



# ELECTRICAL CALCULATIONS I - TECHNICIAN/INTRO LEVEL

**Location:**  
ECNE Headquarters, Windham, New Hampshire

**April 15-16, 2010**

## Who Should Attend:

This two day course is designed for technicians, designers, or novice engineers who are new to the power industry and have a very limited background in electrical calculations. Basic awareness of utility electric systems is necessary and attendance of the *Power Utility Institute: Overview of the Electric System* course or suitable work experience is a prerequisite.

**A background in college-level math and electric circuit theory are recommended.** *Students must be familiar with using an engineering or scientific calculator and bring one to use in class.*

**This course or equivalent work experience is a prerequisite for other Power Utility Institute Courses such as the Distribution Protection Course.**

## Deliverables:

The course provides a brief review of electric circuit theory, and then covers the basics of AC voltage and current, single-phase and three-phase AC power, real and reactive power, load types, transformers, phasing, trigonometry relationships, polar and rectangular notation, and per unit calculations.

Upon completion of this course, participants will have the skills to perform basic AC power calculations and will have a foundation for more advanced courses that deal with analyzing AC circuits and systems.

## Instructors

- **Tamer Youssef:** System Integrity Engineer for United Illuminating Company. B.S. and M.S. in Electric Power and Machines Engineering from Ain Shams University
- **Hamid Jaffari, EED, DBA,** Director of Engineering & Operations for Danvers Electric Municipal Utility. Dr. Jaffari earned his BS, MS and EED from Northeastern University in Electrical Engineering and his Doctor of Business Administration from Argosy University.

**IOU Full Members, Municipal Members and Associate Members qualify for the reduced tuition rate of \$425. IOU Affiliate Member tuition is \$725.  
Non member tuition is \$895.**

**Space is limited and registrations are accepted on a first requested, first honored basis. If the course is oversubscribed a second course may be scheduled.**

# ELECTRICAL CALCULATIONS I - TECHNICIAN/INTRO LEVEL

## COURSE SYLLABUS

April 15, 8:00 AM - 4:45 PM:

### Review of Basic Circuit Theory - Simple DC

#### AC Voltage and Current

- Sinusoids - alternating voltage/current waveform
- AC voltage
- Instantaneous and RMS
- AC Current
- Phasors
  - Geometry and Trigonometry
  - Polar Notation - Magnitude and Angle
  - Rectangular Notation
- Phase Notation
- Phase Sequence
- Single-Phase vs. Three-Phase
- Complex Math

#### AC Power

- Energy
- AC Power
- Instantaneous and -Power Equations, Power Triangle
- Single-Phase and Three-Phase

April 16, 8:00 AM - 4:00 PM:

### Load Types

- Constant Impedance
- Constant Current
- Constant Power
- Resistive
- Reactive

### Connections

- Phase to Phase
- Phase to Neutral
- Neutral versus Ground

### Transformers

- Types
- Typical Equivalent Model
- Primary and Secondary
- Connections and Phasing

### Per Unit

- Base Equations
- Calculations

The curriculum includes course work and homework to ensure opportunities to apply the concepts presented during class.

**Course Syllabus subject to change (instructors' discretion)**






**Please the registration form to enroll in this and other PUI classes. Registrations accepted on first-requested, first honored basis.**

**Please contact Aliceanne Davidson at ECNE, (603) 437-2577 regarding any special dietary needs or special arrangements.**



# POWER UTILITY INSTITUTE

## COURSE ENROLLMENT FORM

Course Title	Date	Tuition (Member/Affiliate/ Non Member)
Intro to Distributed Generation & Interconnection Technologies 	January 20 - 21, 2010 April 20-21, 2010	\$750/975/1095
Power Systems Communications 	February 9 - 11, 2010 Sept. 21-23, 2010	\$500/875/1200
Project Management—Level I (Introductory) 	March 10 - 11, 2010	\$500/850/995
Overhead Distribution System Designs & Layouts	March 30 - April 1, 2010	\$525/875/995
Electrical Calculations I—Technician/Intro Level	April 15 - 16, 2010	\$425/725/895
Project Management Level II (Advanced) 	May 19 - 21, 2010	\$1350/1700/1995
Electrical Calculations II—Engineering/Intermediate Level	May 27-28, 2010	\$425/725/895
Overview of the Electric System & Organization	June 15 - 16, 2010	\$425/725/895
Distribution Transformer Sizing and Selection	September 29 - 30, 2010	\$425/725/895
Underground Distribution System Designs & Layouts	October 27 - 29, 2010	\$525/875/995
Asset Management Fundamentals 	November 16 - 17, 2010	\$400/700/895
Protection of the Distribution System	December 1 - 3, 2010	\$550/895/1020

**Members that qualify for reduced tuition at the Full Member Rate:**

Bangor Hydro-Electric Company  
Central Vermont Public Service Corporation  
Green Mountain Power Corporation  
Maine Public Service Company  
National Grid  
The United Illuminating Company  
Unitil Service Corporation  
Vermont Electric Power Company, Inc.

**All Associate Members**

All ECNE Associate Members can register at the reduced rate shown for Full Members.

**As Affiliate Members, these IOUs qualify for tuition at the rate specified for Affiliates:**

Central Maine Power  
Northeast Utilities

NSTAR  
PSNH

**All 2010 Municipal Members qualify for reduced tuition at the Full Member Rate. 2009 members included:**

Ashburnham Municipal Light Plant  
Belmont Municipal Light Department  
Braintree Electric Light Department  
Chicopee Electric Light Department  
Danvers Electric  
East Norwalk Electric (Third Taxing District)  
Georgetown Light Department  
Groton Electric Light Department  
Hingham Municipal Light Plant  
Holyoke Gas & Electric Dept.  
Ipswich Municipal Light Dept.  
Littleton (MA) Electric Light & Water Department  
Littleton (NH) Water & Light Department  
Mansfield Municipal Electric Department  
New Hampshire Electric Co-Op  
North Attleborough Electric Department  
Peabody Municipal Light Department  
Reading Municipal Light Dept.  
South Hadley Electric Light Department  
South Norwalk Electric & Water  
Sterling Municipal Electric Light Department  
Taunton Municipal Lighting Plant  
Vermont Electric Co-Op  
Westfield Gas & Electric Light Department

COMPANY: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

NAME: \_\_\_\_\_ PHONE: \_\_\_\_\_

EMAIL: \_\_\_\_\_ (Please supply phone # and email address of each registrant)

Course Title:

Date of Course:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

Payment should accompany enrollment form. Full Members, Associate Members and Municipal Members can elect to be invoiced.  Please invoice to: \_\_\_\_\_

Make checks payable to the Energy Council of the Northeast, or charge as indicated below.

Visa  MasterCard  American Express

Name on Card: \_\_\_\_\_

Number: \_\_\_\_\_ Exp. Date: \_\_\_\_\_



**Return by fax to (603) 437-2855 or by mail to:**

Energy Council of the Northeast P. O. Box 1029 Windham, NH 03087

Seating is limited. Registrations are accepted on a first-requested, first honored basis.

**Please call the ECNE office at (603) 437-2577 to confidentially discuss any special needs (dietary or physical) that you may have.**

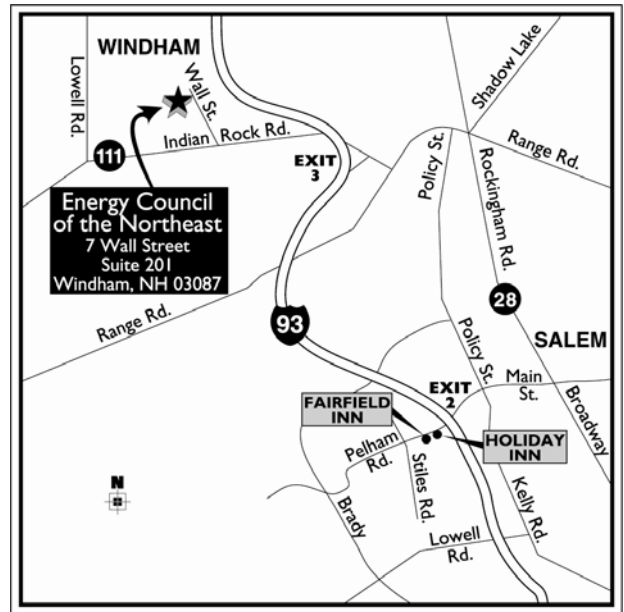
**From Vermont:** I-89 or I-91 to White River Junction. I-89 South to I-93 South, Exit 3. Left at end of ramp. Right at the light onto Wall Street. (Park & Ride on corner)

**From Maine:** I-95 to Route 495 South to Route 213 West to I-93 North, Exit 3. Left at end of ramp. Right at light onto Wall Street. (Park & Ride on corner)

**From New Hampshire:** I-93 South, Exit 3. Left at end of ramp. Right at light onto Wall Street. (Park & Ride on corner)

**From the South:** I-95 North or Route 495 North to I-93 North to Exit 3. Left at end of ramp, right at light onto Wall Street. (Park & Ride on corner)

**From the West:** I-90 (Massachusetts Turnpike) to Route 495 North to I-93 North. Left at end of ramp. Right at light onto Wall Street. (Park & Ride on corner)



**La Quinta Inn  
(Formerly Fairfield Inn)**  
(603) 893-4722  
Ask for ECNE's corporate rate.

**Nearby Hotels (Exit 2)**

Both hotels are located off of Route 93 at Exit 2 on Keewaydin Drive. Turn left off of ramp (coming from North or South) onto Pelham Road. Turn left onto Keewaydin Drive.

**Holiday Inn**  
(603) 893-5511  
Ask for ECNE's corporate rate.