

Multidisciplinary education for energy cyber-physical systems

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Cyber-Physical-Systems include a complex interaction between traditional physics-based principles and traditional sensor/communication/computer-based principles. There is a need to create a curriculum sequence of academic coursework to train the next generation of practicing engineers and researchers. Such a sequence would need to include the proper combination of the following topics:

- Fundamental laws of circuits and power systems
- Fundamental principles of power system sensors and protection
- Fundamental laws of energy conversion and distributed generation
- Fundamental concepts of control systems
- Fundamental concepts of communication devices
- Fundamental concepts of communication networks/wireless
- Fundamental concepts of computing devices
- Fundamental concepts of computer networks/routers/firewalls
- Basic principles of renewables – hydro/solar/wind
- Basic principles of hybrid electric vehicles
- Basic principles of reliability plus generation and transmission capacity
- Basic principles of energy storage and efficiency
- Basic principles of cyber security
- Basic principles of demand response and market mechanisms
- Basic power system sensors, metering, control, SCADA, operations

This presentation will discuss this need for education and a well-designed curriculum for advanced undergrad or graduate students. It will include the possible formulation of an NSF workshop to design this curriculum in detail. It will also feature some recent test cases and the outcomes that have been reported.