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# Power System Modeling and Simulation

Course details: <https://electricityforum.com/electrical-training/power-system-modeling-and-simulation>

## COURSE DATES AND TIMES

The Power System Modeling and Simulation 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 none linear magnetic core saturation
- Special case of resonance or traveler waves in correlation to the Grounding System

A severe short circuit fault in your power system can have catastrophic consequences. This makes short circuit study training fundamental. Fault levels vary from system to system, and location to location. Our training will help you to calculate the maximum available short circuit current at various points throughout the system. Calculated values are then used to evaluate the application of protective devices, and to develop circuit breaker trip settings, which is part of a Power System Coordination Study.

The reliability and safety of electric power distribution systems depend on accurate and thorough knowledge of short-circuit fault currents that can be present, and on the ability of protective devices to satisfactorily interrupt these currents. Knowledge of the computational methods of power system analysis is essential to engineers responsible for planning, design, operation, and troubleshooting of distribution systems. Such knowledge is necessary to determine the interrupting requirements of circuit breakers and fuses, the mechanical and thermal requirements of devices exposed to fault currents, and to perform protection and coordination studies. A full and complete understanding of short-circuit fault currents is essential for the proper and safe coordination of power system coordination and arc flash mitigation.

This 12-hour live online instructor-led 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 and IEC standards. A commercially available software program for performing fault analysis will be used by the presenter to solve example problems.

## **COURSE OBJECTIVES:**

Upon completion of this course, the student shall be able to:

- Identify and Correct Electrical Problems Related to Over and Undervoltage.
- Perform Load Flow Calculation and Sizing
- Perform Optimization of the Electrical power Flow
- Sizing of the major Electrical Equipment and Power Cables
- Calculation Of the Electromagnetic Field stressing the insulation
- Grounding Calculation
- Estimate Resonant System and traveling waves on the Power System
- 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.

## **WHO SHOULD ATTEND**

This Power System Modeling and Simulation Training course is suggested for plant electrical engineers who are responsible for the planning, design, operation, and maintenance of power systems and/or selection of equipment used in industrial, commercial and institutional power distribution systems. Consultants, architect-engineers and corporate facility design engineers will also find this course very beneficial.

## **STUDENTS RECEIVE**

- This Course Includes Our Latest Electrical Protection Handbook!! (Value \$20)
- **\$100 Coupon** Toward any Future Electricity Forum Event (Restrictions Apply)
- 1.2 Continuing Education Unit (CEU) Credits (12 Professional Development Hours)
- **FREE** Magazine Subscription (Value \$50.00)
- Course Materials in Paper Format

## **COURSE OUTLINE**

# **Power System Modeling and Simulation Training Program Outline**

## **DAY ONE**

### **Session 1: Introduction to the Simulation & Calculation Software Load Flow Calculation**

- Overview of Software Tools
- Software applicability and limitations
- Understanding the Library major components
- Steady State Simulation
- Power Flow Simulation
- Setting up case study for Power Flow calculation
- Sizing major equipment and calculating voltage drop using Easy Power
- Model Example for a distributed system using Easy Power
- Voltage Optimization Study

### **Session 2: Short Circuit Analysis and Studies**

- Model of the electrical System for short circuit analysis
- Sources of Fault contribution
- Bolted Fault on 3 Phase Systems
- Phase to Ground short circuit versus three phase short circuit
- ANSI versus IEC short circuit study
- Case study of a Short Circuit Analysis for double feed BUS
- Report Generation and results Interpretation

## **DAY TWO**

### **Session 3: Protection Coordination Studies**

- TCC for fuses, breakers and re-closures
- Parameter settings for circuit breakers and over current relay re-closures
- Coordination time intervals
- TCC Coordination between fuses
- TCC Coordination between circuit breakers
- TCC Coordination Fuses and breakers
- TCC Coordination of grounding relays
- Example of a protection coordination for complex system using fuses, breakers and overcurrent re-closers
- Results interpretation and optimization

#### **Session 4: ARC Flash Studies and Software Simulation**

- IEEE 1584 versus NFPA 70E
- Bolted fault versus arcing fault
- Example of an ARC Flash calculation, with different scenarios
- Interpretation of the results of the ARC Flash Calculations
- Active and passive methods of determining ARC Flash mitigation

#### **Session 5: Other Studies and Software Simulations Available**

- Ground Grid Modeling
- Motor Acceleration Studies
- Transient Stability Analysis
- Harmonics Analysis
- Optimal Capacitor Placement
- Switching management
- Optimal Power Flow Analysis
- Reliability studies
- DC Load Flow Calculations
- DC Short circuit Analysis
- DC charger Sizing
- EMTP Electromagnetic Transient Simulations

#### **Session 6: Substation modeling and calculation**

- Performing all available Easy Power simulation and calculations
- Generating Report in support of the electrical design base
- Normal and upnormal operation case study

#### **COURSE TIMETABLE**

##### **Both days:**

start: 8:00 a.m.

coffee break: 10:00 a.m.

lunch: 12:00 noon (included with course)

restart: 1:15 p.m.

finish: 4:30 p.m.

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

<https://electricityforum.com/onsite-requestforquote>