b>	<b>15</b>
<b>TOTAL HRS</b>	<b>18</b>		

**TOTAL HOURS = 130**

**Brandenburg, Barbara J**

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**Subject:** FW: Re: Enrollment changes due College of Engineering Curriculum Changes

Janet,

Thank you for making me aware of the impact of these changes.

I have discussed this with my Director of Undergraduate students Jurek Jaromczyk and with my faculty and we understand that these changes will have impact on the enrollment in our courses.

Best,

Brent

On Thu, Sep 24, 2015 at 12:06 PM, Janet K. Lumpp <[ijklumpp@uky.edu](mailto:ijklumpp@uky.edu)> wrote:

Dr. Seales,

As you know, the degree programs in the College of Engineering are all proposing undergraduate Curriculum Changes as a result of the First-Year Engineering courses and other departmental initiatives. I am writing to make you aware of the changes that will affect several Computer Science courses no earlier than the Fall 2016 semester. As part of the proposal package, we need to include a reply from you acknowledging that you are aware of the changes that will impact enrollment in these courses.

CS 270 will be required for BS degrees in Computer Engineering

CS 115 will no longer be required for BS degrees in Computer Engineering and Electrical Engineering

CS 221 will no longer be required for BS degrees in Biosystems Engineering, Civil Engineering, Materials Engineering, Mechanical Engineering and Mining Engineering

CS 441 will no longer be required for BS degrees in Computer Engineering

CS 470 will no longer be required for BS degrees in Computer Engineering

Please reply all at your earliest convenience.

Thanks,

Janet

--

Dr. Janet K. Lumpp - University of Kentucky

Director, First-Year Engineering Program

Professor, Electrical & Computer Engineering

email: [ijklumpp@uky.edu](mailto:ijklumpp@uky.edu)

phone: [859-257-4985](tel:859-257-4985)

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**Subject:** RE: Changes to Statistic UK Core Requirement - Please respond to this one.  
**Date:** Thursday, February 11, 2016 at 2:57:26 PM Eastern Standard Time  
**From:** Stromberg, Arnold  
**To:** Anderson, Kimberly, Rayens, William S  
**CC:** Lumpp, Janet K

We approve of these changes.

Arnold J. Stromberg  
Professor and Chair  
Department of Statistics  
University of Kentucky  
313 Multidisciplinary Science Building  
725 Rose Street  
Lexington, KY 40536-0082  
Phone: 859-257-6115  
Fax: 859-323-1973

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**From:** Anderson, Kimberly  
**Sent:** Thursday, February 11, 2016 2:41 PM  
**To:** Rayens, William S; Stromberg, Arnold  
**Cc:** Lumpp, Janet K; Anderson, Kimberly  
**Subject:** Changes to Statistic UK Core Requirement - Please respond to this one.

Hi Arny and Bill

Back in October, Janet Lumpp sent you an email regarding our changes to the Engineering curricula and I see where Arny responded saying that you are aware of the changes and will plan accordingly. We are now being told by the Senate Council that we need a more specific memo from you. As part of our curricular changes, we have 4 programs; Chemical Engineering, Materials Engineering, Electrical Engineering, and Computer Science who have made a change in their curricula that indicates that students are now REQUIRED to take STA 381 for the UK Core Statical Inferential Reasoning. Specifically, the changes are as follow;

Chemical Engineering: Changing UK Core Statical Inferential Reasoning from STAT 210 to STA 381

Materials Engineering: Changing UK Core Statical Inferential Reasoning from STAT 210 to STA 381

Electrical Engineering: Changing UK Core Static Inferential Reasoning from "Choose one course from approved list" to STA 381

Computer Science: Changing UK Core Static Inferential Reasoning from "Choose one course from approved list" to STA 381

If you are ok with these changes, please respond back and say you approve.

Thank you!

Kim

\*\*\*\*\*

**Dr. Kimberly Anderson, Associate Dean for Administration and Academic Affairs**

**Professor, Chemical Engineering**

**College of Engineering**

**University of Kentucky**

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## Executive Summary Revised 1/28/16

### UK College of Engineering

#### First-Year Engineering Curriculum and Course Change Proposal

The nine Bachelor of Science degree programs in the UK College of Engineering propose a First-Year Engineering curriculum to increase retention through hands-on laboratory courses, improve preparation for discipline specific coursework and recruit students into a pre-engineering major while they make an informed decision about the degree program best suited to their interests and career goals. Elements of the proposal include:

- Rationale for the First-Year Engineering curriculum
- Three new First-Year courses
  - EGR 101 Engineering Exploration I (1 credit)
  - EGR 102 Fundamentals of Engineering Computing (2 credits)
  - EGR 103 Engineering Exploration II (2 credits)
- One new introductory course for transfer students
  - EGR 112 Engineering Exploration for Transfer Students (1 credit)
- UK Core Arts & Creativity request
- Structure, oversight and assessment of the First-Year Engineering curriculum
- Curriculum Change Forms
  - All nine degree programs incorporating the new EGR courses
  - Additional curriculum revisions in some degree programs
  - Updated Engineering Standing criteria
  - Acknowledgment by departments whose courses will be dropped or added
  - New course and course change applications in eCats

#### Rationale:

First-Year Engineering (FYE) programs representing multiple engineering disciplines are several decades old and range from a single seminar course to sequences of courses differentiated for pre-calculus to honors students. High school students who are unsure of which type of engineering is most appealing are drawn to schools with broader freshman year experiences with the opportunity to delay the selection of a major. In addition, exposing first year students to hands-on engineering experiences while they are taking their math, chemistry and physics classes not only develops engineering skills early on but increases retention and graduation rates by keeping the students actively engaged in the engineering disciplines. Within the Southeastern Conference engineering schools, five institutions offer FYE courses and none are as comprehensive as the proposed UK FYE content. For example, Vanderbilt University students choose three five-week modules and an optional seminar rather than exposure to all degree programs. University of Tennessee offers Engineering Fundamentals courses which focus on Physics for Engineers for calculus ready students. Texas A&M, University of Alabama and University of Arkansas FYE opportunities are fewer credit hours when compared to the UK COE program with some disciplinary specific coursework. Engineering schools that have adopted a FYE Program have reported improved retention and graduation rates. For example, the University of Tennessee demonstrated an increase in 1<sup>st</sup> year retention from 60% to 80% and an increase in 6-year graduation rate from 40.5% to 46.6%. Their 6-year graduation rate for females showed a dramatic increase from 39.7% to 51.6%.

Ohio State also adopted a similar program and reported an increase in 6-year graduation rate from 37% to 60% and a first year retention rate of 80%. Tennessee also reported that the grades obtained by their students in higher-level courses increased after adopting the FYE Program.

The College of Engineering is proposing a FYE curriculum where all incoming freshmen engineering students will be admitted as pre-engineering majors and will change to the pre-major of their choice during the spring registration cycle for their 2<sup>nd</sup> year classes. No additional admission criteria or enrollment limits will prevent students from declaring a major. Each program already has Engineering Standing criteria in place to ensure students are making satisfactory progress toward their degree. All students will be required to complete three Engineering courses EGR 101, 102, 103 during the first year while completing CIS/WRD, science and math classes.

Transfer students will be admitted directly to a pre-major program and enrolled in EGR 112 with other transfer students rather than EGR 101. Both 101 and 112 emphasize study skills and university resources available to help them become successful engineering students. Specific technical skills covered in EGR 101 as modules will also be used in EGR 112, however, transfer students will only need to complete the modules that fill gaps from their previous coursework. Students will not be allowed to earn credit for both EGR 112 and 101 (one or the other). If a student has AP credit or transfer credit for the programming language taught in EGR 102, they will not need to take EGR 102. We do expect everyone to take EGR 103 for the teamwork and design process experience. Transfer students will not be prevented from going forward with coursework in their major and can take the EGR courses simultaneously.

The College of Engineering section of the UK Bulletin has some inconsistencies in the way in which each degree program has presented its Pre-Major Requirements, Major Requirements and criteria for Engineering Standing. Entries in the Curriculum Change forms reflect the current information as it appears in the Bulletin, however, we would like to present a more consistent set of descriptions going forward. For example, the Pre-Major Requirements will now be the courses listed in the first three semesters of each degree program. Engineering Standing criteria are determined by the faculty in each program and calculated based on a subset of the Pre-Major courses in that program. The Major Requirements are now the required courses in semesters four through eight. As a result of these clarifications, it will be much easier for prospective students to compare and contrast their options as part of their decision to choose the UK College of Engineering and subsequently choose their major at the end of the First-Year experience.

### **EGR Courses:**

#### EGR 101 Engineering Exploration I

1 credit

Lecture

Major Revision

Arts & Creativity

**Course Description:** Engineering Exploration I introduces students to the creativity inherent in how engineers and computer scientists approach innovation, design and problem solving from blue sky brainstorming to implementing a solution. Students will work in teams, practice with tools of the trade (modeling, analysis and visualization), provide peer reviews and discuss ethical implications of creative endeavors. This class is also a process of personal discovery where students explore a variety of traditional and non-traditional study and learning methods, reflect on the results of using different



methods and determine what work best for their individual learning styles and personality type. The final individual artifact is a Create Your Future project describing the student's exploration of their own talents and aptitudes, discovery process for identifying a specific discipline and a visual presentation of their career goals. Open to students enrolled in the College of Engineering.

**Prerequisites:** Enrolled in the College of Engineering or MA ACT of at least 23 or equivalent.

#### EGR 102 Fundamentals of Engineering Computing

2 credits      Lecture and Lab      New course

**Course Description:** Fundamentals of Engineering Computing introduces students to the practice and principles of computer programming and computational problem solving. Students will engage in hands-on project-based problem solving using modern computer software and hardware, with a particular emphasis on problems and techniques commonly appearing in various domains of engineering. Open to students enrolled in the College of Engineering.

**Prerequisites:** Enrolled in the College of Engineering or MA ACT of at least 23 or equivalent.

#### EGR 103 Engineering Exploration II

2 credits      Lecture and Lab      New course      Arts & Creativity

**Course Description:** Engineering Exploration II focuses on a semester long creative engineering design project with students working in teams to apply the skills and tools introduced in EGR 101 (or EGR 112) and EGR 102. Topics and assignments include more in depth engagement with engineering tools for modeling, analysis, visualization, programming, hardware interfacing, team development, documentation and communication. Students gain experience in project management, identifying constraints, accepting and providing critical analysis, iterating to refine their work, and technical report writing.

**Prerequisites:** Prereq: EGR 102 or equivalent; Prereq or concur: MA 113

#### EGR 112 Engineering Exploration for Transfer Students

1 credit      Lecture      New course      Arts & Creativity

**Course Description:** Engineering Exploration for Transfer Students welcomes transfer students to the College of Engineering and introduces them to the creativity inherent in how engineers and computer scientists approach innovation, design and problem solving from blue sky brainstorming to implementing a solution. Students will work in teams, practice with tools of the trade (modeling, analysis and visualization), provide peer reviews and discuss ethical implications of creative endeavors. This class is also a process of personal discovery where students explore a variety of traditional and non-traditional study and learning methods, reflect on the results of using different methods and determine what work best for their individual learning styles and personality type. The final individual artifact is a

Create Your Future project describing the student's exploration of their own talents and aptitudes, discovery process for identifying a specific discipline and a visual presentation of their career goals. Students who received credit for EGR 101 are not eligible for EGR 112..

**Prerequisites:** Enrolled in the College of Engineering or MA ACT of at least 23 or equivalent. Students who received credit for EGR 101 are not eligible for EGR 112.

### **UK Core Arts & Creativity Request:**

Credit for Intellectual Inquiry – Arts & Creativity is requested for EGR 101, 103 and 112 to provide students with a total of 3 credit hours from two courses. EGR 101 for freshmen and EGR 112 for transfer students include personal reflection assignments, peer feedback and an individual design project on their plans for becoming a successful engineering student. The technical tools used in all three courses are different approaches which can be used independently or simultaneously to design and solve engineering problems. Students will be introduced to disciplinary practices from all engineering degree programs, appropriate resources from each discipline and opportunities for co-curricular involvement with student organizations and local professional societies. The semester-long design project in EGR 103 will involve identifying constraints and requirements, preliminary design reviews and a critical design review where their creative output will be evaluated and feedback into refining their product. The final product will include written and graphical documentation, a working prototype and demonstration of the prototype accomplishing the goals defined at the start of the project.

Active learning methods will be used in EGR 101 and 112 to stimulate small group discussion and peer review of student success strategies, problem solving methods and team teaching of technical skills. The Design Your Process project on individual student success is a fulfillment-focused creative process encouraging students to set academic and professional goals, take personal responsibility for their progress and enjoy time on task in rigorous challenging courses. The team design projects in EGR 103 will be more constraint-focused and product-focused creative endeavors working with a somewhat limited set of materials. Risk-taking will be encouraged in the safer virtual domains of software, simulation, visualization and optimization before committing to the real world assembly of the prototype. Tools including hardware and software, and information literacy on the many aspects of design will be presented and quizzed on a weekly basis. In addition to getting involved in student organizations, students in EGR 101 will be expected to attend a minimum of four Engineering Information Sessions and reflect on the information in preparation for the Change of Major and registration for discipline specific courses.

### **Structure, Oversight and Assessment of the First-Year Engineering Curriculum:**

The FYE Curriculum is under the leadership of the FYE Program headed by Director Janet Lump. In the development phase, the Department Chairs and Directors of Undergraduate Studies have provided input as well as a committee of representatives from each degree program defining the technical content appropriate for each EGR course. Regular Title Series Faculty, Lecturers, Staff and Special Title Series Faculty will teach the multiple sections of EGR 101, 102, 103 and 112, along with graduate and undergraduate teaching assistants. In anticipation of a Fall 2016 launch of the new courses, the College

of Engineering plans to hire 4 or 5 additional Lecturers and/or Special Title Series Faculty with academic appointments in departments and effort assigned by the Dean of Engineering to the FYE Program. An Advisory Committee will be formed with one tenured Associate or Full Professor representative from each engineering degree program. The Advisory Committee will conduct annual performance reviews of the Lecturers and STS Faculty, review student course evaluations and evaluate program progress toward goals set by the Dean for recruitment, retention and graduation. In addition, the Advisory Committee will help identify discipline specific content for EGR course assignments and assess how the EGR content is impacting the students and courses during the sophomore, junior and senior years. As part of the annual review process, the Director will solicit input from all of the faculty teaching sections of the EGR 101, 102, 103 and 112 courses and present the results to the Advisory Committee. The Advisory Committee may recommended changes which will then be taken to the FYE Program Faculty and Associate Dean for Administration and Academic Affairs for consideration. Changes will be subject to the appropriate College and University approval procedures which may include review by the College of Engineering Faculty as the faculties of record.

### **College of Engineering Process and Faculty Approval**

Beginning Spring 2014, Dean John Walz and Associate Dean Kim Anderson visited a number of Universities that currently have a Freshman Engineering Program. These included Ohio State, Purdue, University of Michigan and Michigan State. On July 17, 2014, the proposal to adopt a First Year Program was discussed with the Chairs and Associate Deans at an all-day retreat. During Fall 2014 and Spring 2015, the Directors of Undergraduate Studies in the College of Engineering and a working group of interested faculty worked on both the First Year Engineering Program curriculum and the engineering courses that would be offered as part of the program. Each group met at least once a month during this time. On April 28, 2015, a College of Engineering Faculty meeting was held where the First Year Engineering Program and proposed curriculum was presented to the faculty in attendance. The PowerPoint slides were then circulated to the entire faculty for their review. Also in Spring 2015, a search for the Director of the First-year Engineering Program was conducted, resulting in the selection of Dr. Janet Lumpp and 50% appointment to the program. On May 12, 2015 a mandatory meeting with the Chairs and Directors of Undergraduate Studies was conducted with Dean Walz, Associate Dean Anderson and Dr. Lumpp to further discuss the program. At this meeting, it was decided to move forward with the plans. Dr. Lumpp met at least once a month with various stakeholders over the spring and summer of 2015 including the Directors of Undergraduate Studies to develop and revise the original two-course sequence into a three-course sequence and a pathway for transfer students. Another debriefing meeting was held with the Chairs and Directors of Undergraduate Studies on July 10, 2015. During faculty retreats and meetings in August and September of 2015, the faculty in each department reviewed the course descriptions and voted to endorse the program. The Directors of Undergraduate Studies then worked to revise their curricula and faculty again voted as recorded on the Curriculum Change forms. In October 2015, the entire package including the changes in the curricula, new courses and change in courses were reviewed by the College of Engineering Undergraduate Education Team and the College of Engineering faculty prior to being sent to the Undergraduate and Graduate Councils. In addition to College approval, the proposed Freshman Engineering Program was discussed with the Dean's Advisory Council at both Spring and Fall meetings beginning in Spring, 2014 and was very well received by members of the Council.

### Biosystems Engineering

Voted at faculty meeting on August 18-19, 2015. Passed unanimously. All active faculty were present at retreat.

### Chemical and Materials Engineering

Voted at faculty meeting on August 26, 2015. Passed unanimously. 18 Chemical faculty members (4 Paducah) voted. 7 Materials faculty voted.

### Civil Engineering

Voted on August 20, 2015. The count was 18-1.

### Electrical and Computer Engineering

Voted at faculty meeting on September 29, 2015. Passed unanimously. 17 faculty members voted.

### Computer Science

Voted on August 24, 2015. The count was 18-0.

### Mechanical Engineering

Voted at faculty meeting on September 24, 2015. 22 in favor and 2 against.

### Mining Engineering

Voted at faculty meeting on September 2, 2015. 6 approved and 1 abstained.