

## Design of Transmission Lines, Structures, and Foundations

*A comprehensive study of transmission design principles*

**February 27–March 2, 2012**  
Orlando, Florida

**August 13–17, 2012**  
Madison, Wisconsin



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

*A specialized course focusing on computer-aided design*

**February 20–24, 2012**  
Orlando, Florida

**December 3–7, 2012**  
Orlando, Florida



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## 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 27–March 2, 2012**  
Orlando, Florida

**August 13–17, 2012**  
Madison, Wisconsin

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

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

**February 20–24, 2012**  
Orlando, Florida

**December 3–7, 2012**  
Orlando, Florida

# Design of Transmission Lines, Structures, and Foundations

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**February 27–March 2, 2012 in Orlando, Florida**

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

*A specialized course focusing on computer-aided design*

**February 20–24, 2012 in Orlando, Florida**

**December 3–7, 2012 in Orlando, Florida**

**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.

**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.

## 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.

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# Design of Transmission Lines, Structures, and Foundations

February 27–March 2, 2012 in Orlando, Florida

August 13–17, 2012 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 lines, 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

Wind farms and deregulation have 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.

## 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 7, XP or Vista installed. It must also have a 1 GHz or faster processor, a minimum of 512 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, and the foundation design exercise software, FAD Tools 5.0, 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. A FAD 5.0 set up file will also be available at the course, and you will receive a free 30-day license to use this software.

## 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

## Not a Computer Software Training Course

We want to emphasize that this first course is not intended to give you advanced training on how to use the PLS-CADD transmission line design software. The companion course, Computerized Transmission Line Design: PLS-CADD Hands-On Training, will do that. This first course gives you a thorough review of all the major civil and mechanical engineering concepts and methods used in the design of transmission lines and foundations. The instructor introduces you to the classical analytical design methods and develops the force and moment equations using traditional lecture and Q & A techniques. He then uses PLS-CADD software to illustrate the concepts and design examples presented in this course.

## 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.

## 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.

## 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.

The foundation design classroom exercises in this course will be worked using the foundation design software, FAD Tools 5.0. You will be able to load the FAD Tools 5.0 software on your laptop during class, and you will receive a free 30-day license to use this software. FAD Tools 5.0 is used to analyze and design direct embedded pole, drilled shaft foundations for axial, lateral, and moment loading. It is also used to analyze and design H-frame structure foundations for axial, lateral, and moment loading during uplift and compression.

## 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.

## 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.

**"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

## Upcoming Related Courses in Madison

*Principles of Substation Design and Construction*

February 1–3, 2012, Orlando, Florida  
Course #M876

October 15–17, 2012, Madison, Wisconsin  
Course #M994

*Fundamentals of Substation Equipment and Control Systems*

March 26–28, 2012, Orlando, Florida  
Course #M879

October 29–31, 2012, Madison, Wisconsin  
Course #M995

*National Electrical Safety Code IEEE C2-2012*

September 18–20, 2012, Madison, Wisconsin  
Course #N189

To learn more about these and other courses, please contact us.

**Web:** [epd.engr.wisc.edu/](http://epd.engr.wisc.edu/)

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

**Phone:** 800-462-0876

**ENROLL ONLINE TODAY! Or visit our Web site**

## Course Outline

### Monday

#### 7:30 Registration

#### February 27–March 2 in Orlando:

The International Palms Resort and Conference Center

6515 International Drive

#### August 13–17 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

#### 4:30 Optional Session

#### Advanced Computer Analysis and Design Tools

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

#### 6:00 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

*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.

## Past Attendees Say...

**"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

**"I LIKED THE CLASS PROBLEMS—THEY PROVIDED IMMEDIATE OPPORTUNITIES TO APPLY THE THEORY."**

Richard Jinkerson, Director of Engineering, Trinity Structural Towers, Inc.

**"I REALLY APPRECIATED THE HANDS-ON CLASSROOM EXERCISE OF DOING THE LINE DESIGN MANUALLY USING TEMPLATES."**

Simon Pang, Structural Engineering Specialist, ATCO Electric Ltd.

**"BOTH SPEAKERS ARE VERY WELL VERSED IN THE DESIGN OF TRANSMISSION LINES AND FOUNDATIONS, AND IT WAS VERY GOOD FOR ME TO REVIEW THE NUMEROUS DESIGN POINTS, ASSUMPTIONS, AND FORMULAS."**

Dennis McAninch, Staff Engineer, NV Energy

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

February 20–24, 2012 in Orlando, Florida

December 3–7, 2012 in Orlando, Florida

## 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.

## 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.

## 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 25 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 student's computer for students to use during class.

## 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

## Past Attendees Say...

**"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

**"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

## 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 7, 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.

**ENROLL ONLINE TODAY! Or visit our Web site**

## 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 rerating and reconductoring projects, Mr. Lynch is an expert in all the computer programs used throughout the course.

## Course Outline

### Monday

#### 7:30 Registration

#### February 20–24 in Orlando:

The International Palms Resort and Conference Center

6515 International Drive

#### December 3–7 in Orlando:

The International Palms Resort and Conference Center

6515 International Drive

#### 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

## Hotel Room Availability in Orlando

Please note that hotel rooms may be scarce in Orlando during this course 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.

**Note:** The Orlando room blocks are for the convenience of those wishing to stay at the conference hotel. It is not necessary to stay at this hotel to attend the course.

## General Information

### Fees

**February 27–March 2, 2012 and August 13–17, 2012 Design of Transmission Courses:** Fee of \$1995 (\$2095 August course) covers course materials, break refreshments, lunches, and certificate.

**February 20–24, 2012 and December 3–7, 2012 PLS-CADD Courses:** Fee of \$2095 covers course materials, break refreshments, lunches, and certificate.

### Cancellation

**February 27–March 2, 2012 and August 13–17, 2012 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 that date and no-shows are subject to a \$150 administrative fee. You may enroll a substitute at any time before the course starts.

**February 20–24, 2012 and December 3–7, 2012 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.

### Location

**February 20–24, 2012, February 27–March 2, 2012, and December 3–7, 2012 PLS-CADD and Design of Transmission Courses:** The International Palms Resort and Conference Center, 6515 International Drive, Orlando, FL. Phone messages: 407-351-3500.

**August 13–17, 2012 Design of Transmission Course:** The Pyle Center, 702 Langdon Street, Madison, WI. Phone messages: 608-262-1122.

### Accommodations

**February 20–24, 2012 PLS-CADD Course:** We have reserved a block of rooms for course participants at The International Palms Resort and Conference Center, 6515 International Drive, Orlando, FL. To reserve a room (rates starting at \$89), call 800-354-8332 or 407-351-3500 by January 20 and mention group code UW2. Room requests made after January 20 will be subject to availability and at prevailing rates.

**February 27–March 2, 2012 Design of Transmission Course:** We have reserved a block of rooms for course participants at The International Palms Resort and Conference Center, 6515 International Drive, Orlando, FL. To reserve a room (rates starting at \$89), call 800-354-8332 or 407-351-3500 by January 28 and mention group code UW3. Room requests made after January 28 will be subject to availability and at prevailing rates.

**August 13–17, 2012 Design of Transmission Course:** We have reserved a block of sleeping rooms (rates starting at \$89, including continental breakfast) for course participants at the Lowell Center, 610 Langdon Street, Madison, WI. Reserve a room online at [epd.engr.wisc.edu/lodgingM991](http://epd.engr.wisc.edu/lodgingM991), or call 866-301-1753 or 608-256-2621 and indicate that you will be attending this course. Room requests made later than July 14 will be subject to availability.

We have reserved a second block of rooms (rates starting at \$115, including airport shuttle) for course participants at The Madison Concourse Hotel, One West Dayton Street, Madison, WI. To reserve a room, call The Madison Concourse Hotel at 800-356-8293 or 608-257-6000 by July 22 and mention this course and reservation ID 178765. Your enrollment confirmation will include other hotel/motel information.

**December 3–7, 2012 PLS-CADD Course:** We have reserved a block of rooms for course participants at The International Palms Resort and Conference Center, 6515 International Drive, Orlando, FL. To reserve a room (rates starting at \$79), call 800-354-8332 or 407-351-3500 by November 2 and mention group code UW5. Room requests made after November 2 will be subject to availability and at prevailing rates.

## Four Easy Ways to Enroll

 <b>Internet:</b> <a href="http://epd.engr.wisc.edu/">http://epd.engr.wisc.edu/</a>	 <b>Mail to:</b> Engineering Registration The Pyle Center, Dept. 108 702 Langdon Street Madison, Wisconsin 53706	 <b>Fax:</b> <b>800-442-4214</b> or 608-265-3448
 <b>Phone:</b> <b>800-462-0876</b> or 608-262-1299 (TDD 265-2370)		

### Course 1 Information

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

**Course #M878** February 27–March 2, 2012 in Orlando, FL Fee: \$1995

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

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

**Course #M991** August 13–17, 2012 in Madison, WI Fee: (before July 16) \$1995 Fee (after July 16) \$2095

**Save \$100! Enroll by July 16.**

- 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 (Payable in U.S. funds to UW—Madison)



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

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

Expires \_\_\_\_\_

**ENROLL ONLINE TODAY!**

### Course 2 Information

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

**Course #M877** February 20–24, 2012 in Orlando, FL Fee: \$2095

(Enrollment limited to 25; fee payment required at time of enrollment; \*see cancellation policy for this course)

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

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

**Course #M996** December 3–7, 2012 in Orlando, FL Fee: \$2095

(Enrollment limited to 25; fee payment required at time of enrollment; \*see cancellation policy for this course)

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

- P.O. or check enclosed (Payable in U.S. funds to UW—Madison)



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

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

Expires \_\_\_\_\_

### Personal Information (Please print clearly.)

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

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

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

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

Please check the box if you are a person with a disability and desire special accommodations. A customer service representative will contact you. Requests will be kept confidential.

## Need to Know More?

Call toll free 800-462-0876 and ask for

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