

Electrical and Computer Engineering Department
Annual Assessment Report
2003–2004

1 Introduction

The assessment committee is responsible for gathering information regarding the undergraduate curriculum and teaching in the Electrical and Computer Engineering Department. Formal sources of assessment information include:

- The Industrial Advisory Committee
- Alumni surveys
- Senior exit interviews
- Faculty course assessments
- ABET reviewer visits
- Graduate exit interviews

The primary purpose of this document is to summarize observations made over the last year, review recommendations from last year's report, and to make recommendations for further changes.

The committee structure has changed over the last year. Whereas before there was a single "undergraduate assessment committee," there is now a curriculum committee and an assessment committee. Much of the curricular work that formerly fell on the assessment committee has been taken up by the curriculum committee, chaired by Paul Wheeler. This has left the assessment committee in a better position to perform only assessment. However, there is a close coordination between the two committees.

2 Recommendations from last year

Here is the response to the issues that were identified as significant last year. We have not dealt with all of them, but some changes have been made. The issues are expressed in SMALL CAPS and the departmental response to them is in regular (Roman) font.

- **RESPONDING TO ABET ISSUES ABOUT THE COMPUTER ENGINEERING DEGREE.**

As a result of the report, the department has been successfully accredited.

- **SENIOR DESIGN/ENGLISH. WHILE ENGLISH AND COMMUNICATION ISSUES ARE A PART OF THE ABET CONCERN, WE HAVE BEEN CONSIDERING, ON OUR OWN, A NEW SENIOR DESIGN SEQUENCE WHICH WOULD HAVE CLOSER TIES TO THE ENGLISH DEPARTMENT. KEVIN MOORE HAS BEEN WORKING OUT SOME OF THE ISSUES, AND A PILOT PROGRAM IS UNDERWAY THIS YEAR. IF THIS IS SUCCESSFUL, WE MAY EXPAND THIS TO A BIGGER SUBSET OF OUR STUDENTS IN BOTH MAJORS.**

This course is continuing through ECE 5770, and is no longer considered a pilot.

- **CIRCUITS. WITH THE CHANGE IN SCHEDULE A FEW YEARS AGO, THERE ARE TOPICS THAT ARE NOT BEING COVERED AS THOROUGHLY WHICH ARE REGARDED AS BEING QUITE IMPORTANT. WE NEED TO ADDRESS THE CURRICULUM AND MAKE SOME CHANGES.**

The particular topic was power. This was covered by Scott Budge when he taught ECE 3620 last Spring. However, we will need to keep an eye on how well the topic fits in the course, and if it continues to fit in the allotted time.

- **ELECTRONICS. WE RECEIVE FEEDBACK FROM INTERVIEWERS THAT OUR STUDENTS SHOULD BE MORE CONVERSANT IN FET TRANSISTOR DESIGN. WE HAVE ALSO LEARNED OF DESIRES FOR SIGNIFICANTLY BETTER FAMILIARITY WITH SEMICONDUCTOR PROCESSING. A NEW VERSION OF THE BOOK FOR THE ELECTRONICS CLASSES REORDERS SOME OF THE MATERIAL IN A WAY THAT SHOULD BE BENEFICIAL. WE**

ARE CONSIDERING OTHER ORDER-OF-TEACHING IDEAS, AND EXPLORING WHETHER THERE IS MATERIAL THAT NEEDS TO BE REMOVED OR ADDED.

We have made the following responses to concern in the electronics area.

1. We are now requiring of all EE majors the Physics 2710 course, Introductory Modern Physics. This will give them greater appreciation and facility at dealing with things on a small scale, and should contribute to their understanding of lasers, optics, remote sensing, device processing, solid state fabrication, etc.
2. We have voted to move the second semester of electronics (which has been required of all EE students) to become a technical elective. This will strengthen the course for those students that *choose* to take it, since their interest will allow for more intense study.
3. We have recommended a changed order of covering the material in the first semester electronics course, with FET concepts being covered first (and somewhat more thoroughly) than the BJT concepts.

- PROGRAMMING. OUR STUDENTS GET A FULL YEAR OF PROGRAMMING, BUT AS FRESHMAN. CONVERSING WITH THE CS FACULTY (IN PARTICULAR, DAN WATSON), I HAVE BEEN ASSURED THAT WHEN THE STUDENTS COME OUT OF THE SEQUENCE THEY “ARE PROGRAMMERS,” HAVING LEARNED ALL OF THE FUNDAMENTAL IDEAS NECESSARY TO BE EFFECTIVE. THE REALITY IS, WE HAVE STUDENTS THAT STILL STRUGGLE WITH PROGRAMMING, PARTICULARLY ON THE EE SIDE. WE HAVE GOTTEN FEEDBACK FROM SOME RECRUITERS THAT THEY WOULD LIKE MORE PROGRAMMING ABILITY.

THIS IS AN INTERESTING PROBLEM — WE WOULD ALL CERTAINLY LIKE THE STUDENTS TO LEARN MORE. WE WISH THERE WERE TIME FOR MORE ELECTRONICS, AND FOR MORE PROGRAMMING. BUT THERE SIMPLY ISN’T TIME FOR BOTH. IN SOLICITING FEEDBACK FROM THE IAC, AND ADDRESSING THE PARTICULAR QUESTION OF WHETHER THEY WOULD PREFER STUDENTS TO HAVE MORE ELECTRONICS OR MORE PROGRAMMING, THE RESPONSES WERE PRETTY EVENLY SPLIT. (ONE COULD ARGUE ON THIS BASIS THAT THE *amount* OF COURSE MATERIAL IS ABOUT RIGHT; WE JUST NEED TO FINE-TUNE THE DETAILS.)

No change has been made in the amount of programming that students get.

- FRESHMAN COURSE. THE COLLEGE IS WORKING OUT A NEW FRESHMAN COURSE, WORKING FOR SIGNIFICANT INPUT FROM THE EDUCATION-ORIENTED FACULTY MAKING A TRANSITION FROM THE TECHNOLOGY DEPARTMENT. THIS IS INTENDED TO SERVE STUDENTS INTERESTED IN ENGINEERING, BUT WITH AN UNDECLARED MAJOR. AS PART OF THIS COURSE (OR IN ADDITION TO IT) THE COLLEGE IS EXPLORING A COURSE IN WHICH CERTAIN EXTRA-COURSE UNIVERSITY AND/OR ACCREDITATION TOPICS ARE COVERED, SUCH AS THE CIL EXAM, THE SAFETY EXAM, ETC.

AT THE SAME TIME, PAUL WHEELER HAS DEVELOPED A FRESHMAN COURSE THAT PROVIDES A SOLID SURVEY OF THE FIELD OF ELECTRICAL ENGINEERING. HE HAS STARTED THIS YEAR WITH A NEW BOOK.

WE WILL BE INTERESTED TO SEE WHAT THE COLLEGE DEVELOPS, AND HOW STUDENTS FEEL ABOUT OUR OWN FRESHMAN COURSE.

Our own Freshman course continues to be taught. A new book was adopted for the Fall, which is largely self-taught.

- LABORATORIES. WITH CLASS SIZES GROWING, SCHEDULING OF LABS BECOMES INCREASINGLY DIFFICULT. THERE ARE INSTANCES WHEN TOO MANY STUDENTS ARE IN THE LAB AREA FOR ANYTHING TO BE ACCOMPLISHED. PAUL WHEELER HAS SUGGESTED THAT FOR LARGE COURSES WHICH ARE TAUGHT TWICE A YEAR (SUCH AS 2410 OR 2530), THAT A LAB ROOM BE DEDICATED TO THOSE COURSES PARTICULARLY. WE NEED TO EXPLORE WHETHER THAT IS FEASIBLE, POSSIBLY BY OPENING UP ADDITIONAL LAB SPACE (AND ACQUIRING NEW EQUIPMENT).

The lab question continues. We seem to be doing fine this year; however we anticipate being moved out of the building for renovation over the next several months. Until the renovation is completed, we will be living in temporary quarters anyway, so it makes no sense to seek a permanent solution at this time.

- THERE SEEM TO BE A PLETHORA OF MICROWAVE AND EM COURSES FOLLOWING THE CORE UNDERGRADUATE COURSE. IT SEEMS THAT AN ESTABLISHED SECOND COURSE WOULD BE DESIRABLE AND MORE EFFICIENT. WE HAVE HAD PRELIMINARY DISCUSSIONS ON THE POINT WITH RANDY JOST, BUT HAVE TAKEN NO ACTION YET.

The course ECE 5800, a second course in fields and waves, has been instituted. This will feed into radar, EMC, and microwave courses. We have also significantly reduced the maze of courses by limiting the number of dual listed courses.

- THE OUTCOMES FOR 3620/3640 ARE NOT NECESSARILY MATCHED TO THE SEMESTERS THEY ARE TAUGHT, BUT THEY ARE BEING TAUGHT. WE WILL EXPLORE ADJUSTING THE OUTCOMES SO THAT DIFFERENT FACULTY MEMBERS HAVE FLEXIBILITY IN THE ORDER THEY TEACH, WHILE STILL ENSURING THAT THE DESIRED PRINCIPLES ARE TAUGHT.

Some shuffling of the order of the outcomes has been done to better reflect the order of teaching in the 3620/3640 sequence.

- THERE IS A FEELING THAT WITH THE WAY COMPUTER ENGINEERING IS GOING THAT COMPUTER ENGINEERS NEED *more* E&M THAN THEY ARE GETTING IN A ONE-HOUR COURSE. WE NEED TO ADDRESS THIS (E.G., WHAT ARE THE PRIORITIES?)

The feeling still exists among some faculty, but we have not increased the requirement.

- EVER SINCE WE RELINQUISHED TEACHING OUR OWN PROBABILITY COURSE (WITH THE SWITCH TO SEMESTERS), WE HAVE HEARD COMPLAINTS ON THE PART OF THE STUDENTS THAT THEY ARE NOT LEARNING USEFUL MATERIAL, AND EVIDENCE IN FOLLOWING CLASS THAT THAT IS ACTUALLY THE CASE. WE HAVE BEEN DISCUSSING TEACHING THE PROBABILITY CLASS ON OUR OWN, BUT HAVE BEEN WAITING BOTH FOR THE MOST INTERESTED FACULTY MEMBERS TO RETURN FROM SABBATICAL, AND FOR THE HIRING OF NEW FACULTY. SINCE BOTH OF THESE HAVE NOW OCCURRED, IT IS TIME FOR US TO RE-ADDRESS THE ISSUE.

We have learned (from Christine Hailey) that if we do teach our own probability, that it could help fulfill ABET requirements for math/science courses (which was one of the concerns we had initially). We have also received feedback from the recent senior exit interviews that the probability course is not working well. However, given the current faculty loads, we are having to hold the line on the current teaching. If we are successful at hiring more faculty, we may be able to bring it back over from the math department.

3 Curricular/assessment work this year

- The flowchart which Paul put together last year has continued to be refined.
- We were invited to resubmit a proposal to the president's initiative to improve department teaching. This proposal is 34 pages long, and represents many of the aspects that we consider to be positive about the department. (Again we were not selected.)
- Continue to carry out the gathering and evaluation of course assessments.
- The chairs of the committees met regularly to coordinate issues (see some of the results above).
- Put several changes through EPC for the university catalog to eliminate some dual listed courses, straighten out some prerequisites, and introduce ECE 5800.
- Met to discuss the ABET response.
- We have also been asked to put together course outcomes for graduate courses as well as undergraduate courses. This information is not needed for the ABET accreditation, but it is needed for the Northwest accreditation. This is being accomplished by collecting together course assessments for graduate courses, with outcomes. Once collected, the graduate committee will examine the outcomes to see if they coordinate well.

4 Outstanding and upcoming issues

The following issues are on the docket for the upcoming year:

- We are seeing a large bulge in the students in the program. The junior level class has around eighty students in it (based on enrollments in ECE 3620/36040, which does include some students who are retaking the course). Kathy Bayn has informed us that next year we should expect even more students in the junior class, if they are all admitted to the professional program. A significant concern, then, which we mentioned but never looked at in this last year, is raising the admission threshold to improve the quality of our students and reduce the class size. We are still working to achieve the governor's initiative, but we think we can increase retention if we increase the quality.

Among other things, we will be raising the entrance requirement. We have shifted the courses requirements so that there are fewer core requirements, with more technical electives, which should balance the load somewhat.

- Take a look at how the pilot program with the English department is going.
- Finalize the response to ABET.
- Examine how the software engineering course is going (CS 2370). There are some reports that it is not serving our students well, and there is excessive overlap with our junior design course.
- Implement the changes in physics/electronics.
- Hire new faculty and incorporate them into the program.
- Finalize the collection of the graduate course outcomes.
- Recrafting the objectives for the department.
- Reshaping the computer engineering degree. With the new computer engineering faculty that we have, we are gaining a different perspective on what computer engineering should be. We will therefore examine what we are teaching and what we should teach.
- Examine the prerequisites for 2530.

Issues Observed from Course Assessments
Fall 2003/Spring 2004.

In the following, brief summary information gathered from the course assessments is presented. In particular, if the information seems to be of a nature that the committee should be aware of this and/or act upon it, or if a commitment of resources could help improve things, then it is noted here. But if an instructor makes a comment relevant to in class issues, it is not noted here. The intent is to provide a document that will help us close the loop in improving the process.

- 1010** (Wheeler) A new textbook is being sought, since the one used was deemed too difficult. Students felt that too much was covered too fast.
- 2200** (Baker) Class size is “way too large.” The goals of the course need some help from the MAE dept. that it is servicing: is it to prepare them for the FE exam, or to enable them to understand and use electronic equipment?
- 2410** (Swenson) A recitation section would help the students. Some good TAs could help out with this.
- 2530** (Bunker) Students were singularly unprepared. Labs were too large.
- 3260** Students did not like the WebCT testing.
- 3420** (Baker) Very positive on facilities. Requests an asst. prof. to help shape course in modern way. Labs should be graded separately.
- 3620** (Budge) The size of the class grew to 83. This makes it hard on the instructor, and hard for students to get effective help. We have talked about splitting into two sections, but have not done so yet.
- 3710** (Wheeler) More TA help would be good. Students seem less prepared than in the past; changing admission standards should help.
- 3730** (Doupnik) The microsoft assembler should be made so it does not disappear from the machines when they are ghosted (cleaned up)
- 4870** (Liang) Students were not well prepared on vector calculus. They also had many complaints about the book, which are being addressed by moving to another textbook.
- 4740** (Doupnik) Network routers and switches would be of great value to the labs.
- 5640** (Budge) There were a significantly higher number of students (around 40) with only 4 lab stations. In the future, the number of students admitted will be decreased. Means of acquiring more lab equipment is also be addressed. There was also no TA for the course (no one that was here was qualified).
- 5020** Students too inclined to use canned solutions and rely on their calculators.
- 5320** (Chen) More lab equipment; more TA time.
- 5530** (Shaw) Incorporate more FPGA-based design
- 5640** (Budge) Due to number of undergraduates, students were less prepared. Also, class was way too large for number of lab stations. Desperately need a TA next time!
- 5660** (Gunther) Students did not have probability tools — the math course had not prepared them.
- 5750** (Stiles) Issues related to switching to a new and buggy book.
- 5810** (Tompkins) Students need more preparation in basic E&M. This has been addressed by introducing a 5800 course. Introducing this course as a prerequisite should help with many of the difficulties that have been noted in the course.
- 6600** (Doupink) The students lacked O/S skills. They would also be helped if they had completed the compiler course.
- 6780** (Doupnik) A department or college file server where students could keep their work would be of great value.
- 7360** (Chen) The Matlab toolboxes are needed for this course. We need to make sure they are in place for next year.
- 7610** (Doupnik) A file server would help.