

# Engineering Courses

## Synchronous Machine Fundamentals

### Training objectives:

The participants will acquire extensive knowledge of synchronous machines. This will include the design and construction of synchronous machines, the theory of operation, synchronous machine models, the Park's transformation, the per-unit system, steady state and transient operation and control of real and reactive power. Mathematical models based on differential equations that are used in power system simulations are also included.

The class begins with a review of the basic electromagnetic principles that are fundamental to the synchronous machine. This includes Ampere's law and the magnetic circuit concept and Faraday's law for the production of voltage. The machine models are built on coupled circuit theory with attention paid to the leakage reactance of the machine. From these models, first the steady state operation is derived and the reactive capability curve is described. We then proceed to the 3 phase short circuit and unbalanced short circuits.

### The course is intended for:

Engineers and technicians who work for power supply companies and industry who need to know how the synchronous machine interfaces with the system and how the characteristics of the synchronous machine affect the system performance.

### Main features:

- Basic review of magnetic circuits
- Synchronous Machine Equations
- Park's Transformation
- Per Unit System
- Steady State Operation, phasor diagrams, V curves, capability curves, and machine parameters
- Short Circuit behavior, balanced and unbalanced
- Basic Design and Construction Issues

### Recommended prior knowledge:

Basic knowledge of power systems analysis.

**Note: The course is held in English. Class subject to change. Class times are 8-4.**

For more information visit: [www.geenergyconsulting.com](http://www.geenergyconsulting.com)



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