A First Course in Power Engineering- An Energy Conversion Approach

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Power Engineering at the undergraduate level is facing a crisis at many US schools in terms of enrollment. One reason is the attraction of "newer" areas like computer engineering, which seem to excite the students more and pay higher starting salaries.

It is the premise of the organizers of this panel that the first course in power engineering has an important role to play in attracting good students to power engineering. The question is what form should this class take? A power systems approach, a power electronics approach and an energy conversion approach are possibilities and are being presented at the panel. This presentation makes the point that the foundation of power engineering is energy conversion and that power faculty need to find ways to make this class more interesting, rather than gravitating towards subject material that may be more "trendy" but less fundamental and valuable.

Two areas that students universally find interesting are electric vehicles and alternate energy systems based on a renewable energy supply like wind. What these areas have in common is the fundamental material that already exists in many energy conversion classes namely synchronous machines and induction machines. Transformers are of course easy to justify in terms of economical transmission of power from a wind farm. Changing the focus of the applications from traditional power systems to alternate, electric vehicle, automotive or shipboard power systems, allows the Professor to excite the students and entice them into power. Once the door is open, then the complexities of the Utility Power system can be revealed through protection, distribution, power quality and power electronics. Electric drives can lead directly from energy conversion for those interested in industrial power systems, automotive power systems etc. This cohesive approach is applied at Clarkson, where power electronics and drives are considered an integral part of the power program. The decoupling of the power electronics and drives classes from the power program, which exists at some large Universities and indeed in the IEEE itself, through the different Societies, leads to students who are not fully aware of all the opportunities in power. This is one of the reasons for the drop in the power enrolment.

This presentation will go into some of the details of an energy conversion class taught at Clarkson. This includes the use of external speakers in the power area who bring an industrial perspective, class design problems relating to alternate energy and the space program, and field trips to show the class the equipment involved. Some enrolment data of the power program are also included.

Social and environmental issues are addressed through seminars and student in-class presentations.

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