A World-Class Smart Grid Education and Workforce Training Center

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JAMES WORTH BAGLEY COLLEGE OF ENGINEERING
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A World-Class Smart Grid Education and Workforce Training Center

- $12,620,153 Project
  - 40% from Department of Energy
  - 60% Cost Share from partners
- Principal Investigator:
  - Mohammad Shahidehpour
  - Illinois Institute of Technology
- Summary
  - Establishment of the Smart Grid Education and Workforce Training Center
  - Assessment of Training Needs for Smart Grid Workforce
  - Development of Smart Grid Workforce Training Programs

A World-Class Smart Grid Education and Workforce Training Center

- 100 Participating Members
  - 3 domestic universities, 5 international universities, 49 community colleges and high schools
  - Labor unions
  - Utilities, Equipment manufacturers, Software developers
- Target audience:
  - power industry employees, union workers, individuals seeking new careers in energy and smart grid technologies, college and high school students, high school teachers, government employees, Veterans, lawyers, investors, venture capitalists and employees of financial institutions, entrepreneurs and general public, IT professionals, telecom professionals, and others

A World-Class Smart Grid Education and Workforce Training Center

- Training offered
  - university-level degree programs with a focus on Smart Grid
  - certificate programs in smart grid
  - associate degree programs in smart grid offered by community colleges
- Self-sustaining after 3 year initial DOE funding

Mississippi State University Tasks

- Build the Smart Grid Training Lab
  - To provide a means for hands on training
- Workforce and Education Program Development
  - Electrical Engineering curriculum updates
  - Add material to 2 courses
  - Add 2 new courses
- Smart Grid Training Courses
  - Short courses on Smart Grid topics for industry

Fundamentals of Energy Systems

- Update existing course
- Junior level required course
- Synchronous generators; power transmission lines and cables; power transformers; induction and direct current motors; power electronic and programmable controllers; National Electric Code and electrical safety.
- Add – introduction to renewable energy sources, goals, benefits, implementation strategies
- Add –Introduction to Smart Grid

Power System Operations and Control

- Update existing course
- Split level elective – Seniors, 1st year graduate students
- Protection objectives and fundamentals; inputs; protection of generators, transformers, busses and lines; stability and control.
- Add - distributed energy resources, micro grids, demand side management, smart metering, high level of automation, and penetration of electrical vehicles, cyber infrastructure, communications

Renewable Energy Systems

- New course
- Graduate elective
- Renewable Energy
- Converters in Renewable Energy Systems
- Stability Analysis
- Operation Issues of Renewable Energy
- Planning Issues of Renewable Energy
- Marketing Issues of Renewable Energy
- Student presentations on Smart Grid research topics

Smart Grid

- New Course
- Graduate elective
- Survey of the smart grid
  - Introduction to Smart Grid (Background, Concepts and Standards)
  - Optimization for Smart Grid
  - Distributed Energy Resources (Wind, Solar, CHP)
  - Energy Efficiency and Demand Response
  - Wide Area Monitoring and Protection
  - Intelligent Power Electronic Interfaces in Smart Grid
  - Wireless Communication Issues in the Smart Grid
  - Smart Grid Security
  - Human Machine Interface and Visualization in Power Systems
  - Advanced Metering Infrastructure
  - Distribution Grid Management
  - Plug-in Hybrid Electric Vehicle to Smart Grid
  - Lab Demonstrations of Smart Grid Technologies

Smart Grid Short Courses

- Operator training
- Cyber security training
- PI server training
- RTDS training
- PEBB based training