Electrical Power Generation, Transmission and Utilization Course

7 – 11 March 2027
Johannesburg

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Ref: 975_174309 **Date:** 7 – 11 March 2027 **Location:** Johannesburg **Fees:** 6000 Euro

Overview

Electrical Power Generation, Transmission and Utilization Course is a one-week advanced course for engineers and technical professionals who need an Electrical Power Chain Calculation File. Participants connect three-phase power calculations, power generation, transformers, transmission performance, distribution, electrical machines, power factor, losses, and load utilization. The course resolves gaps between equipment-level calculations and end-to-end system decisions through worked models, balance sheets, and operating cases. Agile Leaders Training Center delivers this electrical power course.

Who Should Attend

- Teams responsible for generation equipment performance and plant electrical systems
- Functions responsible for transmission, distribution, and substation engineering
- Personnel responsible for transformer, motor, generator, and load calculations
- Maintenance groups responsible for electrical losses, voltage performance, and power factor
- Technical project teams responsible for evaluating power-chain design and operating choices

The course assumes participants apply circuit, phasor, and three-phase calculations at work, while it leaves out introductory electrical theory and detailed protection-setting studies.

Departments and Industries

The course applies electrical power calculations across organizations that generate, transfer, distribute, and use electrical energy.

- Generation engineering and plant operations in power and utility organizations
- Transmission, distribution, and substation functions
- Electrical maintenance and energy management in industrial plants
- Facilities engineering in transport, healthcare, and data centers
- Design consulting, contracting, and project assurance

Learning Objectives

By the end of this course, participants will be able to:

- Apply three-phase power and phasor calculation methods
- Analyze generator, transformer, line, and load behavior
- Build generation-to-load power and loss balances
- Evaluate voltage regulation, efficiency, and power factor
- Compare equipment and operating options across the power chain
- Prioritize engineering actions through a calculation file

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Course Agenda

Day 1: Three-Phase Power Calculation Basis

- Phasor Diagram and Complex-Power Calculation Method
- Balanced Three-Phase Voltage and Current Worksheet
- Real, Reactive, and Apparent Power Triangle
- Per-Unit Quantity and Base-Conversion Framework
- Generation-to-Load Energy Boundary Map

Day 2: Generation and Electrical Machines

- Generator Electromechanical Conversion Balance
- Synchronous Machine Equivalent-Circuit Model
- Generator Voltage and Reactive-Power Control Matrix
- Induction Motor Torque, Slip, and Efficiency Calculation
- Machine Rating and Operating-Point Evaluation Sheet

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Day 3: Transformers and Transmission Performance

- Transformer Equivalent-Circuit and Loss Calculation
- Transformer Efficiency and Voltage-Regulation Worksheet
- Short and Medium Transmission-Line Model
- Sending-End and Receiving-End Power Balance
- Transmission Loss and Voltage-Performance Decision Record

Day 4: Distribution and Load Utilization

- Radial Distribution Feeder Voltage-Drop Method
- Demand, Diversity, and Load-Factor Calculation Sheet
- Power-Factor Correction and Capacitor-Sizing Method
- Motor and Facility Load Utilization Profile
- End-to-End Efficiency and Loss-Allocation Dashboard

Day 5: Power Chain Practice and Capstone

- Exercise on Three-Phase Power and Energy Boundaries
- Exercise on Generator and Machine Operating Points
- Exercise on Transformer and Line Performance
- Exercise on Distribution Voltage and Power-Factor Actions
- Capstone Exercise: Electrical Power Chain Calculation File

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Practical Exercises

The course uses suggested activities that connect electrical calculations to equipment and operating decisions.

- Suggested activity: calculate three-phase power from field voltage, current, and power-factor data
- Suggested activity: reconcile generator output with transformer, line, and load losses
- Suggested activity: compare voltage-regulation and power-factor correction options
- Suggested activity: present a power-chain file with assumptions, calculations, findings, and actions

FAQs

Who suits electrical power generation, transmission and utilization, and what does it assume?

Engineers and technical professionals who already use circuit, phasor, and three-phase calculations suit the course. It assumes working electrical knowledge and leaves introductory theory and detailed protection-setting studies outside scope.

How does electrical power generation and utilization differ from basic power-system training?

Electrical power generation and utilization links equipment calculations across the complete power chain. Basic power-system training usually describes components and network structure without the same depth of generator, machine, transformer, line, load, loss, and power-factor calculations.

Why is a generation-to-load power balance useful?

A generation-to-load power balance traces real and reactive power from the source through transformers and lines to receiving loads. It exposes losses, mismatches, voltage impacts, and assumptions that affect efficiency and equipment decisions.

How does power factor affect electrical power utilization?

Power factor changes current for a given real-power demand. Lower power factor can increase current, losses, voltage drop, and equipment loading, while properly evaluated correction can improve network utilization.

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What should an electrical power chain calculation file contain?

An electrical power chain calculation file records source data, bases, equipment models, operating cases, equations, results, checks, assumptions, and recommended actions. Reviewers can trace each decision from generation through transmission and distribution to the load.

Conclusion

Participants take back an Electrical Power Chain Calculation File linking three-phase quantities, machines, transformers, lines, distribution, loads, losses, and power factor. The file changes isolated calculations into an end-to-end engineering record. Teams can update it with operating data and use it to evaluate performance and improvement choices.