



## Workforce Training Series for Smart Power Engineering

Learn about current power/energy related technologies including smart grids, sustainable energy, and more in a series of workshops provided by renowned faculty from The Ohio State University Department of Electrical and Computer Engineering and experts from American Electric Power.

### Attend in person or purchase electronic versions following the live events

Individuals can attend the courses in person at The Ohio State University, or purchase electronic versions of the workshops following the live events. These workshops will qualify for professional development hours.

The courses are designed for engineers, technicians, graduate students and others interested in learning about these specialized topics.

A complimentary preparation seminar for engineers without an electrical engineering background will be offered online. Details will be provided during the online course registration process.

The Workforce Training Series is sponsored by The Ohio State University Department of Electrical and Computer Engineering and American Electric Power under a grant from the US Department of Energy.

## Registration Fees

### Course Fees:

Attend in person or purchase electronic versions of the workshops for online-study at your convenience. Each in-person short course registration fee includes the cost of tuition, study materials, break refreshments and lunches.

	Industry Professional	Student
Full-day course	\$1,000	\$500

*Registration deadlines: Seven days prior to course offering*

## General Information

### Location

Dreese Laboratories, Room 260  
The Ohio State University  
2015 Neil Avenue  
Columbus, OH 43210

### Accommodations

The two recommended hotels are:  
**The Blackwell** (located on campus)  
614-247-4000 or 866-247-4003  
Rate: \$131/night (mention *I-Smart Short Courses*)

### Holiday Inn Express & Suites OSU

(located just two miles from campus, shuttle service available)  
614-447-1212 or 800-261-9168  
Rate: \$109.99/night (mention *I-Smart Short Courses*)

### Extracurriculars

There are numerous restaurants, shops and entertainment options located nearby on campus and just a few minutes away in the short north and downtown Columbus.

### Further information

Visit the event website or contact:

### Wendy Flores

floresw@ece.osu.edu

*Information & online registration: [go.osu.edu/ismart](http://go.osu.edu/ismart)*

# Schedule & Descriptions

All courses will be held from 8:30 am to 4:30 pm

## **Sustainable Energy and Society**

**Betty Lise Anderson**

Participants will learn how to realistically estimate the energy obtainable from solar, wind, geothermal, hydro, and other sustainable sources. Compare that to the amounts we use for transportation, heating and cooling, growing food, and making stuff. We'll also discuss nuclear, clean coal, and other energy sources. You will be able to critically evaluate claims in the press. Can we satisfy our energy needs with sustainable resources? At the end of this course, you will have an idea of what it will take, and be able to participate knowledgeably in the ongoing energy debate.

## **Power Systems and Renewable Energy Resources**

**Jin Wang, Longya Xu, Mahesh Illindala and Don Kasten**

An introduction to electrical energy systems; history, current trends, renewable and nonrenewable resources, rotating machines, transformers and power electronic applications, smart grid initiatives. The first half of the short course will focus on an overview of power systems and smart grid related challenges whereas the second half of the short course will focus on detailed technical issues faced by solar and wind energy.

## **Power Electronics Devices, Circuits and Applications**

**Jin Wang and Longya Xu**

This short course is specifically targeted at engineers interested or working in the area of energy conversion and utilization in power systems and vehicular systems. The short course content focuses on the fundamentals of power electronics, covering converter/inverter circuits, magnetic and capacitive components, power switching devices, PWM methods, control strategies, and applications of power electronics devices and circuits in the integration of renewable energy sources and electrification of transportation.

## **Semiconductor Power Devices**

**Siddharth Rajan**

This course will provide a basic introduction to topics including semiconductor physics, PN junction diodes, PIN diodes, solar cells and light emitting diodes, and silicon power switching transistors - FETs and IGBTs.

## **Prep Course: Communications for Smart Grids**

**Eylem Ekici**

This course will cover general principles of communication and networking with a focus on their applicability to Smart Grids and power networks. The course will start with an overview of the traditional networking and communication architectures, software, and hardware systems for communications. Then, the use of existing solutions in Smart Grid and power network architectures will be discussed in detail with an eye towards meeting the requirements of these systems. Throughout the course, case studies and example of communication solutions for power networks and Smart Grids will be presented.

Complete course details: [go.osu.edu/ismart](http://go.osu.edu/ismart)

## Lecturers

Courses will be taught by faculty from The Ohio State University's Department of Electrical and Computer Engineering and engineers from American Electric Power.



**Betty Lise Anderson**

Professor

*Photonics, lasers, fiber optics, optical signal processing and interconnections, optical sensing*



**Eylem Ekici**

Associate Professor

*Computer networks, wireless and satellite systems, routing protocols, and QoS provisioning*



**Mahesh Illindala**

Assistant Professor

*Power electronics and controls for smart grids, microgrids, distributed energy resources*



**Don Kasten**

Associate Professor Emeritus

*Power systems, energy conversion*



**Siddharth Rajan**

Assistant Professor

*Nano-scale semiconductor devices, molecular beam epitaxy, and III-nitride semiconductors*



**Jin Wang**

Assistant Professor

*High voltage engineering, interface for renewable energy sources, high power converters & inverters*



**Longya Xu**

Professor

*Power electronic converters, control of variable-speed drives, solid state control of electric power systems*



**Paul Thomas**

Supervisor Grid Management Deployment

American Electric Power

*Smart grid deployment, distribution planning, underground Networks*



**Tom Weaver**

Manager Distribution System Planning

American Electric Power

*Distribution planning, smart grid development, distribution operations*

### ***Advanced Power Electronics for Utility Applications***

**Jin Wang and Longya Xu**

This short course is specifically targeted at engineers from electric power utility companies and associated equipment manufacturers. The course will start with a review of high power, high voltage power electronics devices and circuits and then focus on advanced static VAR compensation, system stability enhancement, harmonic minimization, etc.

### ***Electric Machines in Modern Day Energy Systems***

**Longya Xu and Don Kasten**

This course will cover the basics of rotating machines. The relationships between mechanical energy, magnetic energy and electrical energy associated with rotating machines and how these relate to the steady operating characteristics will be presented. Application of generators and motors in electric power systems will be discussed. Machine control and variable speed operation of rotating electric machines will also be covered.

### ***Advanced Communications for Smart Grids***

**Eylem Ekici**

Building upon the prep course by the same name, advanced communication and networking solutions for Smart Grids will be introduced in this course. The course will first highlight advanced requirements of Smart Grids and the points where existing communication and networking solutions fail to meet them. Then, network design principles (ad hoc, optimization-based, model-based) will be discussed, emphasizing their advantages and shortcomings individually. The course then covers different analytical models for wired and wireless networking solutions, and their use in network design for Smart Grids.

### ***Field Implementation of Smart Grids: AEP GridSmart Activities***

**Tom Weaver and Paul Thomas**

Electric utilities are applying technology on the distribution system to improve reliability and energy efficiency. Distribution operators will have near real time information about the performance and conditions of the system and will have remote control of devices. The system will utilize automation to minimize the number of customers affected by outages and to reduce the amount of energy used by customers without reducing their level of service. This course will provide insight into the design and operation strategies for present and future smart grid applications. Energy storage related to smart grid applications will also be discussed.

### ***High Voltage Engineering with Laboratory***

**Jin Wang and Don Kasten**

The high voltage short course is specifically designed for engineers and technicians from electric utility companies. The purpose of the course is to provide opportunities for the utility personnel to observe and enhance their understanding of the mechanisms of high voltage phenomena in a controlled testing environment. The course will cover safety aspects and practices in the lab, high voltage measurement techniques, flashover along insulators, insulation material breakdown, corona, and electric field effects.



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**Workforce Training Series for Smart Power Engineering**

***Get the skills you need to succeed!***  
*Learn about current power/energy related technologies including smart grids, sustainable energy, and more in a series of workshops presented spring 2013.*



***Get details and register online at [go.osu.edu/ismart](http://go.osu.edu/ismart)***