

CHANGE UNDERGRADUATE PROGRAM FORM

1. General Information

College: <u>Engineering</u>		Department: <u>Electrical and Computer Engineering</u>	
Current Major Name: <u>Computer Engineering</u>		Proposed Major Name: <u>Computer Engineering</u>	
Current Degree Title: <u>BSCOE</u>		Proposed Degree Title: <u>BSCOE</u>	
Formal Option(s): _____		Proposed Formal Option(s): _____	
Specialty Field w/in Formal Option: _____		Proposed Specialty Field w/in Formal Options: _____	
Date of Contact with Associate Provost for Academic Administration ¹ : <u>9/1/15</u>			
Bulletin (yr & pgs):	<u>2105-16, pg 245-6</u>	CIP Code ¹ :	<u>14.0901</u>
Accrediting Agency (if applicable):		<u>ABET</u>	
Requested Effective Date:		<input checked="" type="checkbox"/> Semester following approval. OR <input type="checkbox"/> Specific Date ² : _____	
Dept. Contact Person:	<u>James E. Lumppp, Jr.</u>	Phone:	<u>257-3895</u>
		Email:	<u>jel@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: EE 101 (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: PHY 231 (4) and PHY 241 (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 381 (3)
Community, Culture and Citizenship: 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
I. Intellectual Inquiry (one course in each area)		
Arts and Creativity	<u>EGR101; EGR 103</u>	<u>3</u>
Humanities	<u>Choose from approved list</u>	<u>3</u>

¹ 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.

² 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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	<i>Choose from approved list</i>	<u>3</u>
Social Sciences		
Natural/Physical/Mathematical	<i>PHY 231, PHY 241</i>	<u>5</u>
II. Composition and Communication		
Composition and Communication I	CIS or WRD 110	3
Composition and Communication II	CIS or WRD 111	3
III. Quantitative Reasoning (one course in each area)		
Quantitative Foundations ³	<i>MA 113</i>	<u>4</u>
Statistical Inferential Reasoning	<i>STA 381</i>	<u>3</u>
IV. Citizenship (one course in each area)		
Community, Culture and Citizenship in the USA	<i>Choose from approved list</i>	<u>3</u>
Global Dynamics	<i>Choose from approved list</i>	<u>3</u>
Total General Education Hours		<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).

The proposed curriculum change includes the addition of EGR 101, 102 and 103, addition of CS 270 and elimination of CS 115, 441 and 470.

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>CPE 490</u>	<input checked="" type="checkbox"/> Specific course) – list: <u>CPE 490</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 credits</u>	<u>CIS/WRD 110; 3 credits</u> <u>CIS/WRD 111; 3 credits</u>
<u>CS 115 ; 3 credits</u>	
<u>CS 215 ; 4 credits</u>	<u>CS 215; 4 credits</u>
	<u>CS 216; 3 credits</u>
<u>EE 211 ; 4 credits</u>	

³ 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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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
<u>EE/CS Technical Electives; 12 credits</u> <u>Technical Elective; 3 credits</u>	<u>CPE Technical Electives; 9 credits</u> <u>Hardware/Software Electives; 6 credits</u> <u>Technical Elective; 6 credits</u>

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
<u>Supportive Elective ; 6 credits</u>	<u>Supportive Elective ; 3 credits</u>

13. Summary of changes in required credit hours:

	Current	Proposed
a. Credit Hours of Premajor or Preprofessional Courses:	<u>33</u>	<u>48</u>
b. Credit Hours of Major's Requirements:	<u>63-66</u>	<u>46</u>
c. Credit Hours for Required Minor:	_____	_____
d. Credit Hours Needed for a Specific Option:	_____	_____
e. Credit Hours Outside of Major Subject in Related Field:	_____	_____
f. Credit Hours in Technical or Professional Support Electives:	<u>15</u>	<u>21</u>
g. Minimum Credit Hours of Free/Supportive Electives:	<u>6</u>	<u>3</u>
h. Total Credit Hours Required by Level:		
100:	<u>24</u>	<u>24</u>
200:	<u>42</u>	<u>47</u>
300:	<u>12</u>	<u>9</u>
400-500:	<u>21</u>	<u>9</u>
i. Total Credit Hours Required for Graduation:	<u>129</u>	<u>130</u>

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

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Incorporation of new First Year Engineering Program course sequence. Combining lecture and associated laboratory courses into one course number. Addition of CS270. Moving EE383 to EE287. Replacing requirements for CS441 and CS470 with electives. Restructuring of technical and engineering electives.

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

YEAR 1 – FALL: (e.g. "BIO 103; 3 credits")	<u>EGR 101; 1 credit</u> <u>EGR 102; 2 credits</u> <u>MA 113; 4 credits</u> <u>CHE 105; 4 credits</u> <u>CIS/WRD 110; 3 credits</u>	YEAR 1 – SPRING:	<u>EGR 103; 2 credits</u> <u>MA 114; 4 credits</u> <u>PHY 231; 4 credits</u> <u>PHY 241; 1 credit</u> <u>CIS/WRD 111; 3 credits</u> <u>CS 215; 4 credits</u>
YEAR 2 - FALL :	<u>MA 213; 4 credits</u> <u>PHY 232; 4 credits</u> <u>PHY 242; 1 credit</u> <u>CS 216; 3 credits</u> <u>CPE 282; 4 credits</u>	YEAR 2 – SPRING:	<u>MA 214; 3 credits</u> <u>EE 211; 4 credits</u> <u>CPE287; 4 credits</u> <u>CS 270; 3 credits</u> <u>CS275; 4 credits</u>
YEAR 3 - FALL:	<u>EE 223; 4 credits</u> <u>CS 315; 3 credits</u> <u>CPE380; 3 credits</u> <u>STA 381; 3 credits</u> <u>UK Core; 3 credits</u>	YEAR 3 - SPRING:	<u>EE 421G; 3 credits</u> <u>EE461G; 3 credits</u> <u>Technical Elective; 3 credits</u> <u>CPE480; 3 credits</u> <u>CPE Elective; 3 credits</u> <u>UK Core; 3 credits</u>
YEAR 4 - FALL:	<u>CPE 490; 3 credits</u> <u>CPE Elective; 3 credits</u> <u>Technical Elective; 3 credits</u> <u>Supportive Elective; 3 credits</u> <u>UK Core; 3 credits</u>	YEAR 4 - SPRING:	<u>CPE 491; 3 credits</u> <u>HW Elective; 3 credit</u> <u>SW Elective; 3 credit</u> <u>CPE Elective; 3 credits</u> <u>UK Core; 3 credits</u>

CHANGE UNDERGRADUATE PROGRAM FORM

Signature Routing Log

General Information:

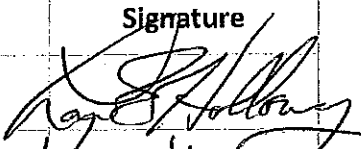
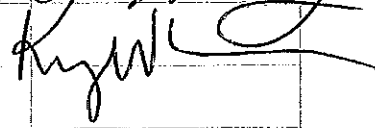
Current Degree Title and Major Name: Bachelor of Science in Computer Engineering, Computer Engineering

Proposal Contact Person Name: James E. Lumpp, Jr. Phone: 257-3895 Email: jel@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
CPE Committee	9/11/15	Lawrence Holloway / 3-8523 / larry.holloway@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 ⁴
Undergraduate Council	12/15/15	Joanie Ett-Mims	
Graduate Council			
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

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



UNIVERSITY OF KENTUCKY

Date: 9/18/2015
To: Janet Lumpp, Director UK FYE Program
From: James E. Lumpp, Jr. (jel@uky.edu, 7-3895)
RE: Computer Engineering Curriculum/FYE Program

**Department of Electrical and
Computer Engineering**
453 F. Paul Anderson Tower
Lexington, KY 40506-0046
Office: (859) 257-8042
Fax: (859) 257-3092
www.engr.uky.edu

The ECE Faculty meet 8/19/15 and 9/3/15 and the Computer Engineering Curriculum Committee convened meetings on 9/9/15 and 9/11/15 and agreed to the following changes to the Computer Engineering BS degree program to better serve the students in the Computer Engineering program:

- Approval of and incorporation of the First-Year Engineering Program as part of the Computer Engineering Degree Requirements
- Addition of the new CS 270 "Systems Programming" course to the Curriculum in place of one EE/CS Elective
- Replacement of CS470 with a CpE Elective.
- Replacement of CS441 with a CpE Elective.
- Reduced the number of hours of Supportive Elective from 6 hours to 3 hours
- Increased the number of hours of Technical Elective from 3 hours to 6 hours
- EE383 "Introduction to Embedded Systems" at 3 hours was changed to a new 4 hour EE287 course
- EE 221 "Circuits II" and EE222 "Circuits II Lab" were combined into a new 4 hours course EE223 "Circuits II"
- EE 280 "Design of Logic Circuits" and EE281 "Logical Design Laboratory" were combined into a new 4 hour course, EE282 "Digital Logic Design"
- One EE/CS Elective was converted into a Hardware Depth Electives
- One EE/CS Elective was converted into a Software Depth Electives
- One EE/CS Elective was converted into a CpE Elective
- Several minor changes to several 300, 400, and 500 level course prerequisites

As a result the number of hours total for the degree program was reduced from 132 to 130.

The current proposal is for Engineering Standing for Computer Engineering to change from including the following courses (total 33 hours):

CIS/WRD 110; 3 credits
CS 115 ; 3 credits
CS 215 ; 4 credits
EE 211 ; 4 credits
EE 280 ; 3 credits
MA 113 ; 4 credits
MA 114 ; 4 credits

MA 213 ; 4 credits
PHY 231; 4 credits

To instead include (total 34 hours):

CIS/WRD 110; 3 credits
CS 215; 4 credits
CS 216; 3 credits
CpE 282; 4 credits
MA 114; 4 credits
MA 213; 4 credits
CHE 105; 4 credits
PHY 231; 4 credits
PHY 232; 4 credits

Please let me know if I can provide any other information.

Computer Engineering

College of
Engineering

Computer engineering involves modeling, design, implementation, testing, evaluation and integration of computer hardware and software to create computing systems. Computer engineers use both hardware concepts from electrical engineering and system software concepts from computer science. Graduates will be well prepared to work in areas such as digital logic design, computer organization/architecture and design, algorithm design and analysis, embedded systems, compilers, and operating systems. Elective options in the curriculum offer preparation in software engineering, databases, dependable systems, networking and communications, VLSI, graphics, image processing, visualization, artificial intelligence, and control systems. The program is offered through a partnership between the Department of Electrical and Computer Engineering and the Department of Computer Science.

Degree Requirements

In addition to fulfilling UK Core and College of Engineering requirements, students must complete the computer engineering curriculum. The following curriculum meets the requirements for the B.S. degree.

Freshman Year

First Semester	Hours
MA 113 Calculus I	4
EE 101 Creativity and Design in Electrical and Computer Engineering (fulfills the UK Core Arts & Creativity requirement)	3
CIS/WRD 110 Composition and Communication I	3
CHE 105 General College Chemistry I	4
CS 115 Introduction to Computer Programming	3
UK Core – Humanities	3
Second Semester	
EE 280 Design of Logic Circuits	3
MA 114 Calculus II	4
PHY 231 General University Physics	4
PHY 241 General University Physics Laboratory	1
CIS/WRD 111 Composition and Communication II	3

Sophomore Year

First Semester	Hours
CS 215 Introduction to Program Design, Abstraction, and Problem Solving Techniques	4
MA 213 Calculus III	4
EE 211 Circuits I	4
PHY 232 General University Physics	4
PHY 242 General University Physics Laboratory	1
EE 281 Logical Design Laboratory	2
Second Semester	
MA 214 Calculus IV	3
CS 275 Discrete Mathematics	4
CS 216 Introduction to Software Engineering Techniques	3
EE/CS 380 Microcomputer Organization	3
UK Core – Social Sciences	3

Junior Year

First Semester	Hours
EE 221 Circuits II	3
EE 222 Electrical Engineering Laboratory I	2
CS 315 Algorithm Design and Analysis	3
EE 383 Introduction to Embedded Systems	3
UK Core – Citizenship - USA	3
STA 381 Engineering Statistics – A Conceptual Approach	3

Second Semester

EE 461G Introduction to Electronics	3
CS 470G Introduction to Operating Systems	3
EE 480/CS 480G Advanced Computer Architecture**	3
EE/CS Technical Elective††	3
EE 421G Signals and Systems	3

Senior Year

First Semester	Hours
CS 441G Compilers for Algorithmic Languages	3
EE 490 Electrical Engineering Capstone Design I**,†	3
EE/CS Technical Elective††	3
Supportive Elective*	3
Technical Elective†	3

Second Semester

EE 491 Electrical Engineering Capstone Design II**,†	3
EE/CS Technical Electives††	6
Supportive Elective*	3
UK Core – Global Dynamics	3

*Supportive elective is to be chosen from any University courses, excluding more elementary versions of required courses, such as precalculus mathematics, MA 308, MA 310 or PHY 211.

**EE 480/CS 480G is only taught in the spring semester. EE 490 is only taught in the fall semester. EE 491 is only taught in the spring semester.

†Technical elective may be selected from upper-division engineering, mathematics, statistics, computer science, physics, or other technically-related fields excluding more elementary version of required courses. To be selected in consultation with academic advisor, if taken. CS 499 fulfills senior design and the GCCR. A technical elective course must be taken to fulfill the technical elective requirement if CS 499 is taken. EE 490 and EE 491 fulfill the technical elective, senior design and the GCCR.

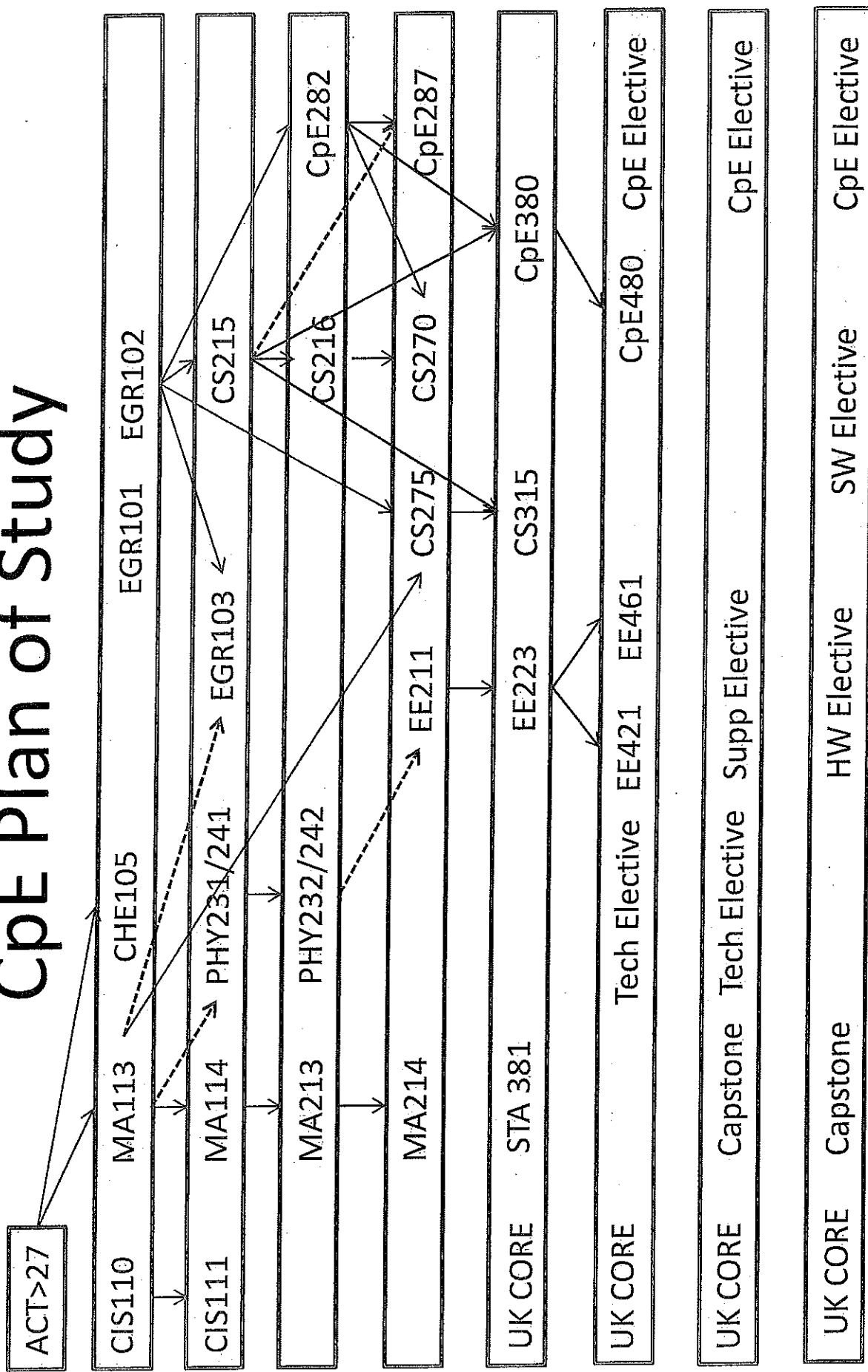
††EE/CS technical electives are senior level courses in either the computer science or electrical engineering disciplines. These include 400-level CS courses and 500-level CS and EE courses with emphasis in the computer engineering area and excluding EE 595. To be selected in consultation with academic advisor.

Recommended EE/CS Technical Electives:

CS 405G Introduction to Database Systems
CS 415G Combinatorics and Graph Theory
CS 416G Principles of Operations Research I
CS 422 Numerical Solutions of Equations
CS 450G Fundamentals of Programming Languages
CS 463G Introduction to Artificial Intelligence
CS 471G Networking and Distributed Operating Systems
CS 485G Topics in Computer Science (Subtitle required)
EE 512 Digital Communication Systems
EE 560 Semiconductor Device Design
EE 564 Digital Electronic Circuits
EE 572 Digital Control of Dynamic Systems
EE 582 Hardware Description Languages and Programmable Logic
EE 584 Introduction of VLSI Design and Testing
EE 585 Fault Tolerant Computing
EE 586 Communication and Switching Networks
EE 587 Microcomputer Systems Design
EE 599 Topics in Electrical Engineering (Subtitle required)

University of Kentucky is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award associate, baccalaureate, masters, and doctorate degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097, call 404-679-4500, or online at www.sacscoc.org for questions about the accreditation of University of Kentucky.

CpE Plan of Study



CpE Plan of Study Hours

1 st Fresh	CIS110 3	MA113 4	CHE105 4	EGR101 1	EGR102 2		14
2 nd Fresh	CIS111 3	MA114 4	PHY231/241 5	EGR103 2	CS215 4		18
1 st Soph		MA213 4	PHY232/242 5		CS216 3	CpE282 4	16
2 nd Soph		MA214 3	EE211 4	CS270 3	CS275 4	CpE287 4	18
1 st Junior	UK CORE 3	Prob/Stats 3	EE223 4		CS315 3	CpE380 3	16
2 nd Junior	UK CORE 3	Tech Elective 3	EE421 3	EE461 3	CpE Elec 3	CpE480 3	18
1 st Senior	UK CORE 3	Capstone 3	Tech Elective 3	Supp. Elec 3		CpE Elec 3	15
2 nd Senior	UK CORE 3	Capstone 3		HW Elec 3	SW Elec 3	CpE Elec 3	15



UNIVERSITY OF KENTUCKY

Date: 9/18/2015
To: UK Senate
From: James E. Lumpp, Jr.,(jel@uky.edu, 7-3895)
RE: Computer Engineering Degree Prefix

**Department of Electrical and
Computer Engineering**
453 F. Paul Anderson Tower
Lexington, KY 40506-0046
Office: (859) 257-8042
Fax: (859) 257-3092
www.engr.uky.edu

The College of Engineering is requesting the prefix "CPE" be established by the University of Kentucky for use with courses used in partial fulfillment of the graduation requirements for students pursuing the B.S. Computer Engineering degree. The CPE prefix will allow the College of Engineering and the Department of Electrical and Computer Engineering better communicate to students the core requirements for the degree and to better track cohorts of students as they progress through the program. This is critically important to the College for ABET accreditation that requires sufficient depth and breadth of "Engineering Topics" for degrees granted with the program name "Computer Engineering".

The UK College of Engineering voted and approved the degree program along with the CPE prefix and subsequently, the UK Senate and the state approved the Computer Engineering Degree program. Currently, the Department of Electrical and Computer Engineering is revising the Computer Engineering Degree Program in preparation for an ABET Accreditation Review in 2016.

Please feel free to contact me if you have any questions.

Sincerely,

James E. Lumpp, Jr.
Director of Undergraduate Studies
Computer Engineering
Professor
Electrical and Computer Engineering

Brandenburg, Barbara J

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> 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

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

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

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 Army and Bill

Back in October, Janet Lumpp sent you an email regarding our changes to the Engineering curricula and I see where Army 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

371 Ralph G Anderson Building | Lexington, KY 40506-0030 | office 859.257.1864 | fax 859.257.5727
email kimberly.anderson@uky.edu | web <http://www.engr.uky.edu>

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 1st 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 2nd 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.