

# ECE Curriculum Committee Meeting Minutes for April 18, 2008

**Members present:** Jont Allen, Tanguil Basar, Stephen Bishop, Donna Brown, Matthew Frank, Kuang-Chien Hsieh, Douglas Jones, Erhan Kudeki, Xiuling Li, Jonathan Makela, Sean Meyn, Michael Oelze  
**Guests:** Kent Choquette and Pete Sauer

1. The Minutes of the April 11, 2008 meeting were approved, subject to any additions by those who spoke at the previous meeting.
2. The Committee continued the discussion of various options for positioning physical electronics material in the core EE curriculum, although those who already spoke on the issue last week were requested to yield the floor to those who had not yet contributed their thoughts. Donna Brown suggested that students should have some choice in the selection of topics from the advanced core, and that while it would be nice if they could cover all of the advanced core, it is probably impractical. She also suggested that perhaps Computer Engineering majors should also have some choice at this level similar to that enjoyed by the EEs through the "3 of 5" list. Matt Franke said that we need to examine the required physics courses as they may not be giving our students the background they need preparatory to ECE 440/340; in particular, they may not be sufficiently emphasizing modeling (e.g., abstracting physical situations to mathematical equations), which is central to engineering. Kent Choquette expressed his view (which he believes is shared by every member of our faculty in the physical electronics area) that *every* Bachelors of Science student from our department should have a working knowledge of transistors, the p-n junction, John Bardeen and the history of the transistor, etc.; any disagreement within the group is about the approach, level, or depth to which the material should be taught, not the essentiality of the material. He argued that the career path of an engineer can change greatly, and that broad preparation including physical electronics is needed to prepare them for such change. Xiuling Li also expressed her belief that physical electronics is fundamental to our discipline and should be studied by every student.

Pat Chapman was unable to attend the meeting but contributed the following comments for the meeting; physical electronics is a very important topic that should be in the curriculum, but several other topics of similar importance are currently not required. A "junior level" course exposed to the "open market" (e.g. 4 of 6) would be a good middle ground. He argues that the "competition" encourages instructors to monitor the course and address problems that arise, and that this has been very good for ECE 430. We would need to consider incentives for students to take the course, given its reputation for being difficult.

3. The ECE 398 KC course proposal by Kent Choquette for the fall semester was discussed. The Chair stated that the course had not yet received Microelectronics and Quantum Electronics Area Committee approval, and that while the Area Committee would discuss it on Monday, an apparently fundamental lack of consensus within the Area meant that it might very well not receive approval. The Chair pointed out that the primary responsibility for required courses within our department resides with the Curriculum Committee, and that while the advice of the relevant area committees are always welcome, the approval decision on such courses rests with the Curriculum Committee. The Chair expressed the belief that a decision not to approve the course for next semester would effectively end any further experimentation with the approach proposed by Kent Choquette as a potential framework for a new ECE 340, whereas approval would express an explicit interest of the Curriculum Committee in further experimentation with this approach as a potential ECE 340 model, in parallel with possibly several other experiments with different models. The Chair emphasized that

no commitment to adopt this model for ECE 340 would be implied by supporting further experimentation at this time.

Kent Choquette gave the Committee an overview of the proposed ECE 398 KC. The course would focus on the p-n junction as a unifying theme; he argued that once students master the fundamental principles underlying this junction, they can then understand at a basic level the different types of transistors and other devices. Certain pedagogical approaches would be employed to enhance learning and acceptance: regularly drawing connections to specific applications such as their use in cell-phones would provide context and motivation for the students, and web-based simulations (such as those available at the NSF-sponsored nanoHUB) would help them grasp basic concepts and aid in their mastering the mathematical models. He stated that the students in ECE 398 JC this semester seemed to enjoy using these simulations, but that he doesn't know yet whether they actually improve students' learning. He indicated that what would be missing relative to the current ECE 440 is the depth of study of transistors, but suggested that this outline would serve as a good gateway both to advanced courses in the photonics and in the more traditional devices areas.

Jont Allen remarked that this course proposal is a radical departure from the current ECE 440 approach, and may be more likely to succeed in teaching the students this material. Erhan Kudeki suggested the ECE 329/450 sequence as a good model for the device area, and that this course might serve well as the first course in such a sequence.

Donna Brown moved to delay the decision on this course until next week, after hearing from the area committee; the motion was seconded. The Chair indicated that the agenda for the next and final meeting was quite full already. Jont Allen argued against the motion, saying that unless the decision was likely to be altered, there was little point to delaying the decision. The motion failed on a 5 to 4 vote. The Committee then voted 9 to 0 in favor of approving the ECE 398 KC course for the Fall 2008 semester, and allowing it to satisfy the ECE 440 curricular requirement for the students who complete it.

4. Pete Sauer gave an overview of ECE 430 and its place in the curriculum. He said it took its modern form after the adoption of ECE 210 which removed several important topics such as mutual induction, three-phase power, and power circuits covered in the previous ECE 270. These topics migrated to (then) ECE 330, which was revised at that time to focus on power circuits and electromechanics. The course was and has remained a gateway course designed for and taught at a level appropriate for juniors. He stated that the renumbering to ECE 430 was an arbitrary administrative decision at the time of renumbering and that the course should have remained ECE 330 to reflect its actual level and role in the curriculum. He said that no significant changes would be needed to fill the role intended by the Curriculum Committee as ECE 330, and that at most two or three lectures might change in routine updating of the course to include a bit on renewable energy.

In response to a "devil's advocate" question as to why the course should remain in the advanced core, Pete stated that most electrical engineers should understand coupled coils, mutual induction, and how motors work, pointing out that the numbers of motors used in modern electrical products is rapidly increasing. Jont Allen said that this course is essential for understanding energy use today, and that our students need this. Erhan Kudeki said that the course completes the basic circuits material in the EE Curriculum.

5. The Committee adjourned at 11:58 PM.

