



brainfiller®

Your International Source for
Electrical Power Training

Design of Electric Power Systems

2 Days

1.6 CEUs



When it comes to designing an electric power system, the NEC® is just the minimum requirement. See not only how to design using the NEC but also how to go beyond the code. When and why do you need to oversize neutrals? How do you perform lighting calculations? Should you use a dry or liquid filled transformer? Why is it better to protect transformers with ANSI thru fault curves? How do you design motor feeder circuits? As part of this class, Jim will show you some of the “tricks of the trade” when it comes to electrical design.

What you **WILL** receive:

- Training manuals containing over 300 pages
- Many design example problems
- Overcurrent protection example problems
- Technical articles
- A better understanding of grounding
- 16 hours of Continuing Education Credit



What you **WILL NOT** receive:

- A commercial to sell you products or equipment
- A sales pitch to sell engineering study services
- A class that is just an overview or teaser

What is so special about Jim Phillips' Power System Class?

Jim is not only one of the most popular and sought after instructors in the industry, he is also directly involved with the development of industry standards and practices. He is a member of the IEEE working group that develops *IEEE Std. 1584tm*, *IEEE Guide for Performing Arc Flash Hazard Calculations*. With a career spanning 30 years and having taught over 2000 training programs to people from all seven continents, Jim draws from his vast experience in the industrial, commercial and utility fields.



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Course Agenda

Design of Electric Power Systems

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DAY ONE

INTRODUCTION

Electrical Safety, Codes and Standards, Economics

TYPES OF SYSTEMS

Radial, Network, Double Ended Substation, Loop System, Maintenance Considerations, Operation Considerations, Key Interlock Systems

VOLTAGE SELECTION

120/240V, 208Y/120V, 480Y/277V, Medium Voltage Selection, Delta vs. Wye Systems, Voltage Drop Calculations

LOAD CALCULATIONS

Lighting and Appliance Loads, Receptacles, Code Calculations, VA per Square ft., Continuous vs. Non-Continuous, Demand Factors, Panel Schedules

CONDUCTORS

Conductor and Conduit Sizing, Insulation Type, Temperature Correction Factors, Neutral and Ground Conductors, Insulation Thermal Capability, Bus Duct

OVERCURRENT PROTECTION

Fuses, Fuse Classifications, Circuit Breakers, Electronic Trip Devices, Ground Fault Protection, Time Current Curves, Operation and Settings of Devices

PANELBOARDS

Power Panels, Lighting and Appliance, Sizing and Ratings, Series Rated vs. Fully Rated Panels

SWITCHBOARDS

Bus Ratings, Breakers, Bus Bracing, AIC, Layout, Series Ratings, Bus Structure, 6 Disconnect Rule

LIGHTING DESIGN

Zonal Cavity Lighting Calculations, Lighting Layout

CASE PROBLEM

Sizing Switchboard Feeders and Overcurrent Protection



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DAY TWO

TRANSFORMERS

Types of Transformers, Characteristics and Specifications, Insulation Temperature Ratings, K Factor, Protection Based on NEC[®] 450, Inrush Current, Transformer Percent Impedance

MOTOR CIRCUITS

Locked Rotor and Overload Protection, Insulation Class / Service Factor, Motor Tables, Sizing of Feeders, Short Circuit Protection

GROUNDING

Grounding Electrode System, Equipment Ground, Conductor Selection, Separately Derived Systems, High Resistance Grounding, Ground, Ground Loops and Power Quality

HAZARDOUS LOCATIONS

Class I, II, and III, Divisions and Groups, Explosion Proof Equipment, Intrinsically Safe Systems, Maximum Experimental Safe Gap (MESG) and Minimum Igniting Current (MIC) Values

LIGHTNING PROTECTION

Concept of Protection, Air Terminals, Conductors, NFPA 780

GENERATORS

Emergency Vs. Standby, Selection of Units, Prime Movers, Gasoline, Gas (LP/Natural), Diesel Driven, Design Factors, Load Characteristics

AUTOMATIC TRANSFER SWITCHES

Size and Ratings, 3 Pole vs. 4 Pole, Protection of the ATS, Short Circuit Withstand Ratings

UNINTERRUPTIBLE POWER SUPPLIES

UPS Operation, Heat Loss, Efficiency, Compatibility with Generators

CASE PROBLEM

Designing a 480V – 208Y/120V Transformer Circuit, Protection and Conductor Selection



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On Site Training Have This Course at Your Location!

Hold this class at your location for a greater savings. For an all inclusive fee you receive the following for each attendee:

What you *WILL* receive:

- Training manuals containing over 300 pages
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- Overcurrent protection example problems
- Technical articles
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**Call Brenda at 800-874-8883 or
e-mail at: brenda@brainfiller.com
for an On-Site Training Proposal!**

**Plan Ahead - Jim's schedule usually
fills up months in advance!**





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Jim Phillips, P.E.

Member of IEEE 1584 *IEEE Guide for Performing Arc Flash Hazard Calculations*

Vice - Chairman of Task Group - *IEEE 1584.1 Guide for the specification of scope and deliverable requirements for an arc-flash hazard calculation.*

Member of IEC 61482-1-2 Determination of arc protection class of material and clothing by using a constrained and directed arc (box test)

Author of the book: *Complete Guide to Arc Flash Hazard Calculation Studies*

Is a regular contributor to Electrical Contractor

Founder of the internationally known website: www.ArcFlashForum.com

For 30 years, Jim has been helping tens of thousands of people around the world understand electrical power systems design, safety, theory and applications. Having taught over 2000 seminars during his career to people from all seven continents (Yes Antarctica is included!), he has developed a reputation for being one of the best trainers and public speakers in the industry.

Jim does not just talk about arc flash and electrical safety - he is part of the development of the arc flash standards! He is also the instructor that has taught other instructors in the industry. Jim is a member of the IEEE 1584 Committee - *IEEE Guide for Performing Arc Flash Hazard Calculations*. He is Vice-Chairman of the IEEE Task Group - IEEE 1584.1 "Guide for the specification of scope and deliverable requirements for an arc-flash hazard calculation study in accordance with IEEE 1584"

Jim literally wrote the book about arc flash studies with his book titled: ***Complete Guide to Arc Flash Hazard Calculation Studies*** available from brainfiller.com and Amazon.com He also wrote "How to Perform an Arc Flash Study in 12 Steps" published by NFPA.

In addition to being a regular contributor to Electrical Contractor Magazine, he was one of the main contributors for the NEC Digest. He has authored many articles published in Europe and is a regular speaker at conferences around the world.

Jim earned a BS Degree in Electrical Engineering from the Ohio State University. His career began with Square D Company's Power System Analysis Group where he was responsible for system studies, power system software development and training at their engineering programs.

Later, Jim was in charge of the studies group of the System Protection Section of Ohio Edison Company. He was part of the adjunct faculty for Stark State College where he taught evening classes in electrical power systems.

Jim is a Registered Professional Engineer, with experience that includes everything from planning transmission systems, to design and analysis of industrial, commercial and utility power systems, cogeneration plant design, expert witness and forensic analysis.

Jim continues to travel the globe typically flying over 150,000 miles a year to work with various U.S. and international standards organizations and speak at many conferences and training events.