01 Jul 2008

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Recommended Citation

M. Crow, "Power Engineering Education: Challenges and Opportunities," *Proceedings of the IEEE Power & Energy Society General Meeting - Conversion and Delivery of Electrical Energy in the 21st Century (2008, Pittsburgh, PA)*, pp. 1, Institute of Electrical and Electronics Engineers (IEEE), Jul 2008.
The definitive version is available at https://doi.org/10.1109/PES.2008.4596593

Power Engineering Education: Challenges and Opportunities

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***Abstract*—This paper presents a summary of the presentation given at the IEEE Power Engineering Society 2008 General Meeting in the Panel Session "Education of the Power Engineer of the Future." In this paper the author presents the challenges facing the current engineering student and the faculty who teach them. Challenges include declining student interest, volatile job markets, and the changing profile of the power and energy industry.**

***Index Terms*—power engineering education**

I. Summary

EVERY generation of engineering student differs from the one previous to it. Today's student has grown up with cell phones, iPods, blogs, and a whole realm of digital media that was foreign to the college student only a decade ago. Young people are extremely adaptable and readily adopt new technologies with ease and yet academia has been slow to change our approach to educating these bright and technologically savvy young people. Incoming freshmen today are increasingly motivated to enter fields in which they are addressing societal needs. Power engineering educators must embrace these new trends if they want to power engineering to be seen as a relevant and interesting career.

Power engineering courses face competing interests. Many power engineering courses have been repackaged as "energy" courses and are exploiting student interest in renewable and alternative energy sources. This is an excellent way to increase student interest, but are we as educators doing them a favor by replacing "traditional" power engineering topics with sections on wind and solar power? The majority of power engineering students will still have traditional careers: utilities, vendors, and manufacturers. The challenge to power engineering faculty is to build the same level of excitement around the opportunities that exist in the "traditional" field.

Interest in alternative energy sources actually offers several opportunities to educate students about traditional topics. For example:

- Solar is inherently DC, wind is AC. This provides an excellent opportunity to introduce the differences in alternating and direct current and to discuss the historical reasons for choosing AC versus DC.
- Wind turbines provide a visual example of electro-mechanical conversion. These are far more accessible to students than discussing steam turbines or nuclear power plants. This provides a starting point to discuss motors and generators, including synchronous and asynchronous operation.
- Wind power is variable. This can be used as a starting point for a discussion of power dispatch, economic operation, and power flow.
- Plug-in hybrid electric vehicles offer examples to discuss energy storage, power dispatch, load leveling, frequency control, and protection. For example, the wide spread use of PHEV poses significant challenges in the fault protection of radial systems.

The primary objective is to provide students with the proper educational background so that they have the expertise to function in many job environments. With a little creativity, there are numerous ways to teach traditional topics with a fresh approach.

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