May 5, 2008

MEMORANDUM

TO: Herbert Rabin  
    Interim Dean, A. James Clark School of Engineering

FROM: Phyllis Peres  
    Associate Provost for Academic Planning and Programs

SUBJECT: Proposal to modify the B.S. in Computer Engineering (PCC log no. 07065)

Your proposal to modify the B.S. in Computer Engineering has been administratively approved. A copy of the approved proposal is attached.

The approval is effective Fall 2008. The College should ensure that the change is fully described in the Undergraduate Catalog and in all relevant descriptive materials, and that all advisors are informed.

CWR/

Enclosures

cc: Carmen Baithrop, Chair, Senate PCC Committee  
    Sarah Bauder, Office of Student Financial Aid  
    Laura Slavin, University Senate  
    Barbara Hope, Data Administration  
    Denise Nadasen, Institutional Research & Planning  
    Anne Turkos, Archives  
    Linda Yokoi, Office of the Registrar  
    Scott Wolpert, Undergraduate Studies  
    Gary Pertmer, A. James Clark School of Engineering
THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM PROPOSAL

DIRECTIONS:
• Provide one form with original approval signatures in lines 1 - 4 for each proposed action. Keep this form to one page in length.
• Early consultation with the Office of the Associate Provost for Academic Planning & Programs is strongly recommended if there are questions or concerns, particularly with new programs.
• Please submit the signed form to Claudia Recker, Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.
• Please email the rest of the proposal as a MSWord attachment to pcc-submissions@umd.edu.

DATE SUBMITTED: 3/20/08

COLLEGE/SCHOOL: Clark School of Engineering

DEPARTMENT/PROGRAM: Computer Engineering

PROPOSED ACTION (A separate form for each) ADD___ DELETE___ CHANGE___ X ___

DESCRIPTION (Provide a succinct account of the proposed action. Details should be provided in an attachment. Provide old and new sample programs for curriculum changes.)

Adding a requirement for ENEE 200, Social and Ethical Dimensions of Electrical and Computer Engineering Technology, to the BS in Computer Engineering without changing the total overall number of required credits.

JUSTIFICATION/REASONS/RESOURCES (Briefly explain the reason for the proposed action. Identify the source of new resources that may be required. Details should be provided in an attachment.)

See attached material

No implication for resources.

APPROVAL SIGNATURES

1. Department Committee Chair ____________________________________________________________________________ 03/27/08
   Adrian Papamarcou
2. Department Chair ____________________________________________________________________________ 03/27/08
   Patrick O'Shea
3. College/School PCC Chair ____________________________________________________________________________ 03/31/08
   Norman Wereley
4. Dean ____________________________________________________________________________ 04/08
   Herbert Rabin
5. Dean of the Graduate School (if required) ____________________________________________________________________________
6. Chair, Senate PCC ____________________________________________________________________________
7. Chair of Senate ____________________________________________________________________________
8. Vice President for Academic Affairs & Provost ____________________________________________________________________________ 5/5/08

VPAAP 8-05
1. Current requirements as shown in the undergraduate catalog:
   See Attachment 1a and 1b.

2. Proposed new requirements:
   See Attachment 2a, 2b and 2c.

3. Identification of and rationale for the changes:
   a. Proposed change:
      Add ENEE 200 as a required course.
   b. Rationale:
      The change listed above was discussed and approved at an open meeting of the entire departmental faculty and has been made to conform to ABET accreditation issues for both EE and CP degrees in our department.
   c. Detailed Summary:
      ENEE 200 has been developed to help meet ABET requirements and to give our students a more in-depth exposure to the interrelations between engineering and society and the roles that ethics and responsibility play in the professional lives of electrical and computer engineers. It has been approved as a CORE IE course and as such it (i) is open to all university students and (ii) the total number of required credits for the CP degree is unaffected by this change.

4. A sample program under the proposed requirements:
   See Attachment 2a.
   The change will require that one section of ENEE 200 be taught every semester (and perhaps during the summer or winter terms as well). ENEE 200 is currently being taught and there are adequate resources to implement this new requirement.

5. Chart showing timetable of course implementation:
   See attachment 3.

6. New Courses:
   ENEE 200 has been approved by VPAC and as a CORE IE course. See Attachment 2c for the syllabus.

7. Deleted Requirements:
   none

8. Other departments impacted by change:
   No other departments are impacted by the proposed changes.

9. Students enrolled in the program prior to the curriculum change:
   Students enrolled in the Computer Engineering degree program prior to Fall 2008 will follow the old requirements (ENEE 200 will not be required). Students entering the Computer Engineering degree program in Fall 2008 and beyond will follow the new requirements (ENEE 200 will be required).
# Computer Engineering

## Sample Graduation Plan† for Old Curriculum

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits I</th>
<th>Credits II</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 135</td>
<td>General Chemistry</td>
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<td>PHYS 161</td>
<td>General Physics</td>
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<td>MATH 140, 141</td>
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<td>CMSC 132*</td>
<td>Object Oriented Programming II</td>
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<td>ENES 100</td>
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<tr>
<td>CMSC 212</td>
<td>Intro to Low-Level Prog Cncpts</td>
<td>4</td>
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<td>CMSC 250</td>
<td>Discrete Structure</td>
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<td>CMSC 351</td>
<td>Algorithms</td>
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<td>PHYS 260/261</td>
<td>General Physics</td>
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<td>ENEE 241</td>
<td>Numerical Techniques</td>
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<td>ENEE 204</td>
<td>Basic Circuit Theory</td>
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<td>ENEE 206</td>
<td>Fundamental Lab</td>
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<td>ENEE 244</td>
<td>Digital Logic Design</td>
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<td>Organization of Prog. Languages</td>
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<td>CMSC 412</td>
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<td>ENEE 303</td>
<td>Analog and Digital Electronics</td>
<td>3</td>
<td></td>
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<td>ENEE 307</td>
<td>Electronics Circuits Design Lab</td>
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<td>ENEE 322</td>
<td>Signal and System Theory</td>
<td>3</td>
<td></td>
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<td>ENEE 324</td>
<td>Engineering Probability</td>
<td></td>
<td>3</td>
</tr>
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<td>ENEE 350</td>
<td>Computer Organization</td>
<td>3</td>
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<td>ENEE 446</td>
<td>Computer Design</td>
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<td></td>
</tr>
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### Senior Year

<table>
<thead>
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<tr>
<td>Technical Electives</td>
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<td>ENGL 393</td>
<td>Junior English</td>
<td>3</td>
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<tr>
<td><strong>Total Credits</strong></td>
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<td>15</td>
<td>16</td>
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</table>

† The minimum number of credits required to earn a degree is 120 credits.

* Students may need to take the CMSC 131 or the exemption exam before taking CMSC 132.‡ NOTE: Schedule assumes one CORE class satisfies the CORE Cultural Diversity requirement.
Effective Spring 2006, all BSCP graduates must distribute their 22 credits of technical electives among the following course categories:

- **Category A. Mathematics and Basic Science Electives:** minimum of 6 credits
- **Category B. Computer Science Theory and Applications:** minimum of 3 credits
- **Category C. Electrical Engineering Theory and Applications:** minimum of 3 credits
- **Category D. Advanced Laboratory:** (No minimum requirement)
- **Category E. Capstone Design:** minimum of 3 credits
- **Category F. Engineering (not Electrical or Computer):** 3 credits

Please read carefully, and make a note of, the following special cases and other items:

1. Two credits of ENEE 499, Senior Projects in Electrical and Computer Engineering, may be used to satisfy the Advanced Laboratory requirement subject to approval by the faculty supervisor and the Associate Chair. The maximum number of ENEE 499 credits that may be applied towards EE technical elective requirements is five.

2. Additional Capstone Design courses can be used as substitutes for
   - the required Electrical Engineering Theory and Applications course; and/or
   - the required Advanced Laboratory course, provided one of the following is completed: ENEE 408A, 408B, 408C, or 408F.

3. Completion of ENEE 408A and ENEE 459A satisfies both the Capstone Design and Advanced Laboratory requirements.

4. If you have any questions on how these requirements affect your current selection of technical electives, please contact an advisor.
# COMPUTER ENGINEERING

## Sample Graduation Plan† for New Curriculum

### FIRST YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Semester</th>
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<tbody>
<tr>
<td>CHEM 135 General Chemistry</td>
<td>3</td>
<td>I</td>
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<tr>
<td>PHYS 161 General Physics</td>
<td>3</td>
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<td>MATH 140, 141 Calculus I, II</td>
<td>4, 4</td>
<td>I, II</td>
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<tr>
<td>CMSC 132* Object Oriented Programming II</td>
<td>4</td>
<td>II</td>
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<tr>
<td>ENES 100 Intro. to Engineering Design</td>
<td>3</td>
<td>I</td>
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<td><strong>CORE‡</strong> General Education</td>
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Total Credits: 13 14

### SOPHOMORE YEAR

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<th>Semester</th>
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<tbody>
<tr>
<td>MATH 246 Differential Equations</td>
<td>3</td>
<td>I</td>
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<tr>
<td>CMSC 212 Intro to Low-Level Prog Cncepts</td>
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<tr>
<td>CMSC 250 Discrete Structure</td>
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<tr>
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<tr>
<td>PHYS 260/261 General Physics</td>
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<td>ENEE 206 Fundamental Lab</td>
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<td>ENEE 244 Digital Logic Design</td>
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<td><strong>ENEE 200 IE CORE class</strong></td>
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Total Credits: 15 17

### JUNIOR YEAR

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<td>CMSC 330 Organization of Prog. Languages</td>
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<td>CMSC 412 Operating Systems</td>
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<td>ENEE 303 Analog and Digital Electronics</td>
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<td>ENEE 307 Electronics Circuits Design Lab</td>
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<td>ENEE 322 Signal and System Theory</td>
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Total Credits: 17 13

### SENIOR YEAR

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<th>Semester</th>
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Total Credits: 15 16

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Attachment 2a – Sample new curriculum
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- Category C. Electrical Engineering Theory and Applications: minimum of 3 credits
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- Category F. Engineering (not Electrical or Computer): 3 credits

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7. Completion of ENEE 408A and ENEE 459A satisfies both the Capstone Design and Advanced Laboratory requirements.

8. If you have any questions on how these requirements affect your current selection of technical electives, please contact an advisor.
ENEE 200: Social and Ethical Dimensions of Electrical and Computer Engineering Technology

Instructor
Wes Lawson   Office: AVW 2325
Phone: 301-405-4972  e-mail: lawson@umd.edu

Office Hours
M-F 9 – 10 AM or by appointment

Course Description

Students will explore and assess the impact of electrical and computer engineering technology on society and the role of society in generating that technology. Special emphasis is placed on the interplay of diverse and often conflicting personal and collective values in both the development and implementation of new technologies. These subjects touch on many areas of interest including ethics, politics, business, the law, and sociology.

Students will learn what the areas of electrical and computer engineering encompass, how engineers work among themselves and interact with non-engineers to meet specific societal needs, and how engineering and its technological artifacts impact society both locally and globally. Students will also develop critical thinking skills to assist them in identifying and analyzing relevant conceptual concerns and ethical dilemmas as they arise and pertain to the practices of electrical and computer engineering and adoption of specific technologies. As such, students will become proficient in applying the concepts and theories necessary for making informed ethical choices.

Course Objectives:

1. To ensure students can clearly articulate and effectively explain the relation between engineering & society – specifically how electrical and computer engineering technologies impact society and the ways in which society influences engineering practice.
2. To ensure students can draw on material from diverse disciplines such as history, ethics, politics, economics, the law, psychology, sociology, etc. in explaining the practice and impact of engineering in both a societal and global context.
3. To ensure students can make informed ethical choices through recognizing and critically analyzing the ethical problems confronting those involved in developing, implementing, and using engineering technologies.
4. To ensure students can effectively present sustained, critical analyses through both oral and written communication.

Semester Outline/Topics

1. Introduction: Course logistics and overview of topics and themes
2. Ethical Concepts, Methods, Theories, and their Application
   a. Ethics: Absolute or Relative?
   b. The three levels of Ethics
   c. Moral Dilemmas and Moral Development
   d. Three major approaches in normative ethics
      i. Consequentialism
      ii. Deontology
      iii. Virtue Ethics
   e. Case Studies: Applications of ethical theories
3. Professions & Codes of Ethics
   a. What is a profession?
   b. Models of professionalism
   c. Professional obligations
   d. Codes of Ethics (Engineering and other Professional)
   e. Micro-ethical vs. macro-ethical distinction
   f. Conflicts of interest
4. Technology and Society
   a. Definitions and theories of technology
   b. Theories of technological change
      i. Technological Determinism
      ii. Social Determinism
iii. Technological Politics
   c. How technologies change society
   d. How society influences the production of new technologies
   e. Technology-based exploitation and underrepresented groups
   f. Case Studies

5. What are electrical and computer engineering?
   a. Broad historical and sociological overview of engineering
   b. Engineering versus Science
   c. History of American Engineering
      i. History of Electrical Engineering
      ii. History of Computer Engineering
   d. Engineering Design
      i. Types of engineering design
      ii. Values in the design process
      iii. Underrepresented groups and the need for diversity

6. Ethics and Institutions
   a. Individuals versus Group Behavior
   b. Organizations and Ethics
   c. Moral Autonomy and Group Loyalty
   d. Honesty in Engineering
   e. Ethical Engineering & Conflict Resolution
   f. Whistle-blowing

7. Responsibility in Engineering
   a. Moral status of responsibility
   b. Responsibility to employers
   c. Responsibility to the profession
   d. Responsibility to the public & Product liability

8. Risk Analysis
9. Intellectual property
10. Environmental Engineering
11. Ethics in Bioengineering
12. Ethics in the Digital World
13. Electronic surveillance, security, and privacy
14. Ethics in Emerging Technologies
15. Ethics in the age of global engineering firms
16. Group Projects & Class Presentations

**Grading Method:**

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<th>Percentage</th>
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<tr>
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<td>Research paper</td>
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<td>F: 00 – 39.9%</td>
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<tr>
<td>Oral presentation</td>
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**Textbook**

**Recommended readings**

**Course Prerequisites**
None

Attachment 2c – Sample new curriculum – ENEE 200 syllabus
**Timetable for the introduction of the course**

The timetable for the introduction of the new course appears below. An 'X' indicates the course will be offered during that term. Steady-state has been reached by the year 2010.

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Attachment 3