JUPITER PRIME

Consulting • Training • Advisory

جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

Electric Power Systems Design and Modelling Training Course

25 – 29 October 2027
Vienna

Electric Power Systems Design and Modelling Training Course

Ref: 3201_121723 **Date:** 25 – 29 October 2027 **Location:** Vienna **Fees:** 6600 GBP

Electric Power Systems Design and Modelling is a 1-week training course for power system and electrical design engineers in utilities, consultancies and industrial sites, who each assemble a network design study pack of calculated results. Growing loads, new renewable connections and tighter fault levels are changing how networks must be laid out and rated. Jupiter Prime Training delivers Electric Power Systems Design and Modelling for engineers who build the models themselves.

Why Electric Power Systems Design and Modelling Matters Now

Network designers now face three pressures at once. Inverter-based solar and storage connections alter fault contributions and voltage behaviour. Industrial and data centre loads are growing in large steps, pushing feeders and transformers towards their thermal limits. Clients also expect design choices backed by traceable calculations. Networks designed from sound models are rated correctly, start motors without nuisance trips and stay stable through faults; poorly modelled ones lead to undersized switchgear, costly retrofits and unplanned outages.

Who Gains Most from Electric Power Systems Design and Modelling

- Engineers preparing single-line diagrams and equipment schedules
- Consultants producing load flow and short circuit calculations
- Utility engineers modelling feeders for connection requests
- Industrial electrical engineers sizing motors, transformers and standby generation
- Engineers moving from site work into network calculation roles

A consultancy design office or a utility network studies group gains most when several of its engineers attend.

Electric Power Systems Design and Modelling Capabilities

The course moves from drawing a network to calculating it and then choosing between layouts on the basis of results.

- Build a per-unit network model from single-line diagrams and nameplate data — design leads
- Calculate load flow, voltage drop and losses under normal and contingency cases — network planners
- Calculate balanced and unbalanced fault currents to rate switchgear — equipment specifiers
- Design an earthing arrangement within step and touch limits — substation designers
- Test motor starting and transient stability behaviour — industrial site owners
- Specify transformer, cable and generator ratings from study results — procurement and clients

Key Electric Power Systems Design and Modelling Terms

- Per-unit system — Expressing voltages, currents and impedances as fractions of chosen base values.
- Load flow — A steady-state calculation of voltages, power flows and losses for a given load pattern.
- Fault level — The current or apparent power that flows into a short circuit at a given point, used to rate switchgear.
- Sequence networks — Positive, negative and zero sequence circuits used to calculate unbalanced faults such as earth faults.
- Critical clearing time — The longest time a fault can remain before a generator loses synchronism with the network.
- Touch potential — The voltage between earthed metalwork and a person's feet during a fault.

Electric Power Systems Design and Modelling Day by Day

Day 1: Building the Network Model

- Single-Line Diagram Capture — Defining Buses, Feeders and Source Boundaries
- Per-Unit System Conversion — Consistent Impedances Across Voltage Levels
- Equipment Data Libraries — Cable, Transformer and Generator Parameter Choices
- Load Modelling Approaches — Constant Power, Current and Impedance Representation
- Operating Scenario Definition — Peak, Light Load and Contingency Cases

Day 2: Load Flow and Voltage Profiles

- Iterative Load Flow Solution — Converging Large Meshed Networks
- Voltage Drop and Regulation Checks — Selecting Tap Positions and Capacitor Banks
- Reactive Power Balance — Sizing Compensation for Weak Feeders
- Single-Outage Contingency Screening — Identifying Overloaded Lines and Transformers
- Loss Evaluation — Comparing Conductor Sizes and Feeder Configurations

Day 3: Fault Levels and Earthing

- Symmetrical Three-Phase Fault Calculation — Switchgear Breaking Capacity Ratings
- Unbalanced Fault Analysis With Sequence Networks — Earth Fault Current Magnitudes
- Neutral Earthing Arrangements — Solid, Resistance or Reactance Earthing Choice
- Earth Grid Design — Step and Touch Potential Limits for Substations
- Arc Energy Estimation — Working Distance and Clothing Category Decisions

Day 4: Motors, Stability and Equipment Sizing

- Motor Starting Simulation — Voltage Dip Limits and Starter Selection
- Transient Stability Studies — Critical Clearing Time for Generator Faults
- Transformer and Cable Sizing — Thermal Loading and Short-Time Withstand
- Generator and Standby Supply Sizing — Step Load and Reserve Margins
- Protection Grading Inputs From Study Results — Settings Handover to Protection Engineers

Day 5: Practising the Network Design Study Pack

- Model Build for a Mixed Utility and Industrial Network — Applying Day One Methods
- Combined Load Flow and Fault Run — Testing Equipment Ratings Together
- Design Option Comparison — Ring, Radial or Interconnected Feeder Layouts
- Study Assumption Register — Recording Data Sources and Sensitivities
- Network Design Study Pack — Completing Results, Recommendations and Model Files

Applying Electric Power Systems Design and Modelling After the Course

- Rebuild one existing feeder in per-unit form and compare calculated voltage drop with field measurements.
- Run a motor starting check for the largest planned drive and confirm the starter choice with the project lead.

Electric Power Systems Design and Modelling Questions FAQ

What is Electric Power Systems Design and Modelling and why does it matter now?

It is the practice of building network models and running load flow, fault, earthing, motor starting and stability calculations to lay out and rate equipment. It matters now because renewable connections and fast load growth change how networks behave.

Which roles gain most from Electric Power Systems Design and Modelling?

Design engineers, consultants and utility network engineers who prepare calculations for new or extended networks gain most.

How does Electric Power Systems Design and Modelling differ from a protection relaying course?

It concentrates on building the model and calculating flows, fault levels and ratings. A protection relaying course starts where this ends, using fault results to set and coordinate relays.

What do you bring back from Electric Power Systems Design and Modelling?

You bring back a network design study pack with model files, calculation results and layout recommendations.

Electric Power Systems Design and Modelling: The Way Forward

The network design study pack each participant completes first informs a layout or rating choice, such as radial against ring feeders or the breaking capacity of new switchgear. Design leads, clients and protection engineers use it as the shared basis for later work. After its first use, revisit the load and source assumptions, because new connections can shift fault levels faster than drawings are updated.