

# Electric Energy Systems Curriculum

With Emphasis on

- Renewables
- Smart Delivery
- Efficient End-Use

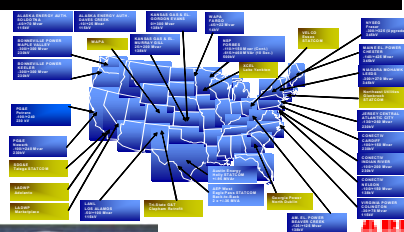
Wind



Solar



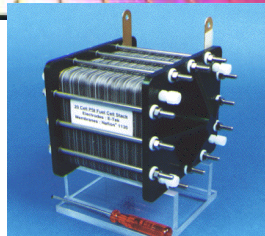
Role of Power Electronics



ABB



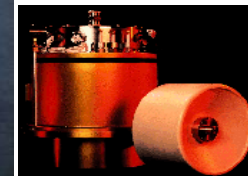
Hybrid



Fuel Cells



CFL



Flywheels for Storage

ONR-NSF-EPRI-AEP Workshop  
Corvallis, OR July 21-25, 2009



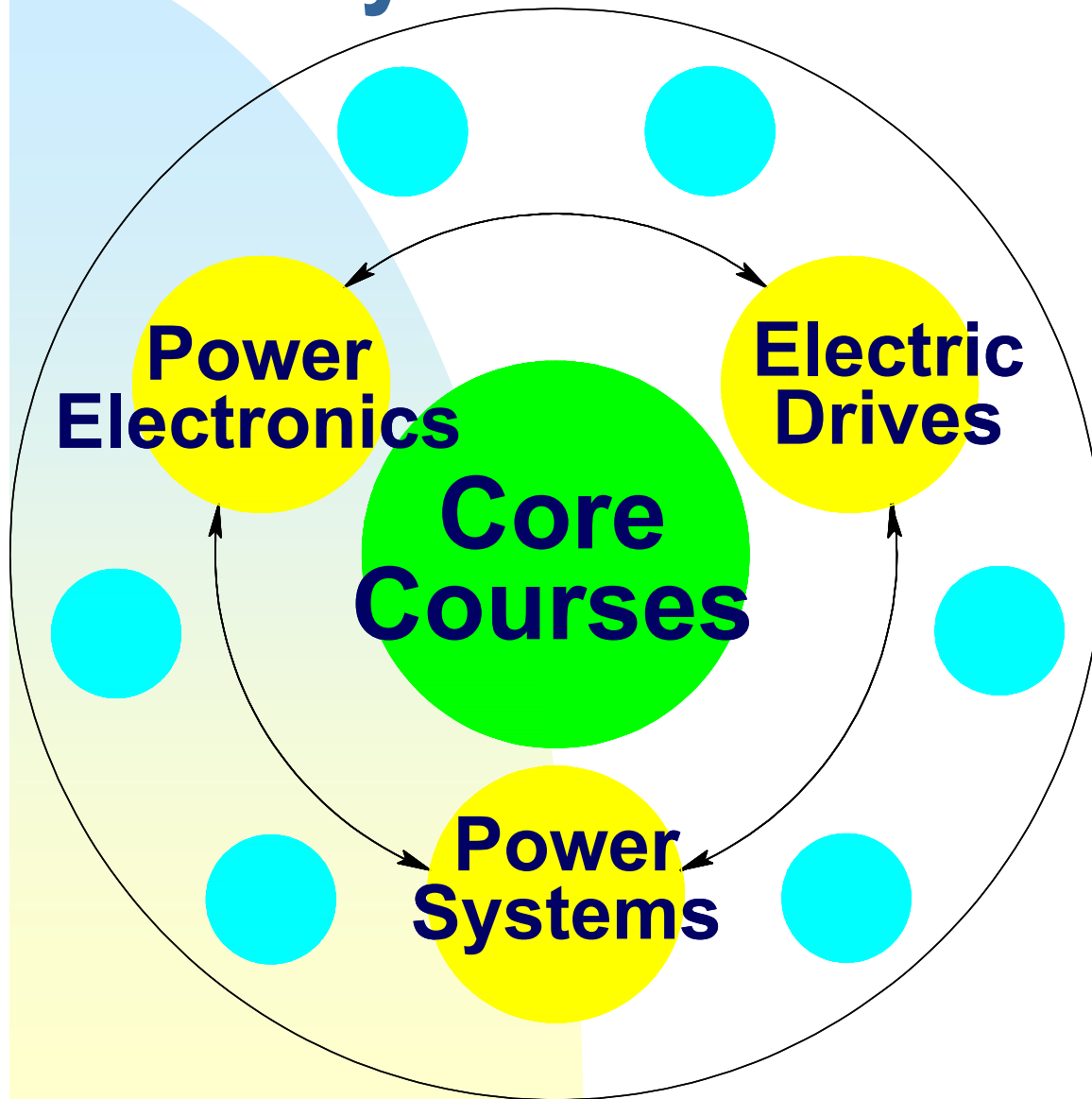
# Thank You!

# Group Effort:

- Ned Mohan
- Bill Robbins
- Bruce Wollenberg
- Paul Imbertson
- Tom Posbergh
- Dr. Narain G. Hingorani (Project Consultant)
- Students

[www.ece.umn.edu/groups/power](http://www.ece.umn.edu/groups/power)

# Integrated Curriculum – Only 3 Courses



## Complementary Courses:

- Analog/Digital Control
- DSPs, FPGAs
- Programming Languages
- Heat Transfer
- Thermo

**Students are  
Broadly Trained;  
They can work in  
any field of EE.**

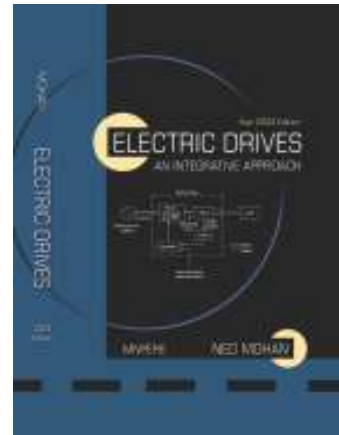
# Resources: Course Learning Objectives

## Power Electronics:

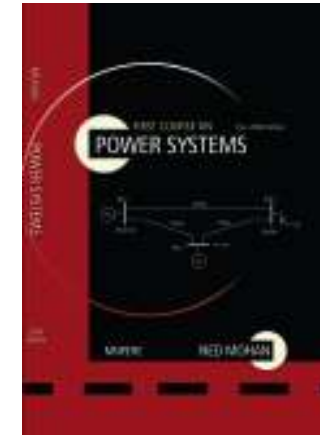


## PSpice Lab:

## Electric Drives:



## Power Systems:



## Software Lab:

MATLAB/Simulink  
PowerWorld  
PSCAD-EMTDC



# Evolving – Comments needed

- Solution Manuals
- PowerPoint Slides for Instructors



# Low-cost Hardware Labs

- Used in **97** University Courses

PSpice Lab and Power Systems Lab are on the website – free to download



# Join the Distinguished Resource Faculty List





# Online Courses Available for University Education (Free?)



# First-Year Graduate Courses

- Power Electronics
- Electric Drives
- Power Systems

# Next Workshop: Tucson, AZ February 4-6, 2010

