Introduction of the Power Program at USF

Graduate Student Orientation

Lingling Fan, Associate Professor
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USF Smart Grid Power Systems Lab

Lab location

PV/battery live laboratory

students

Oct. 2015 Lakshan’s defense

Prof. Poor’s (COE Dean of Princeton) visit

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Power Program Areas

• **Renewable Energy Integration**
  ◦ Power Electronics
  ◦ Energy Delivery Systems
  ◦ AC Machines and Drives
  ◦ *Related control courses*

• **Power System Operation**
  ◦ Power System Analysis
  ◦ Power Systems II
  ◦ Power Market
  ◦ *Related operations research courses (eg., LP, MIP)*

• **And**
  ◦ Control & Optimization in Power Systems, Power System Protection, Power Quality, Distribution Systems
Renewable energy grid integration

Energy Delivery Systems (solar/wind grid integration, microgrids)

Power Electronics

AC machines and Drives

Electric Machines

Power Systems II (voltage/freq control)

Skills
- PSCAD computer simulation skill
- Computer aided control (hardware) skill

EE graduate

EE undergraduate
Power System Operation

- Linear programming
- Convex Programming
- Discrete Optimization

Power Market

Optimization & Control in Power Systems

Power system analysis

Circuits (KCL, KVL)

Control

Power System II

Other places

Programming Skills
MATLAB, Python, OR tools (CVX, CPLEX)

EE graduate

EE undergraduate

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Traditional utility engineering

- Power system protection
- Distribution systems
Power program features

- **Excellent curriculum** that prepares students with computer-aid analysis and design skills: software and hardware
  - Software training (PSCAD) in power systems & power electronics courses
  - Programming and software training (Matlab, CPLEX) in power systems & power market
  - Hardware training in machine and control courses

- **Excellent teaching lab/facility**
  - Opal-RT real-time simulators enabled Hardware-in-the-loop testbed

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RT-LAB Enabled Drive Lab