



Content
Community
Connection

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5-Day Power System Engineering Course - Power System Analysis and Design, Protection Coordination and Arc Flash Analysis/Study

Course details: <https://www.electricityforum.com/electrical-training/electrical-engineering-courses>

Three Power System Engineering Courses

Power System Analysis and Design - October 5-6, 2020

Electrical Relay Protection And Coordination - October 19-20, 2020

Arc Flash Analysis/Study - October 26, 2020

We offer these three Power System Engineering Courses as a bundle, which Electricity Forum members can purchase as a package.

These courses are designed to help electrical engineers understand electrical power systems as they apply to buildings and complexes that are production-oriented. Electrical Engineering Software will be used by the instructor to solve several example problems.

NOTE: Course Includes FULL Demo Software License.

Course #1 - Power System Analysis And Design

<https://www.electricityforum.com/electrical-training/power-system-analysis-course>

Power System Analysis And Design starts with sound design. A proper functioning electric power distribution system is vital to safety, maintenance, troubleshooting and the efficient operation of a modern industrial plant. The power distribution system includes high voltage utility tie circuit breakers, main transformers, medium voltage switchgear, distribution transformers, motor control centers, electric motors, variable speed drives, etc. This course is designed to address all aspects of industrial power distribution systems, including system planning, equipment selection, specification and application, system grounding, protection and conformity with electrical code requirements, etc. Typical one-line and relaying diagrams will be discussed for various applications.

The Power System Design part of the course Will Teach Students How To:

- Identify And Correct Electrical Problems Related To Over And Undervoltage
- Describe Proper Voltage Requirements To Ensure Appropriate Utilization Of Plant Equipment
- Perform Per-Unit Calculations
- Define Short Circuit Calculations And Methods
- Develop The Procedures For Selecting Medium Voltage NEMA Class E2 Motor Starters

Course #2 - Power System Relay Protection And Coordination

<https://www.electricityforum.com/electrical-training/power-system-protection-training>

The Power System Protection And Coordination section of the course will provide a practical and comprehensive description of the principles and concepts of analysis, application and operation of protection schemes for various power system elements such as feeders, transformers, motors, buses, generators, etc. The Power Systems Coordination course makes extensive use of in-class curve drawing exercises and actual case histories to familiarize trainees with the art of power systems coordination. Selection of time/current characteristics, protection, selectivity and deriving protective device settings consistent with National Electric Code and ANSI Standard requirements are emphasized in this course. This course covers the subject of power system protection from a practical perspective, and includes important functional aspects such as testing and coordination of protection systems. This course is designed for individuals who are involved with industries and utilities which depend on proper system protection for operational efficiency and minimizing damage to equipment.

The Power System Relay Protection And Coordination Engineering Training Course:

- Will Reduce Unnecessary Downtime!
- Provide Recommended Settings For Adjustable Trip Circuit Breakers And Relays.
- Will Increase Coordination (Selectivity) Between Devices.
- Identify Deficiencies In System Protection.
- Will Provide Recommended Solutions To Help Correct Your Problem Areas.
- Reviews And Discussions On The Use Of System Devices With Respect To National Electric Code Requirements, And Appropriate ANSI/IEEE Standards

Course #3 - Arc Flash Analysis/Study - IEEE 1584 Update

<https://www.electricityforum.com/electrical-training/arc-flash-analysis-training>

Our Arc Flash Analysis - Short Circuit Study/Arc Flash Study engineering course will provide students with an in-depth review of fault analysis problems in industrial, commercial

and institutional power systems and provide the means for solving such problems, and discusses the impact of short-circuit fault currents on equipment selection. The course also highlights the differences in the computational approaches recommended in IEEE 1584 and IEC standards. A commercially available software program for performing fault analysis will be used by the presenter to solve example problems.

The **Arc Flash Analysis/Study - IEEE 1584 Update** Training course will analyze all aspects related to the:

- Electrical Power Flow During Normal Operation
- Optimization Of Electrical Power Flow And Sizing
- Electrical Power Flow During Abnormal Operation, As Described Below.
- Transients Status Of The Electric Power System
- Dynamic Loads Behavior And How They Affect The Power System
- Special Investigation Of The Electromagnetic Field
- Harmonics Generated Into The Power System Caused By Switching Or Non-Linear Magnetic Core Saturation
- Special Case Of Resonance Or Traveler Waves In Correlation To The Grounding System

These three Electrical Engineering Courses will demonstrate electrical engineering software Simulation and Calculations engineering course will provide students with an in-depth review of fault analysis problems in industrial, commercial and institutional power systems and provide the means for solving such problems, and discusses the impact of short-circuit fault currents on equipment selection.

WHO SHOULD ATTEND

This Power System Analysis, Protection Coordination and Modeling and Arc Flash Analysis/Study - IEEE 1584 Update course is designed for utility, industrial, commercial and institutional power system electrical engineering personnel, electrical consulting engineers, as well as electrical design engineers, who are responsible for the reliable design, engineering and operation of industrial, commercial and institutional electric power

distribution systems. Plant, facility, and corporate electrical engineers dealing with one or more company distribution systems and consulting and utility engineers dealing with clients' systems. Consultants, architect-engineers will also find this course very beneficial.

STUDENTS RECEIVE

- 100+Page Electrical Protection Handbook
- A **FREE** Digital Magazine Subscription
- **\$100** Coupon toward any future Electricity Forum event (restrictions apply)
- 2.8 CEU Credits and Course Certificate
- Workshop Course Materials in Paper Format
- FREE Arc Flash Software Demo CD

COURSE OUTLINE

Power System Engineering Courses

Course #1 - Power System Analysis And Design Live Online Training Course Outline

DAY ONE

Introduction to Industrial and Commercial Power Systems

- Elements Of Industrial Power Systems
- Typical Industrial Power Systems
- One Line Diagram

System Design Considerations:

- Safety
- Reliability
- Flexibility
- Voltage Considerations

System Planning

- Load Demand & Survey
- Local Generation
- Utility Service & Requirements
- Substation Configuration
- Protection Consideration
- Special Loads

Equipment Selection:

- Substation Transformers
- Switchgears & Circuit Breakers
- Fuses & Fuse Disconnects
- Power Distribution Centers
- Motor Control Centers
- Surge Arresters
- Voltage/Current Transformers
- Relays & Protection Schemes

Power factor considerations

- Power Flow Fundamentals
- Benefits Of PF Improvements
- Voltage Improvement
- Techniques To Improve PF

Application of power system Analysis

- Why A Study?

- Most Common System Studies

DAY TWO

Short Circuit Studies:

- Short Circuit Terminology
- Types Of Short Circuits
- Sources Of Fault Currents
- Database & System Modeling
- Short Circuit Results & Comparison With Equipment Ratings
- Limiting Short Circuit Currents

Coordination of Protective Devices:

- Purpose Of Protection
- Overcurrent Protection
- Ground Fault Protection
- Differential Protection
- Transformer Protection
- Motor Protection, Cable Protection & Bus Protection

Grounding

- Types Of System Grounding
- Selection Of System Grounding
- Impact Of System Grounding
- Equipment Grounding

Power Flow Analysis

- Database And System Modeling
- Voltage Regulation & Voltage Control
- Normal & Emergency Operations

Harmonics in Power Systems

- Harmonic Problems And Solutions
- Sources Of Harmonic Currents And Voltages
- Resonance Conditions
- Effects Of Harmonics
- Harmonic Analysis

Course #2 - Power System Protection and Coordination Training

DAY ONE

Power System Protection

Short Circuit Theory and Analysis

- Effect Of Short Circuit
- Fault Current Sources
- Fault Current Types
- Fault Calculations
- Typical Industrial Power Systems

System Design Considerations:

- Safety
- Reliability
- Flexibility
- Voltage Considerations

Electrical Equipment Ratings:

- Switchgear Rating And Selection Criteria
- Low Voltage Fuse
- Molded Case Circuit Breakers
- Busway
- Conductors

Switchgear Ratings & Selection Criteria:

- Low Voltage Power Circuit Breakers
- Power Fuse
- Load Interrupters
- Medium Voltage Power Circuit Breakers

Transformer Protection

- Objectives In Transformer Protection
- Transformer Primary Protective Device
- Factors Affecting Transformer Protection

Generator Protection

- Short-Circuit Performance
- Generator Protective Device

Conductor and Bus Protection:

- Types Of Conductor Circuits
- Protection Of Cables
- Busway Protection

Motor Protection

- Factors To Consider
- Types Of Protection
- MV Motor Protection

DAY TWO - Power System Protection and Coordination

Overcurrent Coordination

- Effect Of Short Circuit
- Fault Current Sources
- Fault Current Types
- Fault Calculations
- Typical Industrial Power Systems
- **Overcurrent Coordination Fundamentals:**
- Overcurrent Protection General Consideration
- Protection Guidelines

- TCC Plots
- CTIs

Fuse Characteristics:

- Low Voltage Fuses
- Power Fuses
- TCC Curves
- Fuse Coordination Criteria

LV Circuit Breaker Characteristics:

- Molded Case Circuit Breakers (MCCBs)
- Low Voltage Power Circuit Breakers
- TCC Curves
- Coordination Criteria

Time overcurrent relays

- Introduction
- Electromechanical Relays
- Relay Characteristics
- Solid State Relays
- CTIs

Course #3 - Arc Flash Analysis/Study - IEEE 1584 Update

Introduction to Arc Flash

- Arc Blast And Calories
- Arcing Current
- Incident Energy
- Flash Protection Boundary
- Factors Affecting An Arc Flash
- Personal Protective Equipment

An Overview of Fault Current Analysis

- Fault Current Sources
- Short Circuit Current Parameters
- Actual Fault Types
- Balanced Fault Analysis
- Impedance Diagrams
- Fault Current Calculations

Relevant Arc Flash Standards and Their Significance

- CSA Z462
- IEEE Standard 1584
- NESC 410A3

Arc Flash Analysis Process

- Data Collection
- Fault Current Sources
- Fault Current Calculations
- Modes Of Operation

- Arc Duration
- Incident Energy Calculation

Data Collection Process

- How To Improve Outcomes
- Data Collection Activities & Skillsets
- Obstacles In Data Collection
- Required Equipment/Device Information
- Understanding Short-Circuit Ratings

Calculation Methodology

- Protective Device Settings
- Protective Device Responses
- Understanding Time-Current Curves
- Fault Current Vs. Energy Released
- Arc Flash Label

Mitigating Risk of Arc Flash Hazards

- Electrical Equipment Type And Incident Energy
- Arc Flash Level Reduction
- Fuse-Protected Vs. Non-Fuse-Protected Circuit Breakers
- Arc-Resistant Switchgear

Software Application for Arc Flash Analysis

- System Modelling
- Arc Flash Calculation

COURSE TIMETABLE:

All days:

Start: 10:00 a.m. ET

Lunch: 12:00 noon (included with course)

Finish: 4:30 p.m. ET

Contact us Today for a FREE quotation to deliver this course at your company's location.

<https://www.electricityforum.com/onsite-training-rfq>