Notes from the Curriculum Advisory Board Meeting

Q1: What are the strengths of the curriculum?

- It's good that aspects of power electronics are included in all three courses. (Seen as critical knowledge / skill for future work.)
- For small schools, the three courses and hardware labs (e.g., small footprint, relatively inexpensive, and safe) are appropriate.
- The three courses combined (power systems, power electronics, and electric drives) seem to stand the test of time: If hiring is low in one of the three areas, the other areas seem to pick up.
- Engineers from other disciplines can learn enough from the textbooks and labs to communicate with EEs on power projects.
- Student interest /enrollment in these courses is increasing. Keep improving the content to interest students.

Notes from the Curriculum Advisory Board Meeting

Q2: What are the shortcomings of this curriculum?

- Should Power Electronics be a required course? What should be in required versus elective courses, even if just a couple lectures are put into the required courses?
- Each course seems stuffed with too much material. If teaching more than one of these courses, can / should cut a lot of the duplicated material.
- Would remote experiments on higher voltage machines be helpful (e.g., remote use of 20 kV ONR labs, RTDS systems at Florida)?
- Applications to renewable energy and recent developments in power electronics (e.g., smart grid) may be under-emphasized. Faculty have to develop supplemental materials.
- One course in the power systems area is not enough – there's much more information and innovation in that area than the other two. The three courses are not balanced.
- Would like to see more simulation activities, particularly linking the three courses – e.g., power electronics linking to the grid.
- Could we create a "community of power engineering scholars" among the student population, along with the faculty and industry groups? Working together on projects, for example? Facebook groups?

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Q2, cont.: What are the shortcomings of this curriculum?

- Could the Power Electronics and Electric Drives labs interact, so students see the same lab in different courses & see how they relate?
- Some universities have graduate students revise & upgrade the labs every year.
- Fundamentals of energy conversion should be included somewhere (e.g., chemistry of fuel cells, resource prediction, interconnection)
- Sensors in he power grid could be included somewhere.
- Include “teasers” for graduate courses, encourage students to learn more.
- Machine design – who’s going to do it? Where is it taught? Only know of a continuing ed course at MIT. Desperate need in industry. Magnetic material and insulation issues.
- Course or module on integration of renewable energy courses?
- Systems approach is most important, rather than specific knowledge. Industry can teach specifics but overall thinking is harder.
- Storage isn’t even looked at, and that’s a huge problem facing the future (e.g., for electric vehicles)

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Q3: What power electronics software is used in industry?

Comments:

- Saber is used in shipbuilding but often too expensive for small business ($40k per year). Free student license, but difficult for university. No real uniformity in industry.

Notes from the Curriculum Advisory Board Meeting

Q4: If only one course can be supported, which one is most important?

Comments:

- Must be realistic about how many courses can be offered given the current state of university budgets, etc.
- Probably a general course that is accessible to students from the other specialties at your university (e.g., signals).
- One required course on power and energy systems. People often try to put too much into the course (primarily power systems, but components from other areas) - keep iterating on the content.
- Think about what is expected from an undergraduate: should they be an expert in any one area?
- Ted says: Power Systems, end of discussion. ☺
- Need people 10 feet wide and an inch deep.
- Power flow.
- People need a basic understanding of the electric power business.
- Whatever will bring grants for faculty and jobs for the students.

Notes from the Curriculum Advisory Board Meeting

Q5: What (aside from funding) can industry provide to improve power engineering education?

Comments:

- Hire students in the junior year, help them pick senior electives, mentor them so they are ready to go sooner. Pay for senior year and master's level to recruit & improve learning.
- Encourage graduate pursuit in power engineering.
- Provide co-op or internship opportunities as supplemental learning in general, since the universities can only do so much.
- Industry – please provide data to faculty for class activities or research. Give us data, and we'll think of a use for it!
- Support senior projects.
- Guest lectures, seminar series.
- Could industry representatives teach additional courses (or skills and activities), when academia doesn't have the experts or time? Counter comment: "Industry reps are horrible about understanding the basics or student capabilities; they're better at specialized topics or skills after the basics have been covered."