ECE Distinguished Seminar Series

Power Electronics and the Growing Energy Revolution:
The How of Alternative and Sustainable Energy

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Abstract: This presentation illustrates the new electrical energy revolution - the twenty-first century revolution that is completely changing the original twentieth century electrification revolution. It is shown how that power electronics, the processing of electrical energy with electronic circuits, is the driver behind this revolution. Modern portable devices, new energy resources, the fundamental changes occurring in automobiles, and many other areas have power electronics as a critical enabling technology. These innovations are the basis for alternative and sustainable energy technologies for the future. The tasks require nonlinear switching circuits, the core technology of power electronics. Examples include electronic motor drives, dc-dc converters, solar energy power conditioning circuits, “digital power,” electric and hybrid automobiles, single-chip power converters, high-efficiency power supplies, special semiconductor devices, and even applications to audio amplifiers. Emphasis is on the urgent need for engineers familiar with the challenges and design tools of power electronics to help the nation and world enter a new energy era.

Philip T. Krein holds the Grainger Endowed Director’s Chair in Electric Machinery and Electromechanics, and is Director, Grainger Center for Electric Machinery and Electromechanics at the University of Illinois at Urbana-Champaign. He received the B.S., A.B. in 1978 from Lafayette College, and M.S., (1980) and Ph.D. (1982) from the University of Illinois at Urbana-Champaign.

Prof. Krein joined the faculty at Illinois in 1987. He was in industry prior to that time. He introduced the modern power electronics curriculum, and developed classroom and laboratory courses. Since 1992, he has been a Faculty Advisor to the University’s Advanced Electric Vehicle Program, and has worked with large student teams on hybrid and solar cars. 1997-98, he was a Fulbright Scholar at the University of Surrey. His areas of interest include: analysis, control, and design approaches for power electronic systems; modeling and control of electrical machinery; applications of electrostatics; portable and spacecraft power; and electric and hybrid vehicle systems. He is a Fellow of IEEE, and is a Past President of the IEEE Power Electronics Society.