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## Proposal to the Senate Educational Policy Committee

**PROPOSAL TITLE:** Establish a Major in Electrical and Computer Engineering in the Department of Electrical and Computer Engineering, College of Engineering for the degree of Master of Engineering.

**SPONSOR:** Prof. Steven J. Franke, Associate Head for Graduate Affairs, Department of Electrical and Computer Eng., 2084 ECEB MC-702, 333-8128, s-franke@illinois.edu.

**COLLEGE CONTACT:** William G. Buttlar, Associate Dean, Office of Graduate and Professional Programs, College of Engineering, 306 Engineering Hall MC-266, 333-0678, buttlar@illinois.edu.

**BRIEF DESCRIPTION:** The Department of Electrical and Computer Engineering (ECE) requests establishment of a major in Electrical and Computer Engineering in the Master of Engineering (M.Eng.) degree. The proposed degree is different from ECE's existing research-oriented Master of Science (M.S.) degree in that it is a terminal professional degree, no thesis is required, and it is not intended as a pathway to the doctoral program. The degree will require 32 hours of course work. The major in ECE will be a self-supporting program. Further details of the requirements for the proposed degree and the current requirements for a traditional ECE M.S. degree are given in the Appendices.

**JUSTIFICATION:** The major in ECE in the M.Eng. degree program will provide the opportunity for ECE students to broaden their knowledge beyond what can be covered in a 4-year B.S. degree program. It is generally accepted in industry and in academe that a 4-year B.S. in ECE is barely adequate to prepare students for current and future engineering challenges, and that a professional master's degree is highly desirable preparation for employment in today's competitive industrial environment. Core topics currently required in the undergraduate curriculum are necessary but not sufficient in most cases to meet industry's needs. This is evident today when an increasing number of companies coming to campus are explicitly looking for applicants with a graduate degree. Global competition is forcing an increased emphasis on innovation, interdisciplinary approaches to problem solving, communication skills, and teamwork. This course-work-only degree program is intended for industry engineers and students from other institutions who have a 4-year B.S. and would like to obtain an advanced degree but aren't interested in pursuing a Ph.D. degree. A combined B.S./M.Eng. degree program is proposed in a companion to this document and is intended for Illinois undergraduates with superior academic records. The M.Eng. degree program will facilitate the development of exchange programs and collaborations with international educational institutions and will bring Illinois' degree offerings on par with those of our peer institutions.

This M.Eng. degree requires a professional development component which is a minimum of 4 hours. Professional development for this M.Eng degree can be completed in the form of business courses, leadership courses, or capstone project.

**BUDGETARY AND STAFF IMPLICATIONS:**

1) Resources

- a. How does the unit intend to financially support this proposal?

The M.Eng. in ECE program is requesting self-supporting program status. Students enrolled in the program will pay tuition. The College of Engineering (CoE) will use graduate tuition dollars returned to the CoE from the Office of the Provost Budget and Resource Planning to fund additional instructional resources needed (if any) to support the curriculum in M.Eng. programs. Graduate tuition funds returned to the colleges from campus are considered state, recurring funds that may be used to fund faculty hires or support instruction in other ways. The CoE has developed a tuition distribution model for departments offering majors/concentrations within the M.Eng. degrees. The tuition distribution MOU is provided in Appendix D. Graduate tuition funds returned to the CoE will be distributed to the designated home unit (and CoE departments providing instruction) to supplement instructional resources needed (if any) to support students in MEng degree programs.

- b. How will the unit create capacity or surplus to appropriately resource this program? If applicable, what functions or programs will the unit no longer support to create capacity?

The proposed curriculum for this program groups together existing courses currently available for student enrollment. No new courses are being proposed to support this curriculum. Please see Resource Implications discussion in section 2 for a discussion of the impact on course enrollments and TA support.

- c. Will the unit need to seek campus or other external resources? If so, please provide a summary of the sources and an indication of the approved support.

No

- d. Please provide a letter of acknowledgment from the college that outlines the financial arrangements for the proposed program.

Tuition MOU provided as Appendix D

2) Resource Implications

- a. Please address the impact on faculty resources including the changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

Total enrollment in the ECE M.Eng. program is expected to be approximately 60 students. Current enrollment in the ECE graduate program is approximately 500. Hence, the M.Eng. program will increase the total graduate student body by up to 12% over current levels. ECE graduate enrollment was 600 in 2005 and exceeded 550 from 2002 through 2006. Thus, expected total graduate enrollment is well within the range experienced in recent years. Excess capacity in virtually all ECE 400- and 500-level classes will be able to handle these additional enrollments without increases in the number of sections offered. Enrollment in some courses is expected to increase enough to warrant an increase in the level of TA support, however any increase in total TA appointment expenditures is expected to be at most commensurate with the 12% increase in enrollment and will be more than offset by additional tuition revenue returned to the Department.

- b. Please address the impact on course enrollment in other units and provide an explanation of discussions with representatives of those units.

With the exception of the 4 credit hour Professional Development requirement, which may be fulfilled outside of the major department for breadth, all degree requirements can be fulfilled within the ECE department. Thus, there will be minimal impact on other units. The initial list of approved Professional Development courses is comprised of courses offered by the Technology Entrepreneur Center, so we have included a letter of support from that unit.

- c. Please address the impact on the University Library.

None anticipated. Letter provided.

- d. Please address the impact on technology and space (e.g. computer use, laboratory use, equipment, etc.)

No impact on research labs. Minimal impact on engineering work station labs. Any resources needed to address impact to CoE lab resources can be accommodated with the CoE retained percentage of graduate tuition.

For new degree programs only:

- 3) Briefly describe how this program will support the University's mission, focus, and/or current priorities. Include specific objectives and measurable outcomes that demonstrate the program's consistency with and centrality to that mission.

The M.Eng. degree program in ECE is consistent with the University's mission to serve the state, the nation, and the world, preparing students for lives of impact through the transfer and application of knowledge. Global competition in industry is forcing an increased emphasis on innovation, interdisciplinary approaches to problem

solving, communication skills, and teamwork. Core topics currently required in the undergraduate curriculum are necessary but not sufficient in most cases to meet industry's needs. Advanced 400- and 500-level technical electives in ECE and other engineering disciplines emphasize projects, team-oriented work, and reporting and communication skills, as well as providing students with exposure to contemporary issues. Additional coursework selected from this catalog will go a long way toward addressing the needs of industry.

- 4) Please provide an analysis of the market demand for this degree program. What market indicators are driving this proposal? What type of employment outlook should these graduates expect? What resources will be provided to assist students with job placement?

Today, with the increasing breadth and depth of the engineering profession, additional preparation and professional skills development are required. For several years, our accrediting bodies have been considering expansion of engineering education beyond the bachelor's degree. Civil Engineering has already moved in that direction, and we expect that other disciplines will follow. Both Civil Engineering and Computer Science have launched very successful professional master's degree programs. With the existing non-thesis master's, which will be terminated once this new degree is in place, ECE has been unable to meet the needs of the numerous students who have inquired about a course-work-only degree program in ECE, as well as our inability to participate in international cooperative education agreements and online degree programs which are better suited to course-work-only degrees. This new M.Eng. is designed to allow ECE to meet these needs. Master's degrees in ECE recently ranked in the top ten in Forbes magazine's "Best Master's Degrees for Jobs Right Now"<sup>1</sup> based on employment outlook and pay rank. Students will have the resources of the CoE Engineering Career Services office to assist with job placement.

- 5) If this is a proposed graduate program, please discuss the programs intended use of waivers. If the program is dependent on waivers, how will the unit compensate for lost tuition revenue?

The M.Eng. ECE major is requesting self-supporting status. There will be no Graduate College or BOT waivers allowed for students in this program.

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<sup>1</sup> <http://www.forbes.com/sites/jacquelynsmith/2013/06/07/the-best-and-worst-masters-degrees-for-jobs-right-now/>

**DESIRED EFFECTIVE DATE:** Fall 2015

**STATEMENT FOR PROGRAMS OF STUDY CATALOG:** See Appendix A.

**CLEARANCES:** (Clearances should include signatures and dates of approval) - - These signatures must appear on a separate sheet. If multiple departments or colleges, add lines.)

Signatures:



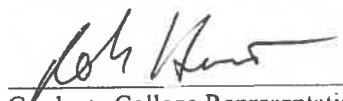
Unit Representative:

September 22, 2014

Date:

  
College Representative:

9-23-14  
Date:

  
Graduate College Representative:

11/24/14  
Date:

\_\_\_\_\_  
Provost Representative:

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Educational Policy Committee Representative:

\_\_\_\_\_  
Date:

## APPENDIX A STATEMENT FOR PROGRAMS OF STUDY CATALOG

*Changes are in red, bold, underlined font, except for new table showing proposed M.Eng. requirements, which is red only.*

### Electrical and Computer Engineering

[ece.illinois.edu](http://ece.illinois.edu)

Head of the Department: William H. Sanders

Director of Graduate Studies: Steven J. Franke

Graduate Programs

2090 Electrical and Computer Engineering Building

306 N. Wright St.

Urbana, IL 61801

(217) 333-0207

Email: [ece-grad-apps@illinois.edu](mailto:ece-grad-apps@illinois.edu)

**Major:** Electrical and Computer Engineering

**Degrees Offered:** **M.Eng.**, M.S., Ph.D.

**Online Program:** Electrical and Computer Engineering

**Degrees offered:** M.S.

**Joint Degree Program:** Master of Science in Electrical and Computer Engineering and [Master of Business Administration](#)

**Degrees Offered:** M.S. and M.B.A.

**Medical Scholars Joint Degree Program:** Doctor of Philosophy (Ph.D.) in Electrical and Computer Engineering and Doctor of Medicine (M.D.) through the [Medical Scholars Program](#)

### Graduate Degree Programs

The department offers graduate programs in electrical and computer engineering leading to the degrees of Master of Engineering, Master of Science, and Doctor of Philosophy. Virtually every specialty within electrical and computer engineering is represented. Courses and research opportunities exist in the following areas: applied computation theory; bioengineering, acoustics, and magnetic resonance engineering; communications; computer-aided design and test; computer systems; computer vision and robotics; decision and control; electromagnetic fields; electrooptics, lasers, and plasmas; integrated circuits; microelectro-mechanical systems; mobile computing and communication; optoelectronics; power and energy systems; power electronics; remote sensing and propagation; semiconductor materials and devices; semiconductor physics and computational electronics; and signal, image, and speech processing. The programs are very flexible to encourage interdisciplinary studies and research.

**The Master of Engineering degree in ECE is designed for students having a B.S. degree in ECE or a related field and offers an opportunity to broaden knowledge of areas in ECE beyond what is possible in a four-year undergraduate curriculum. The M.Eng. is a professional degree and is not intended for students interested in obtaining research experience. Students interested in a research-oriented career, and all students interested in obtaining a Ph.D., should instead apply to the traditional M.S. program.**

Opportunity exists for specializing in (i) computational science and engineering and (ii) energy and sustainability engineering within the department's graduate programs via the [Computational Science and Engineering \(CSE\) Option](#) and the [Energy and Sustainability Engineering \(EaSE\) Option](#) by completing the required coursework. The [Medical Scholars Program](#) permits highly qualified students to integrate the study of medicine with study for a graduate degree in a second discipline, including Electrical and Computer Engineering. For complete program information, visit the [Electrical and Computer Engineering graduate program Web site](#).

## Admission

Applicants must have completed an electrical engineering curriculum or a computer engineering curriculum substantially equivalent to those of the University of Illinois at Urbana-Champaign. A minimum grade point average of 3.00 (A = 4.00) for the last two years of undergraduate study is required. However, because of space limitations, applicants with GPAs below 3.50 are rarely admitted. All applicants must submit scores from the general test of the [Graduate Record Examination \(GRE\)](#). Students interested in the Ph.D. program must have a master's degree for admission to the PhD program. Applicants with master's degrees are admitted only if a faculty member is willing to serve as the Ph.D. thesis advisor. Accordingly, such applicants should visit, write, call, or e-mail prospective Ph.D. advisors and discuss their research interests and potential Ph.D. thesis topics well in advance of application deadlines. Admission for the spring semester is possible, in addition to the usual fall semester admissions. Students interested in pursuing a Ph.D. degree are encouraged to apply to the master's with thesis program. Students interested in working in industry and who do not wish to pursue a Ph.D. should apply to the Master's of Engineering (M.Eng.) in ECE. Graduates of curricula in the physical sciences, mathematics, and computer science may be admitted if they are judged to have the necessary background to profit from graduate work in electrical and computer engineering. All applicants whose native language is not English must submit a minimum TOEFL score of 96 (iBT), 243 (CBT), or 590 (PBT); or minimum [International English Language Testing System \(IELTS\)](#) academic exam scores of 6.5 overall and 6.0 in all subsections. Applicants may be exempt from the TOEFL if [certain criteria](#) are met. For those taking the TOEFL or IELTS, [full admission status](#) is granted for scores greater than 102 (TOEFL iBT), 253 (TOEFL CBT), 610 (TOEFL PBT), or 6.5 (IELTS). [Limited status](#) is granted for lesser scores and requires enrollment in [English as a Second Language \(ESL\) courses](#) based on an ESL Placement Test (EPT) taken upon arrival to campus.

Applicants to the joint M.B.A degree program must meet the admissions standards for



both programs and be accepted by both programs. Students may apply to the Medical Scholars Program prior to beginning graduate school or while in the graduate program. Applicants to the Medical Scholars Program must meet the admissions standards for and be accepted into both Electrical and Computer Engineering and the College of Medicine. An application to the Medical Scholars Program will also serve as the application to the Electrical and Computer Engineering graduate program. Further information on this program is available by contacting the Medical Scholars Program (125 Medical Sciences Building, 217-333-8146, [mspo@illinois.edu](mailto:mspo@illinois.edu)).

## Degree Requirements

For additional details and requirements refer to the department's [Graduate Study Manual](#) and the [Graduate College Handbook](#).

### Master of Science

Requirements	
Credit Hours:	Hours
<b><i>Total Credit for the Degree</i></b>	<b>32</b>
Thesis Research – ECE 599 (min-max applied toward degree)	8
Course Work	24
ECE 500 – registration (0 hours) every term while in residence	0
500-level ECE courses other than ECE 590, ECE 596, ECE 597, ECE 599	12
Elective courses (subject to Other Requirements and Conditions below)	12
<b>Other Requirements and Conditions (may overlap):*</b>	
Credit in ECE 411, 415, 445, 590 or 596, PHYS 404, 405, 435, and 436 and STAT 400 does not count toward the degree.	
No course used to fulfill any degree requirement may be taken using the "Credit/No Credit" option.	
A maximum of 4 hours of ECE 597 (or other individual study) may be applied toward the elective course work requirement.	
Maintain a minimum program GPA of 3.0.	
There is no final examination for the M.S. degree.	

## Master of Engineering, Electrical and Computer Engineering

Requirements	
Credit Hours:	Hours
<b><i>Total Credit for the Degree</i></b>	<b>32</b>
Course Work	32
ECE 500 – registration (0 hours) every term while in residence	0
500-level ECE courses (subject to Other Requirements and Conditions below)	12
Professional Development: <ul style="list-style-type: none"> <li>•ECE 596 Master’s Project supervised by ECE (or affiliate) graduate faculty</li> <li>•Course(s) in leadership, entrepreneurship, or other business-related topic from <a href="#">approved list</a> or as approved by ECE Director of Graduate Studies</li> </ul>	4
Elective courses (subject to Other Requirements and Conditions below)	16
<b>Other Requirements and Conditions (may overlap):*</b>	
A minimum of 12 credit hours of ECE course work at 500-level must be applied toward the degree. Up to 4 hours of ECE 596 and/or ECE 597 (or other individual study) may be applied toward this degree requirement.	
Course work must include at least 18 credit hours of ECE course work; 15 of these hours must be from no more than 2 different focus areas. The ECE Graduate Committee maintains the <a href="#">Focus area</a> course lists.	
Credit in ECE 411, 415, 445, 590, PHYS 404, 405, 435, 436 and STAT 400 do not count toward the degree.	
No course used to fulfill any degree requirement may be taken using the "Credit/No Credit" option.	
This degree option is non-thesis only.	
Maintain a minimum program GPA of 3.0.	

## Doctor of Philosophy

Requirements	
Credit Hours:	Hours
<b><i>Total Credit for the Degree</i></b>	<b>64</b>
Thesis Research – ECE 599 (min-max applied toward degree)	32-40
Course Work	24-32
ECE 500 – registration (0 hours) every term while in residence	0
3 permanent 500-level courses in 3 different <a href="#">Ph.D. Breadth Requirement areas</a>	12

Elective courses (subject to Other Requirements and Conditions below)	12-20
<b>Other Requirements and Conditions:*</b>	
Credit in ECE 411, 415, 445, 590 (seminar), 596, 597 (individual study), PHYS 404, 405, 435, and 436, STAT 400, or any other seminar or individual study course does not count toward the degree.	
At least one ECE 500-level course must be taken.	
No course used to fulfill any degree requirement may be taken using the "Credit/No Credit" option.	
Maintain a minimum program GPA of 3.0.	
A Masters degree is required for admission to the Ph.D. program.	
Ph.D. exam and dissertation requirements:	
<ul style="list-style-type: none"> <li>Qualifying exam</li> <li>Preliminary exam</li> <li>Final exam or dissertation defense</li> <li>Dissertation deposit</li> </ul>	

## Joint Degree Program

The joint M.B.A. program requires a total of 92 graduate hours of course work with 32 for the M.S. as prescribed above, plus 60 graduate hours for the [M.B.A. degree](#), including 40 hours of M.B.A. core course work; and 20 hours of M.B.A. elective course work to fulfill the requirements of a concentration. Detailed information may be found at the department's [graduate program Web site](#). For the joint M.B.A. program, the degrees are awarded simultaneously after the requirements for both degrees have been met.

## Medical Scholars Program

Students in the Medical Scholars program must meet the specific requirements for both the [medical](#) and graduate degrees. On average, students take eight years to complete both degrees. The first year of the combined program is typically spent meeting requirements of the Electrical and Computer Engineering graduate degree.

## Faculty Research Interests

Research interests of the Electrical and Computer Engineering faculty include the broad areas of study described in the graduate programs section and more. Many faculty members hold affiliate status with other departments, and a number of faculty members from other departments hold affiliate status with the department. In addition, some faculty hold appointments in the Beckman Institute for Advanced Science and Technology, the Coordinated Science Laboratory, the Materials Research Laboratory, and the Micro and Nanotechnology Laboratory. All these affiliations provide opportunities for graduate student appointments to conduct research. For a detailed list of current research interests of the faculty, visit the department's [research Web site](#).

## Centers, Programs, and Institutes

There are numerous interdisciplinary programs, laboratories, and centers for research within the department. These are described at the department's [research Web site](#).

## Financial Aid

Fellowships, research assistantships, and teaching assistantships (all of which include tuition and partial fee waivers) are available for the majority of students who are admitted **to the M.S. and Ph.D. programs**. There will be no Graduate College or BOT waivers allowed for students in the M.Eng. program. International applicants generally are not awarded teaching assistantships but are eligible for the other forms of financial aid. All applicants, regardless of U.S. citizenship, whose native language is not English and who wish to be considered for teaching assistantships must demonstrate [spoken English language proficiency](#) by achieving a minimum score of 50 on the [Test of Spoken English \(TSE\)](#), 24 on the speaking subsection of the TOEFL iBT, or 8 on the speaking subsection of the IELTS. For students who are unable to take the TSE, iBT, or IELTS, a minimum score of 50 is required on the [SPEAK test](#), offered on campus. All new teaching assistants are required to participate in the [Graduate Academy for College Teaching](#) conducted prior to the start of the semester.

## APPENDIX B

### Summary of Current M.S. and Proposed M.Eng. Degree Programs

#### Current M.S. Degree Program (32 hours)

- 8 hours of thesis credit (ECE 599)
- 24 hours course work, including at least 12 hours credit in 500 level ECE courses other than ECE 590, ECE 596, ECE 597, ECE 599 or other reading and independent study courses. At most 4 hours of ECE 597 or other independent study course work may be used to satisfy course work requirements.

#### Proposed M.Eng. Degree Program (32 hours)

32 hours course work, including at least 12 hours at 500-level, of which at least 8 hours must be 500 level ECE course work other than ECE 590, ECE 596, ECE 597, ECE 599 or other reading and independent study courses. Up to 4 hours of ECE 596, ECE 597 or other reading and independent study course work may be used to satisfy the degree requirements. Course work must include at least 18 hours of ECE course work and at least 15 hours chosen from no more than two different focus areas. The ECE Graduate Committee approves the [Focus area course lists](#). Coursework must include 4 hours of professional development defined as (i) graduate-level project course ECE 596 Master's Project supervised by ECE graduate faculty or faculty affiliate or (ii) graduate-level coursework in leadership, entrepreneurship, or business. Courses acceptable under category (ii) include but are not limited to:

ENG 460 Entrepreneurship for Engineers (1 hour)

ENG 461 Technology Entrepreneurship (3 hours)

ENG 466 High-Tech Venture Marketing (1 or 2 hours)

ENG 560 Managing Advanced Technol I (1 hour)

ENG 561 Managing Advanced Technol II (1 hour)

ENG 565 Technol Innovation & Strategy (2 hours)

ENG 566 Finance for Engineering Mgmt (2 hours)

ENG 567 Venture Funded Startups (1 hour)

ENG 598: Special Topic where topics include Applied Project Management and Creativity, Innovation & Vision, Advancing Creativity, and Teach Resp Cond of Research I

The Director of Graduate Studies must approve professional development courses not listed here.

## APPENDIX C

### Focus Area Course Lists for ECE M.Eng. Degree

M.Eng. coursework must include at least 15 hours chosen from no more than two different focus areas. Focus areas and courses within each area are listed below.

#### **Microelectronics, Photonics, Nanotechnology**

ECE 441 Physics and Modeling of Semiconductor Devices  
ECE 444 IC Device Theory & Fabrication  
ECE 455 Optical Electronics  
ECE 481 Nanotechnology  
ECE 484 Principles of Advanced Microelectronic Processing  
ECE 485 Introduction to Microelectromechanical Devices and Systems  
ECE 487 Introduction to Quantum Electronics  
ECE 488 Compound Semiconductors and Devices  
ECE 495 Photonic Device Laboratory  
ECE 510 Micro and Nanolithography  
ECE 518 Advanced Semiconductor Nanotechnology  
ECE 523 Gaseous Electronics and Plasmas  
ECE 532 Compound Semiconductors and Diode Lasers  
ECE 535 Theory of Semiconductors and Semiconductor Devices  
ECE 536 Integrated Optics and Optoelectronics  
ECE 539 Advanced Theory of Semiconductors & Devices  
ECE 565 Energy Dissipation Electronics  
ECE 572 Quantum Optoelectronics  
ECE 574 Nanophotonics

#### **Integrated Circuits and Systems**

ECE 425 Introduction to VLSI System Design  
ECE 482 Digital IC Design  
ECE 483 Analog IC Design  
ECE 527 System-On-Chip Design  
ECE 552 Numerical Circuit Analysis  
ECE 560 VLSI in Signal Processing and Communications  
ECE 581 Advanced Analog IC Design  
ECE 582 Physical VLSI Design  
ECE 585 MOS Device Modeling & Design

#### **Power and Energy Systems**

ECE 431 Electric Machinery  
ECE 432 Advanced Electric Machinery  
ECE 464 Power Electronics  
ECE 469 Power Electronics Laboratory

ECE 476 Power System Analysis  
ECE 530 Analysis Techniques for Large-Scale Electrical Systems  
ECE 568 Modeling and Control of Electromechanical Systems  
ECE 573 Power Systems Operations and Control  
ECE 576 Power System Dynamics and Stability  
ECE 588 Electricity Resource Planning

**Biomedical Imaging, Bioengineering and Acoustics**

ECE 402 Electronic Music Synthesis  
ECE 403 Audio Engineering  
ECE 414 Biomedical Instrumentation  
ECE 415 Biomedical Instrumentation Laboratory  
ECE 416 Biosensors  
ECE 437 Sensors and Instrumentation  
ECE 467 Biophotonics  
ECE 472 Biomedical Ultrasound Imaging  
ECE 473 Fundamentals of Engineering Acoustics  
ECE 480 Magnetic Resonance Imaging  
ECE 537 Speech Processing Fundamentals  
ECE 538 Speech and Hearing Acoustics  
ECE 545 Advanced Physical Acoustics  
ECE 564 Modern Light Microscopy  
ECE 594 Mathematical Models of Language

**Electromagnetics, Optics, Remote Sensing**

ECE 447 Active Microwave Circuit Design  
ECE 451 Advanced Microwave Measurements  
ECE 452 Electromagnetic Fields  
ECE 453 Wireless Communication Systems  
ECE 457 Microwave Devices & Circuits  
ECE 458 Applications of Radio Wave Propagation  
ECE 459 Communications, I  
ECE 454 Antennas  
ECE 455 Optical Electronics  
ECE 456 Global Navigation Satellite Systems  
ECE 460 Optical Imaging  
ECE 465 Optical Communication System  
ECE 466 Optical Communications Lab  
ECE 468 Optical Remote Sensing  
ECE 520 Electromagnetic Waves and Radiating Systems  
ECE 521 Analytical Foundations of Electromagnetic Theory  
ECE 531 Theory of Guided Waves  
ECE 540 Computational Electromagnetics  
ECE 546 Advanced Signal Integrity

ECE 569 Inverse Problems in Optics  
ECE 579 Nonlinear Optics  
ECE 571 Electromagnetic Waves in Inhomogeneous Media  
ECE 577 Advanced Antenna Theory  
ECE 578 Advanced EM Diffraction and Radiation

### **Signal Processing, Communications, Control Systems**

ECE 417 Multimedia Signal Processing  
ECE 418 Introduction to Image and Video Signal Processing  
ECE 420 Embedded DSP Laboratory  
ECE 459 Communications, I  
ECE 463 Digital Communications Laboratory  
ECE 486 Control Systems I  
ECE 490 Introduction to Optimization  
ECE 513 Vector Space Signal Processing  
ECE 515 Control System Theory & Design  
ECE 517 Nonlinear & Adaptive Control  
ECE 528 Analysis of Nonlinear Systems  
ECE 534 Random Processes  
ECE 544 Topics in Signal Processing  
ECE 547 Topics in Image Processing  
ECE 551 Digital Signal Processing, II  
ECE 553 Optimum Control Systems  
ECE 554 Dynamic System Reliability  
ECE 555 Control of Stochastic Systems  
ECE 556 Coding Theory  
ECE 558 Digital Imaging  
ECE 559 Topics in Communications  
ECE 561 Detection and Estimation Theory  
ECE 562 Advanced Digital Communications  
ECE 563 Information Theory  
ECE 580 Optimization by Vector Space Methods  
ECE 586 Topics in Decision and Control

### **Computing Systems, Networks, Software, Algorithms**

ECE 408 Applied Parallel Programming  
ECE 412 Microcomputer Laboratory  
ECE 419 Security Lab  
ECE 422 Computer Security I  
ECE 424 Computer Security II  
ECE 425 Introduction to VLSI System Design  
ECE 428 Distributed Systems  
ECE 435 Computer Networking Laboratory  
ECE 438 Communication Networks



ECE 439 Wireless Networks  
ECE 462 Logic Design  
ECE 511 Computer Architecture  
ECE 512 Computer Microarchitecture  
ECE 524 Advanced Computer Security  
ECE 526 Distributed Algorithms  
ECE 541 Computer Systems Analysis  
ECE 542 Design of Fault-Tolerant Digital Systems  
ECE 548 Computer Models of Cognitive Processes  
ECE 549 Computer Vision  
ECE 550 Advanced Robotic Planning  
ECE 567 Communication Network Analysis  
ECE 584 Embedded System Verification  
ECE 589 Robot Control Theory

Appendix D: Tuition Distribution MOU for Master of Engineering

**TO: William H. Sanders**  
**Interim Department Head**  
**Department of Electrical and Computer Engineering**

**FROM: William G. Buttler**  
**Associate Dean**  
**Graduate and Professional Programs**

**SUBJECT: Tuition Distribution for Master of Engineering**

**DATE:**

This Memorandum of Understanding (MOU) is between the College of Engineering (CoE) and its Departments participating in Master of Engineering (M.Eng.) programs. The CoE agrees to distribute graduate tuition received from campus (net of campus overhead, which is currently 10% of total graduate tuition) for students enrolled in M.Eng. programs as follows.

20%: To CoE

20%: To the M.Eng. designated home unit

\$200/Grad IU: To CoE rubrics outside of the M.Eng. designated home unit that provide graduate instructional units (IU---1 Grad IU is assumed equivalent to 1 credit hour)

Any tuition remaining after the above allocations are made will be distributed to the M.Eng. designated home unit.

<b>Example of M.Eng Distribution</b>				
Projected student enrollment	20			
Tuition per student	\$16,754			
Total IU's for M.Eng. Program	32			
IU's in secondary unit(s)	8			
		<b>Allocation</b>	<b>Remainder</b>	<b>%</b>
<b>Total Tuition</b>		<b>\$ 335,080</b>		
10% Campus		\$ 33,508	\$ 301,572	10%
College - 20% net campus overhead		\$ 60,314	\$ 241,258	18%
M.Eng. Home Department - 20% net campus overhead		\$ 60,314	\$ 180,943	18%
Departments providing courses:*				
Based on \$200 per IU for secondary unit (s), remainder to home unit*				
Secondary CoE Unit IUs	8	\$ 32,000	\$ 148,943	10%
M.Eng. Home Unit IUs	24	\$ 148,943		44%
<b>Total Tuition to M.Eng. Home Unit</b>		<b>\$ 209,258</b>		<b>62%</b>

In previous tuition distribution agreements for master's degree programs in the CoE, departments were only eligible for tuition distribution for programs that were distinctly different than the traditional master's degree program offered by that department; i.e. attracting incrementally new students than the traditional degree, and tuition was distributed after a "baseline" of tuition garnered from the existing program was determined. Departments operating under this MOU will receive a \$0 baseline. In order to be eligible to receive tuition under this MOU, departments must also adhere to the following assumptions:

- 1) M.Eng. programs can be designated as self-supporting. Even for programs that are not designated as self-supporting, it is assumed that the majority of students enrolled in M.Eng. programs will pay full tuition.
- 2) M.Eng. programs can set tuition rates greater than standard campus graduate tuition. Justification including proposed program costs, student demand, and competitor information must be provided with the request for differential tuition. CoE Administration must approve the request before it is forwarded to campus for review. Contact Elizabeth Stovall in the Office of Graduate and Professional Programs, [estovall@illinois.edu](mailto:estovall@illinois.edu).
- 3) The CoE department designated as the M.Eng. home unit (Major or Concentration) is responsible for ensuring the availability of required courses. Tuition flow to CoE departments/units of course rubrics outside of the M.Eng. home unit, but within the CoE, will follow the tuition distribution model outlined above. For elective courses with open enrollment, it is assumed that enrollment issues can be handled via advising.
- 4) M.Eng. programs designated as self-supporting must obtain prior CoE approval to offer scholarships to students enrolled in M.Eng. programs. Contact Elizabeth Stovall in the Office of Graduate and Professional Programs, [estovall@illinois.edu](mailto:estovall@illinois.edu). The resulting decrease in tuition revenue from scholarships will impact funds available to distribute to CoE external units providing courses, however, the obligation at the \$200/Grad IU standard rate remains.
- 5) M.Eng. programs not designated as self-supporting may experience students enrolling who have obtained tuition waivers from other units. The resulting decrease in tuition revenue will impact funds available to distribute to CoE external units providing courses, however, the obligation at the \$200 /Grad IU standard rate remains.

If a unit is already receiving tuition distribution for a master's degree program in the CoE, an addendum to this MOU will be drafted in order to address the "baseline" that will be used, as well as any other issues that might need to be addressed during the transition to the M.Eng. program.

This agreement will remain in effect for three years, after which time it will be reviewed, and must be renewed.

Tuition Distribution MOU for Master of Engineering

COE Approved October 2013

Addendum for CoE Departments providing courses external to the M.Eng. designated home unit

To: CoE Department Head(s), CoE Department(s)

From: M.Eng. Major/Concentration Home Unit

Re: M.Eng. (specify Major/Concentration)

Tuition received by the College of Engineering (CoE) for students enrolled in M.Eng. programs will be distributed to CoE departments (external to the designated home unit) which provide courses required for the M.Eng. degree program listed above at the rate of \$200/Grad IU, where 1 Grad IU is assumed equivalent to 1 credit hour. Tuition will be distributed to units at the end of the fiscal year based on 10-day enrollment data of each semester.

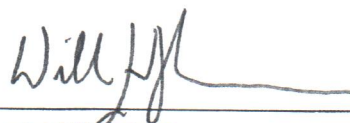
Tuition distribution is to be used to provide instructional resources needed to support the offering of course(s) to M.Eng. students. Department(s) named above offering course(s) for the M.Eng. degree program referenced in this MOU agree to provide enrollment for M.Eng. students in these course(s), at the level projected in the M.Eng. program proposal; in the same instruction format in which is the course is typically offered (e.g. instructor, class schedule, etc.) with instructional quality consistent with offerings of the course(s) prior to the enrollment of M.Eng. students. M.Eng. programs will be reviewed annually for the first three years to evaluate student enrollment, course availability, student/faculty ratios, and student/faculty assessment (by survey or other means). After the initial three years, the programs will be reviewed every three years.

Signatures

M.Eng. designated home unit:

ECE

\_\_\_\_\_  
Department

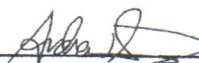


\_\_\_\_\_  
Authorized Signature

CoE Department offering course(s): ENG 460, ENG 461, ENG 466, ENG 560, ENG 561, ENG 565, ENG 566, ENG 567, ENG 598.

Technology and Entrepreneurship

\_\_\_\_\_  
Department



\_\_\_\_\_  
Authorized Signature

FINAL

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

University Library  
Office of Dean of Libraries  
and University Librarian  
230 Main Library, MC-522  
1408 West Gregory Drive  
Urbana, IL 61801



March 24, 2014

William G. Buttlar  
Associate Dean  
Office of Graduate and Professional Programs  
College of Engineering  
306 Engineering Hall  
M/C 704

Dear Dean Buttlar:

Thank you for providing the University Library with the opportunity to review the College of Engineering's proposals to the Senate Committee on Educational Policy to:

- Establish a combined Bachelor of Science - Master of Engineering Degree in the Department of Electrical and Computer Engineering
- Establish a Major in Electrical and Computer Engineering in the Department of Electrical and Computer Engineering for the Master of Engineering degree.

Based upon the two proposals that we reviewed, we do not believe that there will be any substantive impact on existing library offerings—either in terms of library materials or personnel.

The librarians in the Grainger Engineering Library have an excellent relationship with the College and if additional services or materials are required as the program develops, I have every confidence that we will be able to work together to meet the needs of the students.

Sincerely,

John Wilkin  
Juanita J. and Robert E. Simpson  
Dean of Libraries and University Librarian

c: Thomas Teper  
William Mischo  
Mary Schlembach  
Elizabeth Stovall, Graduate Programs Director, CoE

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

EP.15.31

Office of the Provost and Vice Chancellor  
for Academic Affairs

Swanlund Administration Building  
601 East John Street  
Champaign, IL 61820



December 22, 2014

Gay Miller, Chair  
Senate Committee on Educational Policy  
Office of the Senate  
228 English Building, MC-461

Dear Professor Miller:

Enclosed is a copy of a proposal from the College of Engineering and the Graduate College to establish an MENG in Electrical and Computer Engineering.

The proposal has been reviewed and approved by the Graduate College Executive Committee. It now requires Senate review.

Sincerely,

A handwritten signature in black ink that reads 'Kathryn A. Martensen'.

Kathryn A. Martensen  
Assistant Provost

c: J. Hart  
W. Buttlar  
A. Edwards  
S. Franke  
R. McElroy  
A. McKinney

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

RECEIVED  
NOV 26 2014  
Office of the Provost

Graduate College

204 Coble Hall  
801 South Wright Street  
Champaign, IL 61820-6210



Executive Committee

November 24, 2014

2014-2015 Members

Sarah Lubienski, Interim  
Dean & Chair  
Graduate College

Kristi Kuntz  
Office of the Provost  
207 Swanlund MC-304

Members

Abbas Aminmansour  
Architecture

Dilip Chhajed  
Business Administration

Wojciech Chodzko-Zajko  
Kinesiology & Community  
Health

Susan Cole  
Social Work

John D'Angelo  
Mathematics

Nicki Engeseth  
Food Science & Human  
Nutrition

Susan Fowler  
Special Education

Marie Heffernan  
Psychology

Paul Hergenrother  
Chemistry

Jack Juvik  
Crop Sciences

Samantha Knoll  
Mechanical Science &  
Engineering

John Jambros  
Aerospace Engineering

Glaucio Paulino  
Civil & Environmental  
Engineering

Dana Rabin  
History

Carla Santos  
Recreation, Sport and  
Tourism

Renée Trilling  
English

Dear Kristi,

Enclosed please find the proposal to establish a major in Electrical and Computer Engineering in the Department of Electrical and Computer Engineering for the degree of Master of Engineering and the proposal to establish a combined Bachelor of Science – Master of Engineering degree in the Department of Electrical and Computer Engineering. The Graduate College Executive Committee has approved both of these proposals.

The proposals were first received at the Graduate College on September 30, 2014. They were reviewed by the Program Subcommittee on October 28, 2014. As an outcome of that meeting some minor revisions and clarifications were requested for both proposals. Both of them were approved to move onward to the Executive Committee, pending the receipt of the needed information. The Program Subcommittee noted that it evaluated only the graduate portions of the proposal seeking to establish a combined Bachelor of Science – Master of Engineering degree. The revised proposals were received at the Graduate College on November 10, 2014. They were then reviewed by the Executive Committee.

Both proposals were unanimously approved by the Graduate College Executive Committee at the November 14, 2014 meeting. I send them to you now for further review.

Sincerely,

John C. Hart  
Associate Dean, Graduate College

c: W. Buttlar  
A. Edwards  
S. Franke  
R. McElroy  
A. McKinney

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

College of Engineering  
306 Engineering Hall, MC-266  
1308 West Green Street  
Urbana, IL 61801



RECEIVED  
SEP 30 2014  
GRADUATE COLLEGE

September 23, 2014

Associate Dean Alejandro Lugo  
Graduate College  
204 Coble Hall  
MC-322

Via: Andreas Cangellaris, Engineering College

Dear Dean Lugo:

The College of Engineering Executive Committee has reviewed and approved the following proposals:

**New Proposals: "Establish a Major in Electrical and Computer Engineering in the Department of Electrical and Computer Engineering for the Degree of Master of Engineering"**

**"Establish a Combined Bachelor of Science– Master of Engineering Degree in the Department of Electrical and Computer Engineering, College of Engineering"**

Sincerely yours,

David Ruzic, Vice Chair  
Executive Committee

Approval Recommended:

Andreas Cangellaris, Dean  
College of Engineering

9-23-2014

Date

DR/rd

Enclosure

c: Bill Buttlar  
Bill Sanders  
Steven Franke  
Rhonda McElroy



**Senate Educational Policy Committee  
Proposal Check Sheet**

**PROPOSAL TITLE** (Same as on proposal): Establish a Major in Electrical and Computer Engineering in the Department of Electrical and Computer Engineering , College of Engineering for the degree of Master of Engineering

**PROPOSAL TYPE** (select all that apply below):

A.  Proposal for a NEW or REVISED degree program. Please consult the Programs of Study Catalog for official titles of existing degree programs.

1. Degree program level:

Graduate                       Professional                       Undergraduate

2.  Proposal for a new **degree** (e.g. B.S., M.A. or Ph.D.):

Degree name, "e.g., Bachelor of Arts or Master of Science": \_\_\_\_\_

3.  Proposal for a new or revised **major, concentration, or minor**:

New or  Revised **Major** in (name of existing or proposed major): Electrical and Computer Engineering

New or  Revised **Concentration** in (name of existing or proposed concentration): \_\_\_\_\_

New or  Revised **Minor** in (name of existing or proposed minor): \_\_\_\_\_

4.  Proposal to rename an existing major, concentration, or minor:

Major                       Concentration                       Minor

Current name: \_\_\_\_\_

Proposed new name: \_\_\_\_\_

5.  Proposal to terminate an existing degree, major, concentration, or minor:

Degree                       Major                       Concentration                       Minor

Name of existing degree, major, or concentration: \_\_\_\_\_

6.  Proposal involving a multi-institutional degree:

New                       Revision                       Termination

Name of existing Illinois (UIUC) degree: \_\_\_\_\_

Name of non-Illinois partnering institution: \_\_\_\_\_

Location of non-Illinois partnering institution:

State of Illinois       US State: \_\_\_\_\_       Foreign country: \_\_\_\_\_

- B.  Proposal to create a new academic unit (college, school, department, program or other academic unit):

Name of proposed new unit: \_\_\_\_\_

- C.  Proposal to rename an existing academic unit (college, school, department, or other academic unit):

Current name of unit: \_\_\_\_\_

Proposed new name of unit: \_\_\_\_\_

- D.  Proposal to reorganize existing units (colleges, schools, departments, or program):

1.  Proposal to change the status of an existing and approved unit (e.g. change from a program to department)

Name of current unit including status: \_\_\_\_\_

2.  Proposal to transfer an existing unit:

Current unit's name and home: \_\_\_\_\_

Proposed new home for the unit: \_\_\_\_\_

3.  Proposal to merge two or more existing units (e.g., merge department A with department B):

Name and college of unit one to be merged: \_\_\_\_\_

Name and college of unit two to be merged: \_\_\_\_\_

Proposed name and college of new (merged) unit: \_\_\_\_\_

4.  Proposal to terminate an existing unit:

Current unit's name and status: \_\_\_\_\_

- E.  **Other educational policy proposals** (e.g., academic calendar, grading policies, etc.)

Nature of the proposal: \_\_\_\_\_

Revised 10/2012