MEMORANDUM

TO: Darryll Pines  
    Dean, A. James Clark School of Engineering

FROM: Elizabeth Beise  
       Associate Provost for Academic Planning and Programs

SUBJECT: Proposal to Modify the Bachelor of Science in Electrical Engineering (PCC log no. 14063)

The proposal to modify the Bachelor of Science in Electrical Engineering has been administratively approved. A copy of the approved proposal is attached.

This change is effective Fall 2015. Please ensure that this change is fully described in the Undergraduate Catalog and in all relevant descriptive materials, including the undergraduate program’s four-year plan (contact Lisa Kiely at likely@umd.edu for more information), and that all advisors are informed.

MDC/
Enclosure

cc: Gregory Miller, Chair, Senate PCC Committee  
    Barbara Gill, Office of Student Financial Aid  
    Reka Montfort, University Senate  
    Erin Taylor, Division of Information Technology  
    Pam Phillips, Institutional Research, Planning & Assessment  
    Anne Turkos, University Archives  
    Linda Yokoi, Office of the Registrar  
    Cynthia Stevens, Office of Undergraduate Studies  
    William Fourney, A. James Clark School of Engineering  
    Rama Chellappa, Department of Electrical and Computer Engineering
THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM/UNIT PROPOSAL

- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.
- Please submit the signed form to the Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.

PCC LOG NO. 14063

A. James Clark School of Engineering
College/School:
Please also add College/School Unit Code-First 8 digits: 01203200
Unit Codes can be found at: https://hypprod.umd.edu/Html_Reports/units.htm

Department/Program: Electrical & Computer Engineering
Please also add Department/Program Unit Code-Last 7 digits: 1320901

Type of Action (choose one):
- Curriculum change (including informal specializations)
- Curriculum change for an LEP Program
- Renaming of program or formal Area of Concentration
- Addition/deletion of formal Area of Concentration
- Suspend/delete program

New academic degree/award program
New Professional Studies award iteration
New Minor
Request to create an online version of an existing program

Italics indicate that the proposed program action must be presented to the full University Senate for consideration.

Summary of Proposed Action:

Addition of ENEE101 Introduction to Electrical & Computer Engineering (ECE) as a requirement for the Electrical Engineering major. Elimination of ENEE200 Societal and Ethical Issues in Engineering Technology, as a major requirement in Electrical Engineering.

Departmental/Unit Contact Person for Proposal: Dr. Rama Chellappa, Dr. Mel Gomez, Mr. Neruh Ramirez

APPROVAL SIGNATURES - Please print name, sign, and date. Use additional lines for multi-unit programs.

1. Department Committee Chair
   [Signature]
   [Name]
   [Date]

2. Department Chair
   [Signature]
   [Name]
   [Date]

3. College/School PCC Chair
   [Signature]
   [Name]
   [Date]

4. Dean
   [Signature]
   [Name]
   [Date]

5. Dean of the Graduate School (If required)
   [Signature]
   [Name]
   [Date]

6. Chair, Senate PCC
   [Signature]
   [Name]
   [Date]

7. University Senate Chair (If required)
   [Signature]
   [Name]
   [Date]

8. Senior Vice President and Provost
   [Signature]
   [Name]
   [Date]
**ELECTRICAL ENGINEERING (EE) CURRICULUM CHANGE PROPOSAL**

**REQUIRED INFORMATION**

1. **Current requirements as shown in the undergraduate catalog:**
   See attachment A.

2. **Proposed new requirements:**
   See attachment B.

3. **Identification of and rationale for the changes:**
   a. **Proposed changes:**
      (1) Require students to take ENEE101 Introduction to Electrical & Computer Engineering (ECE).
      (2) Eliminate the requirement to take ENEE200 Societal and Ethical Issues in Engineering Technology.
      (3) Both changes would apply to all new students to ECE in Fall 2015.
   
   b. **Rationale:**
      To provide ECE students the opportunity to learn and have a clear understanding of the ECE curriculum and topics in their first year. To provide ECE students an opportunity within their first year to learn about and develop a clear understanding of the ECE curriculum and ECE topics.
   
   c. **Detailed Summary:**
      (1) **Addition of ENEE101**
         Even the most informed entering freshman student does not have a clear understanding of the ECE curriculum. This is expected since ECE is extremely broad and spans the areas of physics and mathematics, hardware and software, as well as covering fundamental principles of devices and highly integrated complex systems. Furthermore, in the current plan of study, ECE students do not typically enroll in ECE courses until the third semester (except for programming courses). In addition, most students are not fully cognizant of the relevance of these courses in their overall curriculum. Digital logic design (ENEE244), for example, teaches the theory of the design and analysis of combinational and synchronous sequential systems, but students find it difficult to absorb these concepts in the absence of a clear context where they are used. Similarly, ENEE 222 Elements of Signal Analysis teaches discrete-time and continuous-time signals, but can appear to be another mathematics course as students have a minimal understanding of the central role played by transforms in many areas of electrical and computer engineering. By introducing applications of these principles in ENEE 101, it is anticipated that the overall quality of the educational experience will be significantly enhanced, resulting in better retention and graduation rates as well as graduates who better prepared for academics and industry.

      (2) **Elimination of ENEE200:**
         The new curriculum will drop the requirement that ENEE200 from the curriculum. The change is necessary to provide room in the graduation plan to add the new ENEE101 course. The ABET Student Outcome of understanding professional and ethical responsibility will be satisfied in the following manner: Instead of having one required course to address engineering ethics, the pedagogy will be spread over several courses with varying degrees of expose.
i. ENES100 Introduction to Engineering Design is required for all Clark School engineering students and devotes a section on ethical issues in engineering. It has a lecture entitled “Product Liability and Ethics” that illustrates the impact of product designs and consumer safety. All students are required to attend the lecture, and in most cases, a follow up group discussion about the lecture. We regard this as “preliminary exposure”. In ENEE101, students will be required to study the extensive literature on the Institutional Review Board published by University of Maryland and to pass a written examination, which will be a course requirement. The IRB literature includes ethics issues on intellectual property, privacy laws, and property rights.

ii. Additionally, students in ENEE101 will be required to write a reaction paper on a case study about a current ethical dilemma. We regard these activities as “intensive exposure” to ethics.

iii. Finally, students will be required to address ethical implications as part of their culminating design experience (capstone courses). Admittedly, there will be some variations on the depth of ethical discussions depending upon the capstone course, but at the very least, students will write a section on ethical standards as part of their final design report. We regard this as “direct application of ethics”. Through these three courses, which will provide a measured and systematic introduction to ethics within engineering design, students will have satisfied the ABET student outcome of understanding professional and ethical responsibility.

(3) External Transfer Student Exception:
External transfer students admitted to the department who have completed the 200-level ENEE courses and an equivalent of ENES100, will be exempted from ENEE101. The reason behind this exemption is that ENEE101 is mainly an introductory course for students unfamiliar with ECE topics. External transfer students who have already taken lower level ENEE courses, will be very familiar with the introductory topics offered in ENEE101.

In order to acquire the ethics portion covered in ENEE101, these students may pick one of the following:

i. Complete the University of Maryland IRB workshop; write and submit a position paper on a current relevant ethics topic.

ii. Use a previously taken ethics course (at their previous institution) to satisfy this ethics requirement.

iii. Take an ethics course here at UMD (i.e. PHIL140, GEMS104, or ENEE200).

(4) Non-ECE Students at UMD
First-year University of Maryland students interested in the ECE major will be given the opportunity to enroll in ENEE101 based on seat availability. This will include students in other Engineering majors, Letters & Sciences students, and students in other University majors.

4. A sample program under the proposed requirements:
See attachment B.
5. **Chart showing timetable of course implementation:**
The department will continue to offer ENEE200 so students in who are following the pre-Fall 2015 curriculum can fulfill this requirement. ENEE101 will be required and offered for all new ECE students entering in Fall 2015.

6. **New Course(s):**
ENEElOl Introduction to Electrical & Computer Engineering (ECE)
The proposed ENEE 101 class is a 3 credit, hands-on class with a 50 minute lecture and 2hr 50min laboratory per week. The topics are organized into 6-7 unique modules that highlight the diverse areas of ECE. Each of the modules include key elements of both EE and CpE curriculum, including computing systems and software, communications and controls, electrodynamics and waves, microelectronics and signal processing, and power.

Among proposed the modules are:

a. Developing applications on the android operating system  
b. Thermal control feedback system for cooking eggs.  
c. Data collection and signal analysis of brain EEG.  
d. Wavelength division fiber optic communication.  
e. Image processing, data encryption and recovery.  
f. Model-based software design implementation.  
g. Microprocessor and Matlab interfacing.  
h. Augmented reality.  
i. Measuring electron drift velocity in semiconductors.  
j. Ethics and IRB

A set of modules may vary from semester to semester, with the exception of Ethics and IRB, which will be part of every offering.

7. **Deleted Requirements:**
ENEE200 will no longer be a major requirement for new students in the ECE department starting Fall 2015. The department will continue to offer ENEE200 for pre-fall 2015 students who need to take the course as a major requirement. At this point, the department is contemplating submitting ENEE200 to Undergraduate Studies for approval in the General Education program.

8. **Other departments impacted by change:**
No other departments are impacted by the proposed changes. Per the guidelines of the Associate of Science in Engineering (ASE) continuous review process, the ECE Department will notify the ASE Oversight Council’s Continuous Review Committee (CRC) of the changes to our program (http://www.mhec.state.md.us/ASE/Continuous_Review_Process_with_ABET_notes.pdf).

9. **Students enrolled in the program prior to the curriculum change:**
The department will continue to offer ENEE200 for pre-fall 2015 students in the department who need to take the course as a major requirement.
# ELECTRICAL ENGINEERING

Sample Graduation Plan for Old Curriculum

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