UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Electrical and Computer Engineering

William L. Everitt Laboratory
1406 West Green Street
Urbana, IL 61801-2991

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Professor Andreas Cangellaris, Head
Department of Electrical and Computer Engineering
155 Everitt Lab, MC-702

Professor Douglas L. Jones, Chair
Curriculum Committee, Department of Electrical and Computer Engineering
155 Everitt Lab, MC-702

Dear Andreas and Doug:

Thank you for your presentations at the department faculty meeting on February 23. We are responding to your invitation to suggest ideas to improve the department.

When Andreas and one of us (MCL) met last November, we shared our common concern that many students leave ECE after they take ECE 110. This issue also arose at the faculty meeting. While we should avoid blaming a single course for the attrition of potential majors in electrical and computer engineering, we should consider whether we are doing everything possible to keep students who could complete our undergraduate programs successfully, students whom we would be proud to count as ECE alumni.

At the meeting on February 23, Andreas presented a few of the findings of the College of Engineering "Climate Study," overseen by Professor Lizanne DeStefano. The report highlights several reasons, besides low grades, for the departure of students from the college. The report also lists other opportunities for improvement.

From the report, we have identified four problems that discourage students from continuing in ECE. For each problem, we have recommended an action that the department could take immediately to improve the retention of students in ECE.

Problem 1: Poor quality teaching
     Recommendation: Assign proven instructors to ECE 110 and ECE 190. Assign graduate teaching assistants to ECE 110 and ECE 190 who have previously demonstrated excellence in teaching, or who clearly have the potential for excellence.

Problem 2: Excessive workloads
     Comment: Students continually tell us that in some ECE courses, they average 15 to 20 hours per week. This amount of time for one course is unreasonable.
     Recommendation: Monitor the amount of time that students spend in our 100- and 200-level courses. Check whether students average much more than 9 hours per week in a 3-hour course (classes plus homework), or 12 hours per week in a 4-hour course.

Problem 3: Excessive competition

Recommendation: Ask faculty to implement teaching methods that encourage cooperation instead of competition for grades. In particular, grading "on the curve" promotes competition between students because it limits the number of grades of each type.

Problem 4: Curricula do not meet students' career goals

Comment: Last fall one of us (MCL) talked with two students who had received grades of A in ECE 110. Both were leaving ECE for other majors at Illinois because they hoped to go to medical school, and they were unable to fit their pre-med requirements into our curricula. The other one of us (SAB) had the same difficulty; he had to finish his pre-med requirements as a graduate student at MIT. **The requirements of our undergraduate curricula are driving away excellent students**.
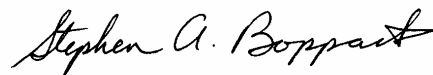
Recommendation: Reduce the technical requirements in our undergraduate curricula to the engineering accreditation guidelines of one year (32 hours) of mathematics and science, and one and one-half years (48 hours) of engineering topics. At UC-Berkeley, each 120-hour undergraduate engineering program requires 30 hours of mathematics and science, and 45 hours of engineering. This change would enable ECE majors to complete pre-med requirements, or the requirements of the Campus Honors Program, or the requirements of a minor other than mathematics or physics. Although students may take fewer ECE courses for their degrees, we should have more ECE majors and more ECE graduates. Because students would take more ECE courses as electives, they would have higher motivation and satisfaction. In addition, we might be able to attract students from other majors into ECE. At Stanford, about one-quarter of engineering graduates started out in other majors.

We would be happy to work with you to address these and other problems, as we endeavor to improve the opportunities for students to succeed in ECE.

Yours truly,

Michael C. Loui
Professor of Electrical and Computer Engineering
University Distinguished Teacher-Scholar

Stephen A. Boppart
Professor of Electrical and Computer Engineering,
Bioengineering, and Medicine

cc: D. A. Tortorelli