



## **Power System Education in the College of Engineering**

**Electric Energy Systems Workshop ONR/NSF-Sponsored Faculty and Industry**

**Workshop: Electric Energy Systems Curriculum for Sustainability**

**February 2-5, 2012**

**Napa Valley Marriott**

**Napa, California**

**Peter Mark Jansson PhD PP PE**  
**Associate Professor – Electrical Engineering**

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**Professor – Electrical Engineering**

ELEC 491.01

Required Course for EEs Bucknell University – Autumn Semester 2011

Offered by Electrical Engineering

INSTRUCTOR - Professor Peter Mark Jansson PhD PP PE

# Electrical Energy Conversion

# Electrical Energy Conversion Syllabus

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- See attached pdf

# Course Overview

- Electrical Devices and Systems
- Electrical Substations
- Three Phase Power Circuits
- The Electric Industry and Deregulation
- Power Transformer Circuits
- Distribution and Transmission Systems
- Rotating Electric Machines
- Equivalent Circuits and Per-Unit Analysis

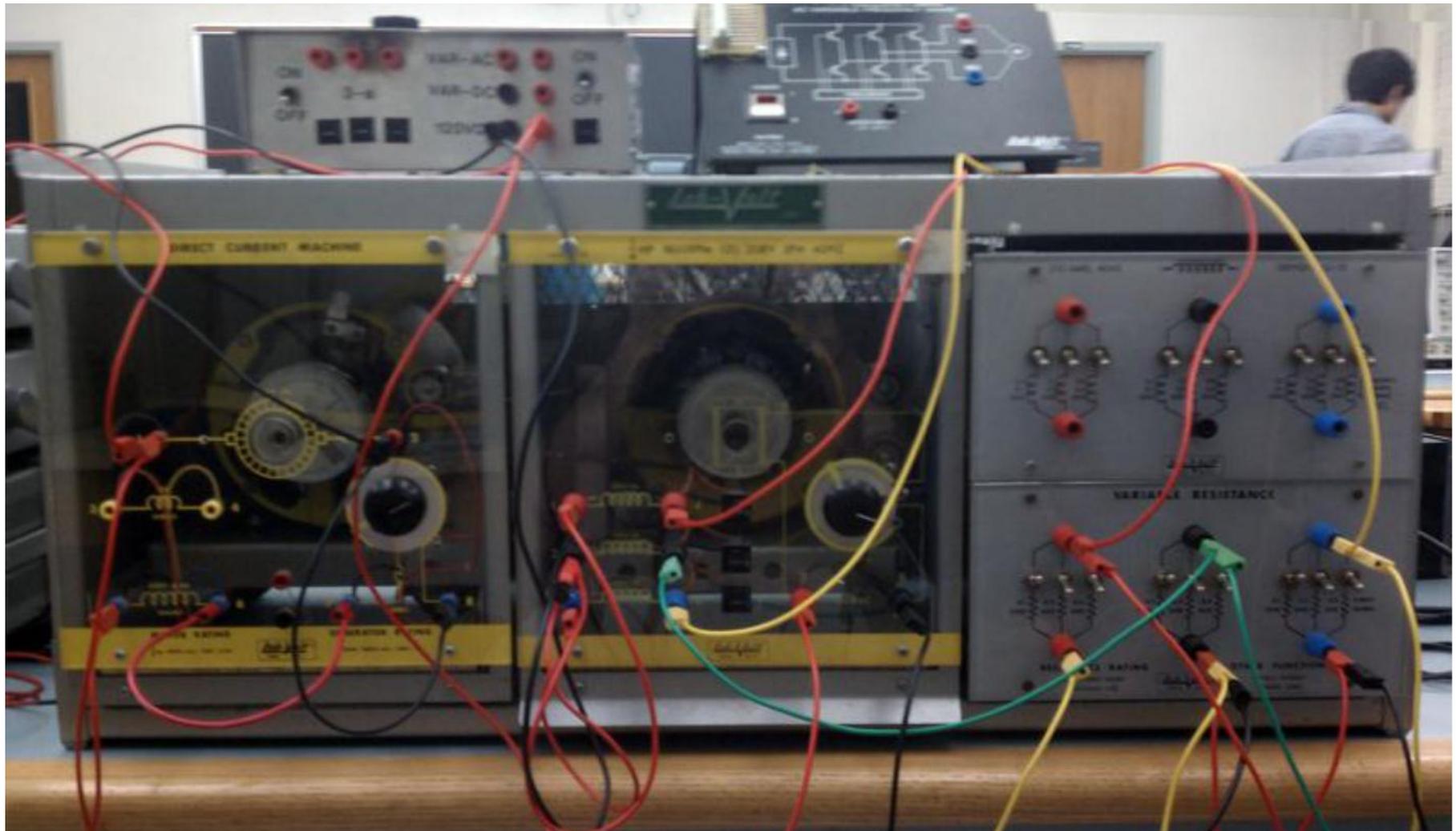
# Course Overview (continued)

- Power Flow
- Synchronous Generators
- Power Quality
- Interconnected Power Systems and PJM
- Economic Dispatch
- Locational Marginal Pricing
- Smart Grid Concepts
- HVDC and Power Electronics Devices

# Hands-On Laboratory Experiences

- Visit to PJM Headquarters
- Motor / Generator Lab
- Variable Frequency Drive Lab
- Citizen's Electric
  - Substation/Storeroom Tour
- Ned Mohan Textbook Labs
  - First Course on Power Systems
  - PSCAD - EMTDC
    - 3-phase Circuits, VARS and power factor correction
    - Power Quality
  - PowerWorld and MATLAB
    - Power Flow and Transformers

# Electrical Energy Conversion Lab Equipment



ELEC 494.01

New Course at Bucknell University – Spring Semester 2012

Offered by Electrical Engineering

INSTRUCTOR - Professor Peter Mark Jansson PhD PP PE

# Renewable Energy Systems

# Renewable Energy Systems Syllabus

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- See attached pdf

# Course Overview

- Text: Gil Master's
  - Renewable and Efficient Electric Power Systems
  - © 2004 John Wiley
- Electrical System & Energy Fundamentals
- Electric Power Industry – Past & Present
- Distributed Generation (all technologies)
- Economics of Distributed Resources
- Wind Power Systems & Resource Assessment
- Solar Resources and Fundamentals
- Design of Photovoltaic Systems

# Renewable Energy Systems Field Training Tours

- **Bucknell University Environmental Center**
  - 2.5-kW PV Array
  - Two other PV Arrays
    - Fixed and Tracking (3.2 kW)
- **Large Scale Wind**
  - Operational Wind Farm
  - Duke Energy's 69 MW Farm (under construction)
- **Large Scale PV System**
  - 550 kW PV system in State College PA

