

*Two practical courses in transmission line design for design engineers and technicians...*

## **Design of Transmission Lines, Structures, and Foundations**

A comprehensive study of transmission design principles

**February 23–27, 2009**

**Orlando, Florida**

**August 17–21, 2009**

**Madison, Wisconsin**

## **Computerized Transmission Line Design: PLS-CADD Hands-On Training**

A specialized course focusing  
on computer-aided design

**February 16–20, 2009**

**Orlando, Florida**

**December 7–11, 2009**

**Las Vegas, Nevada**



THE UNIVERSITY  
of  
**WISCONSIN**  
MADISON

Department of Engineering Professional Development  
432 North Lake Street Madison, Wisconsin 53706

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**WISCONSIN**  
MADISON

**COLLEGE OF ENGINEERING  
DEPARTMENT OF ENGINEERING  
PROFESSIONAL DEVELOPMENT**

**Design of  
Transmission  
Lines**



**PLS-CADD**



*Two practical courses in transmission line design for design engineers and technicians...*

## **Design of Transmission Lines, Structures, and Foundations**

- Gain a solid understanding of transmission line design and behavior
- Learn how to design new transmission lines and upgrade existing ones

**February 23–27, 2009 in Orlando, Florida**

**August 17–21, 2009 in Madison, Wisconsin**

## **Computerized Transmission Line Design: PLS-CADD Hands-On Training**

- Learn how to use modern integrated software to expedite your design and upgrade projects
- Practice using transmission line design software at your own computer

**February 16–20, 2009 in Orlando, Florida**

**December 7–11, 2009 in Las Vegas, Nevada**

# Design of Transmission Lines, Structures, and Foundations

A comprehensive study of transmission design principles

February 23–27, 2009 in Orlando, Florida

August 17–21, 2009 in Madison, Wisconsin

## Computerized Transmission Line Design: PLS-CADD Hands-On Training

A specialized course focusing on computer-aided design

February 16–20, 2009 in Orlando, Florida

December 7–11, 2009 in Las Vegas, Nevada

*Two important courses for transmission line design engineers, structural engineers, consulting engineers, design and drafting technicians, and others needing a thorough understanding of the engineering principles of transmission line design and behavior*

### Course Summaries

#### **Design of Transmission Lines, Structures, and Foundations**

This in-depth course will provide you with the latest criteria and practical techniques used in the design of transmission lines, structures, and foundations. Your instructors first will explain transmission design concepts and then illustrate them with design examples using traditional design methods and modern computer software. This course does not include training in how to use the PLS-CADD computer program.

Course topics include:

- Single and multiple pole structures
- Latticed steel towers
- Conductor design and behavior
- Line assessment and upgrading concepts
- Strength analysis for joint use
- Foundation design

This up-to-date course applies to the design of new transmission lines and the upgrade of existing ones.

**Earn 3.4 Continuing Education Units (CEU) or 34 Professional Development Hours (PDH).**

#### **Computerized Transmission Line Design: PLS-CADD Hands-On Training**

The purpose of this course is to teach you how to use the PLS-CADD computer program. This computer lab course includes background theory and hands-on computer modeling. Lectures will present the basic concepts, and computer exercises will illustrate them. Numerous case studies will provide a range of real-life examples.

Course topics include:

- Software system overview and terrain modeling
- Conductor design and modeling
- Structures modeling by allowable spans
- Interactive line design and generation of construction documents
- Modeling existing lines, assessment, and refurbishment
- Using detailed structure models for strength verification

This course will provide you with the training you need to be more proficient with the computer software that will make you more effective on your job.

**Earn 3.2 Continuing Education Units (CEU) or 32 Professional Development Hours (PDH).**

### Expert Instructors

The instructors for these courses are recognized experts in their fields. They are experienced design engineers with many years of practical experience in transmission line and foundation design.

#### **Otto Lynch Principal Instructor**

Otto Lynch is a civil/structural engineer and the primary instructor and course coordinator for both of these courses. Mr. Lynch is recognized throughout the industry as an expert in transmission line design and is one of the developers of the widely used transmission line design software program, PLS-CADD. You will benefit from his expert teaching abilities and his career-long experience in transmission line design.

### Real-Life Examples

The concepts presented in these courses will be reinforced with case studies from the actual work history of your experienced instructors. These practical applications of engineering design techniques will assist your learning and show you how to apply the knowledge you gain in these courses to real-life problems you face on the job.

# Design of Transmission Lines, Structures, and Foundations

February 23–27, 2009 in Orlando, Florida

August 17–21, 2009 in Madison, Wisconsin

## Learn How to Design New Transmission Facilities and Upgrade Existing Ones

### A comprehensive design guide

At this technical course you will learn the latest criteria and practical techniques for the design of transmission line structures and their foundations. You will study various types of supporting structures, including wood, concrete, and tubular and latticed steel. You will also learn about conductor design and behavior under various operating temperatures and weather conditions. You will examine concepts for assessing and upgrading the capability of existing transmission lines. This course does not include training in how to use the PLS-CADD computer program.

### Transmission capacity in short supply

Deregulation has changed the way the electric grid is being used. Power transfers have increased transmission flows and taxed the capacity of existing lines. In addition, loads have grown substantially over the last decade while few new transmission lines were built. These factors have produced a shortage of transmission capacity in many areas of the United States.

### More capacity needed

New transmission lines will need to be built to meet the requirements of growing loads and operation under changing competitive markets. Where right-of-way is at a premium and new lines cannot be built, existing lines will need to be upgraded to meet growing needs.

### Learn transmission design principles

Construction of new lines and upgrading of existing ones will require comprehensive knowledge of transmission line conductors, structures, and foundations. This course will give you the knowledge you need to effectively design new lines and modify existing ones to meet the future needs of the electric transmission system.

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## Bring Your Own Laptop Computer

Classroom exercises in transmission line design and foundation design will be computer-based. For this purpose, we ask that students bring their own laptop computers. See computer hardware and software requirements below. If you prefer to rent a computer, please indicate that choice on the enrollment form. Contact Program Director John Raksany (raksany@epd.engr.wisc.edu; 800-462-0876) if you have questions.

## Computer Hardware and Software Requirements

Your laptop must have Microsoft Windows XP or Vista installed. It must also have Excel installed from Office 1997 or later, an 800 MHz or faster processor, a minimum of 256 MB of RAM, and 200 MB of available disk space. An external two-button mouse is also recommended. You must have administrative rights on your computer so that the transmission design exercise software, PLS-CADD/LITE, can be installed. A CD of PLS-CADD/LITE will be supplied at the course, along with a free six-month license to use this software. Software for the foundation exercises will be Excel-based, and the Excel programs will be supplied at the course.

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## Key Course Topics

- Design criteria and loads
- Wind, ice, and broken conductor loads
- Basic sag and slack equations
- Survey data and clearance requirements
- Spotting transmission structures
- Conductor design and behavior
- Assessing existing capability
- Structural analysis for upgrading/reconductoring
- Strength analysis for joint use
- Foundations for single poles, frames, and towers

## You'll Learn How To

- Analyze single and multiple pole structures
- Apply basic buckling equations to wood pole designs
- Model and analyze steel latticed towers
- Check structure strengths and line clearances
- Apply NESC overload factors

## Benefit from Case Studies

Your instructors, experienced design engineers, will use case studies and design examples to illustrate (1) actual applications of the concepts discussed in this course and (2) the real-world design issues you may face in the field.

## Course Instructors

**Dr. Anthony M. DiGioia Jr.** is president of DiGioia, Gray & Associates LLC and former president and chairman of GAI Consultants. Dr. DiGioia manages major projects in various areas of civil engineering, including soil mechanics, foundation engineering, and probabilistic analysis and design of transmission lines, structures, and foundations. As an assistant professor of civil engineering at Carnegie Mellon University, he taught courses on various subjects, including soil mechanics, foundation engineering, and bridge foundation design. He is currently an adjunct professor in the Civil & Environmental Engineering Department of CMU and a member of ASCE, SAME, ASTM, CIGRE and IEEE.

**Otto J. Lynch PE** is a civil/structural engineer and vice president of Power Line Systems, Inc., Madison, Wisconsin. Prior to joining Power Line Systems, Mr. Lynch was with Black & Veatch for over 12 years doing civil/structural design for substations and transmission lines. He has designed several families of lattice steel transmission towers, participated in their full-scale testing programs, and worked on transmission projects ranging from 69kV through 500kV and utilizing wood, tapered tubular steel, lattice steel, concrete, and laminated wood structures throughout the world. Mr. Lynch is an experienced project manager of large turn-key transmission projects through 345kV. In addition to his real-world transmission design experience, Mr. Lynch also has extensive knowledge of computer applications related to design and analysis of transmission lines and structures. Since joining Power Line Systems in 2000, he has taught many courses and seminars on overhead line design and analysis.

## Who Should Attend

This course will benefit those people involved in the design and construction of transmission line structures and their foundations. This includes:

- Transmission line design engineers
- Structural engineers
- Consulting engineers
- Design and drafting technicians
- CAD technicians
- Surveyors

Experienced individuals and those recently assigned to transmission line projects will benefit from this course.

## Computer Software Included with Course

The transmission design concepts presented in this course will be illustrated through design examples using the line design program PLS-CADD, developed by Power Line Systems, Inc. You will receive a CD and instructions for a free six-month license to use a subset of that program (PLS-CADD/LITE) that calculates sags, tensions, loading trees, and thermal rating of overhead conductors.

## Upcoming Related Courses in Las Vegas and Madison

*Fundamentals of Substation Equipment and Control Systems*

April 1–3, 2009, Las Vegas, NV  
Course #K414

*Principles of Substation Design and Construction*

April 6–8, 2009, Las Vegas, NV  
Course #K415

*National Electrical Safety Code IEEE C2-2007*

September 15–17, 2009, Madison, WI  
Course #K336

**To learn more about these courses, please contact us.**

Web: <http://epd.engr.wisc.edu/utilitypower>

E-mail: [custserv@epd.engr.wisc.edu](mailto:custserv@epd.engr.wisc.edu)

Phone: 800-462-0876

## Past Attendees Say...

***“This has been the best technical seminar that I have attended. The information was provided in a manner that makes it applicable to the daily engineering activities of the utility industry.”***

Brandon Boone, Lead Service Planner, Sumter Electric Cooperative, Inc., Sumterville, FL

***“The course and notebook are excellent! The notebook will be a great design reference for me in my daily job of designing transmission lines. I really liked the integration of using PLS-CADD, TOWER, etc. into the course. Very helpful and interesting.”***

Michael Braithwaite, Civil Engineer, Nevada Power

***“I have attended several short courses and this has been the best. Organization, presentation, and content were superb. The speakers were very effective in communicating the materials.”***

Jeremy Pettus, EIT, Tennessee Valley Authority, Chattanooga, TN

# Design of Transmission Lines, Structures, and Foundations

February 23–27, 2009 in Orlando, Florida

August 17–21, 2009 in Madison, Wisconsin

## Course Outline

### Monday

7:30 Registration

February 23–27, 2009  
in Orlando:

The Holiday Inn–International  
Drive Resort

6515 International Drive

August 17–21, 2009

in Madison:

The Pyle Center

702 Langdon Street

8:00 Welcome

John A. Raksany PE

Program Director

Department of Engineering

Professional Development

University of Wisconsin–Madison

8:15 Instruction Begins

Otto Lynch

#### 1. Design Criteria and Loads

- Design philosophies
- Codes and standards
- Wind and ice loads
- Longitudinal loads
- Concepts of wind and weight spans

#### 2. Behavior of Suspended Cables

- Basic sag and slack equations
- Ruling span concept
- Offset clipping
- Interaction between structures and cables

#### 3. Loading Tree

4:30 Adjournment

### Tuesday

8:00 Instruction Continues

Otto Lynch

#### 4. Conductor Design and Behavior

- Conductor types
- Creep and permanent elongation
- Sag-tension calculations
- High-temperature effects
- Current vs. temperature relationships
- Vibration and galloping

#### 5. Basic Structure Spotting

- Strength considerations
- Clearance requirements

#### 6. Computer Analysis and Design Tools

- PLS-CADD/LITE
- 3-dimensional line modeling
- Examples

4:30 Adjournment

7:00 Optional Evening Session

#### Advanced Computer Analysis and Design Tools

- Design examples that illustrate modern computer design capabilities through use of the PLS-CADD software tool

9:00 Adjournment

### Wednesday

8:00 Instruction Continues

Otto Lynch

#### 7. Design of Wood Poles

- Unguyed and guyed

#### 8. Design of Tubular Steel Poles

#### 9. Design of Concrete Poles

#### 10. Design of Wood H-Frames

#### 11. Line Assessment and Upgrading Concepts

- Assessing existing capability
- Elevated temperature operation
- Re-tensioning/re-sagging
- Pole joint use issues
- Structural analysis for upgrading/reconductoring

#### 12. Case Studies

4:30 Adjournment

### Thursday

8:00 Instruction Continues

Otto Lynch

#### 13. Design of Steel Latticed Towers

- Tower configurations
- Modeling for analysis
- Detailed design criteria
- Examples

*“Excellent course. This course provided information essential to anyone involved in transmission engineering and design.”*

Richard Goddard, Manager, Transmission  
Engineering and Project Management,  
Portland General Electric

Dr. Anthony M. DiGioia

#### 14. Foundations

- How to specify, analyze, and use soil investigations
- Types of foundations

#### 15. Foundations for Single Poles

- Analysis and design methods
- Examples

4:30 Adjournment

### Friday

8:00 Instruction Continues

Dr. Anthony M. DiGioia

#### 16. Foundations for Frames and Towers

- Factors influencing type of foundations
- Analysis and design methods
- Examples

#### 17. Guy Anchors

3:00 Final Adjournment

## Daily Schedule

The daily schedule for both courses will include morning and afternoon refreshment breaks and lunch at noon. The courses will be conducted in a smoke-free environment.

## Hotel Room Availability in Orlando

Please note that hotel rooms may be scarce in Orlando during this February period. If you plan, or tentatively plan, to attend this course, please reserve your hotel room early and before the cut-off dates listed in the accommodations section.

# Computerized Transmission Line Design: PLS-CADD Hands-On Training

February 16–20, 2009 in Orlando, Florida

December 7–11, 2009 in Las Vegas, Nevada

## Learn How to Use PLS-CADD Through Computer Exercises

The purpose of this course is to teach you how to use the PLS-CADD computer program. The course emphasizes hands-on computer modeling. Your instructor will first explain a basic transmission design concept and then demonstrate how to implement that design principle using the PLS-CADD software. Students will then execute the same design principles on their own computers. Numerous case studies will provide a range of real-life examples.

## Benefit from Advanced Computer Technology

### Advanced software aids transmission design process

Advanced computer programs are available to aid the transmission design engineer in the structural and geometric design of electric power lines. Computer software also makes it possible to more easily produce related construction documents such as plan-and-profile drawings and material lists.

### Software not always used to full potential

While computer tools are available to greatly increase the design engineer's productivity and work quality, they are often not used to their full potential. One reason is a lack of training or understanding of advanced survey techniques, proper design criteria, line behavior, structural analysis, and drafting. A second reason is an ineffective integration of these new design tools.

### Learn how to use integrated software

At this course you will have hands-on training on how to use advanced transmission design software that has integrated the various surveying, engineering, drafting, and material management functions. Your training will help you become proficient at using this advanced software and help you be more productive when using it in your work.

## Get the Training You Need To Be More Effective on Your Job

The purpose of this course is to teach design engineers and technicians how to use the PLS-CADD computer program. Case studies will provide real-life examples. This course will provide you with the training you need to more effectively use PLS-CADD software on your job.

## Special Features of This Course

- Background theory and computer exercises
- Review of basic line design concepts
- State-of-the-art integrated software
- Case studies

## Hands-On Training...Limited Enrollment

Because this course features intensive hands-on computer training, we limit enrollment to 20 students. Enroll early to ensure your place in the class.

## Computer Software Used in This Course

The computerized design tool capabilities presented in this course will be illustrated through design examples using the programs PLS-CADD, PLS-POLE and TOWER, developed by Power Line Systems, Inc. These programs and classroom example files will be installed on each classroom computer for students to use during class.

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*"I really liked the intermingled combination of hands-on computer work, illustrations of practical situations, and understandable explanations of the associated physics. Excellent course, I learned a lot!"*

Mark Hiple, Supervising Engineer, Ameren IP

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## Who Should Attend

This course is intended for transmission engineers, technicians, and managers who are using or planning to use computerized line design tools. This includes:

- Transmission line design engineers
- Structural engineers
- Consulting engineers
- Design, drafting, CAD technicians
- Surveyors

## Bring Your Own Laptop

We ask that students bring their own laptop computers for these courses. See computer hardware requirements below. If you prefer to rent a computer, please indicate that choice on the enrollment form. Contact Program Director John Raksany (raksany@epd.engr.wisc.edu; 800-462-0876) if you have questions.

## Computer Hardware Requirements

If you are already a PLS-CADD user, please bring a laptop on which you have previously run the PLS-CADD software. Your laptop must have Microsoft Windows XP or Vista installed. It must also have a 1 GHz or faster processor, a minimum of 512 MB of RAM, 200 MB of available disk space, and an available USB port for hardware key connection. An external two-button mouse is also recommended. If you have not previously installed PLS software on your computer, you must have administrative rights on your computer so that the hardware key drivers can be installed. Detailed computer hardware and software information will be e-mailed to you several weeks before the course starts.

# Computerized Transmission Line Design: PLS-CADD Hands-On Training

February 16–20, 2009 in Orlando, Florida ■ December 7–11, 2009 in Las Vegas, Nevada

## Course Instructor

**Otto J. Lynch PE**, vice president of Power Line Systems, Inc., Madison, Wisconsin, is responsible for the technical sales and development of overhead line software. He is an expert in the PLS-CADD computer program and has conducted numerous seminars and training sessions in its use and applications. A pioneer in integrating LiDAR aerial survey data into the PLS-CADD program for transmission line rerouting and reconductoring projects, Mr. Lynch is an expert in all the computer programs used throughout the course.

## Course Outline

### Monday

#### 7:30 Registration

**February 16–20, 2009  
in Orlando:**

The Holiday Inn–International  
Drive Resort  
6515 International Drive

**December 7–11, 2009  
in Las Vegas:**

The Riviera Hotel and Casino  
2901 Las Vegas Boulevard South

#### 8:00 Welcome

**John A. Raksany PE**  
Program Director  
University of Wisconsin–Madison

#### 8:15 Instruction Begins

##### 1. Overview and Terrain Modeling

- PLS-CADD system overview
- Presentation of projects
- How to organize project files
- View commands, opening of windows, viewing of phases and sags
- Needed terrain data and surveying techniques
- Prepare a terrain model
  - generate and edit feature codes data
  - import/generate and edit terrain files: XYZ or PFL models
  - digitize existing drawings

##### 1.1 LiDAR Aerial Surveying

- How to use 3-dimensional survey data
- Building design models from LiDAR data
- Identifying clearance limits and potential for clearance upgrades

#### 5:00 Adjournment

### Tuesday

#### 8:00 Instruction Continues

##### 2. Conductor Design and Modeling

- Various conductor types
- Conductor properties: advantages and disadvantages
- Permanent deformation from overloading and creep
- Effects of high temperature on creep and strength reduction
- Conductor models in PLS-CADD
  - stress-strain charts
  - where to get conductor data
- Aeolian vibrations: how to limit
- Temperature vs. ampacity
- Line thermal rating

##### 3. Design Criteria

- Weather data
- Wind and ice loads: gust response factors, etc.
- Conductor limits of use
- Conditions for automatic sagging
- Structure loads and safety factors
- Conditions for checking clearances
- PLS-CADD/LITE: simplified PLS-CADD module
  - quick sag/tension calculations
  - various sagging methods
  - create load files for TOWER and PLS-POLE

#### 5:00 Adjournment

### Wednesday

#### 8:00 Instruction Continues

##### 4. Structures Modeling by Allowable Spans

- Available structure models
  - allowable spans method
  - full analysis method
- Material lists, parts lists
- Create and edit allowable span structures

##### 5. Interactive Line Design

- Spot structures interactively
- String and sag conductors: demonstrate four sagging methods
- Check clearances: vertical, between phases, galloping, etc.
- Check overall design efficiency

##### 6. Generate Construction Documents

- Plan-and-profile sheets, staking lists, stringing charts, offset clipping, etc.

#### 5:00 Adjournment

### Thursday

#### 8:00 Instruction Continues

##### 7. Modeling of Poles and Frames by Analysis

- Overview of structure programs; PLS-POLE
- Create and edit wood, steel and concrete poles/frames
- Determining allowable spans of existing structure designs

##### 8. Modeling Existing Lines, Assessment and Refurbishing

- Modeling existing lines and structures
- Assessment, reconductoring, refurbishing, etc.
- Joint use issues and modeling
- Links to SAPS
  - limits of validity of ruling span concept
  - unbalanced ice, RSL after broken conductor, marker balls, structure deflection, etc.

#### 5:00 Adjournment

### Friday

#### 8:00 Instruction Continues

##### 9. Automatic Optimum Spotting

- Theory and examples

##### 10. Checking Detailed Tower Models

- Brief overview of TOWER program capabilities
- Linkage between PLS-CADD and TOWER
- Checking and modifying older tower designs

#### 12:00 Final Adjournment

***“I thought that the class and content were wonderful. Otto Lynch did a great job teaching this course!”***

Scott Higley, Engineering Technician,  
Springfield Utility Board, Springfield, OR

## Hotel Room Availability in Orlando

Please note that hotel rooms may be scarce in Orlando during this February period. If you plan, or tentatively plan, to attend this course, please reserve your hotel room early and before the cut-off dates listed in the accommodations section.

## General Information

### Fees

**February 16–20, 2009 and December 7–11, 2009 PLS-CADD Courses:** Fee of \$2095 covers course materials, break refreshments, lunches, and certificate.

**February 23–27, 2009 and August 17–21, 2009 Design of Transmission Courses:** Fee of \$1995 covers course materials, break refreshments, lunches, and certificate.

### Cancellation

**February 16–20, 2009 and December 7–11, 2009 PLS-CADD Courses:** \*These limited enrollment courses require fee payment at time of enrollment. If you cannot attend, please notify us at least 7 days prior to the first day of the course, and we will refund your fee. Cancellations received after this date and no-shows will be charged the full course fee. You may enroll a substitute at any time before the course starts.

**February 23–27, 2009 and August 17–21, 2009 Design of Transmission Courses:** If you cannot attend, please notify us at least 7 days prior to the first day of the course, and we will refund your fee. Cancellations received after this date and no-shows are subject to a \$150 administrative fee. You may enroll a substitute at any time before the course starts.

### Location

**February 16–20, 2009 PLS-CADD and February 23–27, 2009 Design of Transmission Courses:** The Holiday Inn–International Drive Resort, 6515 International Drive, Orlando, Florida. Phone messages: 407-351-3500.

**August 17–21, 2009 Design of Transmission Course:** The Pyle Center, 702 Langdon Street, Madison, Wisconsin. Phone messages: 608-262-1122.

**December 7–11, 2009 PLS-CADD Course:** The Riviera Hotel and Casino, 2901 Las Vegas Boulevard South, Las Vegas, Nevada. Phone messages: 702-734-5110.

### Accommodations

**February 16–20, 2009 PLS-CADD Course:** We have reserved a block of rooms for course participants at The Holiday Inn–International Drive Resort, 6515 International Drive, Orlando, Florida. To reserve a room (\$97 sgl/quad), call 888-233-9527 or 407-351-3500 by January 15 and mention the event: PLS-CADD Hands-On Training. Or register on the Web at <http://epd.engr.wisc.edu/lodgingK332>. Room requests made after January 15 will be subject to availability and at prevailing rates.

**February 23–27, 2009 Design of Transmission Course:** We have reserved a block of rooms for course participants at The Holiday Inn–International Drive Resort, 6515 International Drive, Orlando, Florida. To reserve a room (\$97 sgl/quad), call 888-233-9527 or 407-351-3500 by January 22 and mention the event: Design of Transmission. Or register on the Web at <http://epd.engr.wisc.edu/lodgingK333>. Room requests made after January 22 will be subject to availability and at prevailing rates.

**August 17–21, 2009 Design of Transmission Course:** We have reserved a block of rooms for course participants (\$106 sgl/\$116 dbl) at the Madison Concourse Hotel, One West Dayton Street, Madison, Wisconsin. To reserve a room, call the Madison Concourse Hotel at 800-356-8293 or 608-257-6000 by July 25 and mention this course and group code DES0816.

**December 7–11, 2009 PLS-CADD Course:** We have reserved a block of sleeping rooms at the best available rate for course participants at the Riviera Hotel & Casino, 2901 Las Vegas Boulevard South, Las Vegas, Nevada. A deposit equal to the room rate for one night is charged at time of booking. This deposit is refundable if the reservation is canceled 48 hours prior to scheduled arrival. Room block rates may not be available for Friday or Saturday night stays. To reserve a room, call 800-634-6753 or 702-794-9412 and indicate that you will be attending this course under group code University of Wisconsin–Madison. Room requests made later than November 15 will be subject to availability.

## Four Easy Ways to Enroll



**Phone:**  
800-462-0876 or  
608-262-1299 (TDD 265-2370)



**Internet:**  
<http://epd.engr.wisc.edu/>

**Mail to:**

Engineering Registration, The Pyle Center  
702 Langdon Street, Dept. 108  
Madison, Wisconsin 53706



**Fax:**

800-442-4214 or 608-265-3448



### Course 1 Information

Please enroll me in **Design of Transmission Lines, Structures, and Foundations**

**Course #K333** February 23–27, 2009 in Orlando, FL Fee by January 26: \$1895  
Fee after January 26: \$1995 **Save \$100! Enroll by January 26**

- I will bring my own laptop computer  
 I want to rent a computer for a \$300 weekly fee

**Course #K511** August 17–21, 2009 in Madison, WI Fee by July 20: \$1895  
Fee after July 20: \$1995 **Save \$100! Enroll by July 20**

- I will bring my own laptop computer  
 I want to rent a computer for a \$300 weekly fee

Bill my company  P.O. or check enclosed



Cardholder's Name \_\_\_\_\_

Card No. \_\_\_\_\_ Expires \_\_\_\_\_

**Enroll Early.  
Save \$100!**



### Course 2 Information

Please enroll me in **Computerized Transmission Line Design: PLS-CADD Hands-On Training**

**Course #K332** February 16–20, 2009 in Orlando, FL (Enrollment limited to 20: fee payment required at time of enrollment; \*see cancellation policy for this course) Fee by January 19: \$1995 Fee after January 19: \$2095  
**Save \$100! Enroll by January 19**

- I will bring my own laptop computer  
 I want to rent a computer for a \$300 weekly fee

**Course #K594** December 7–11, 2009 in Las Vegas, NV (Enrollment limited to 20: fee payment required at time of enrollment; \*see cancellation policy for this course) Fee by November 9: \$1995 Fee after November 9: \$2095  
**Save \$100! Enroll by November 9**

- I will bring my own laptop computer  
 I want to rent a computer for a \$300 weekly fee

P.O. or check enclosed



Cardholder's Name \_\_\_\_\_

Card No. \_\_\_\_\_ Expires \_\_\_\_\_

**Enroll Early.  
Save \$100!**



### Personal Information (Please print clearly.)

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Phone (\_\_\_\_\_) \_\_\_\_\_ Fax (\_\_\_\_\_) \_\_\_\_\_

E-mail \_\_\_\_\_

## Need to Know More?

Call toll free **800-462-0876** and ask for

**Program Director:** John A. Raksany PE, [raksany@epd.engr.wisc.edu](mailto:raksany@epd.engr.wisc.edu)

**Program Associate:** Mary Danielson, [danielson@epd.engr.wisc.edu](mailto:danielson@epd.engr.wisc.edu)

Or e-mail [custserv@epd.engr.wisc.edu](mailto:custserv@epd.engr.wisc.edu)