

**POWER AND ELECTRICAL TRAINING**

DC Machine Maintenance and Power Electronics Fundamentals

3 day course

Classroom, online or in-house

Course overview

Power electronics sits behind modern electrical and electromechanical systems, from utility networks and industrial drives through to transportation, renewable generation and infrastructure projects. This course builds a working understanding of power conversion using modern electronic switching devices, with direct application to DC machines and the converter interfaces around them. Delegates review the structure, characteristics and performance of ideal and practical switching devices, then examine the main converter topologies in detail: AC to DC rectifiers, DC to DC switching regulators and DC to AC inverters. Resonant and soft switching conversion are introduced alongside systematic methods for circuit analysis, including waveform evaluation and the calculation of average and RMS values, power, power factor and harmonic content. The programme is built around real case studies, guided exercises and hands on workshops.

What you will learn

- Identify and explain the various types of power conversion system and their industrial applications
- Differentiate ideal from practical power semiconductor switches and analyse their switching characteristics and losses
- Apply analytical techniques to power electronics circuits and calculate power, power factor and harmonic components
- Explain the operation of rectifier, phase controlled and force commutated converter circuits
- Analyse Buck, Boost and Buck Boost DC to DC converters in continuous and discontinuous conduction modes
- Explain the operation of DC to AC inverter systems and apply pulse width modulation techniques
- Evaluate the advantages and limitations of soft switching topologies, including Zero Current and Zero Voltage Switching

Who should attend

- Electrical, electronics, control and instrumentation engineers and technicians
- Maintenance and operations personnel
- Power system and industrial plant engineers
- Technical supervisors and engineering managers working with power conversion systems
- Anyone responsible for operating, maintaining or troubleshooting interconnected power systems using AC to DC and DC to AC converters

Course outline

- 01** Day 1: power electronic systems, classification of power processors and converters, symbols and conventions
- 02** Day 1: power semiconductor switching devices, switching characteristics and losses, drive and snubber circuits
- 03** Day 1: line frequency and phase controlled rectifiers, inrush currents, harmonics and power factor
- 04** Day 2: DC to DC switch mode converters covering Buck, Boost, Buck Boost, Cuk and full bridge topologies
- 05** Day 2: DC to AC inverters, single phase and three phase, pulse width modulation and blanking time effects
- 06** Day 2: resonant and soft switching converters, switching power supplies and uninterruptible power supplies
- 07** Day 3: DC motor drives, adjustable speed drives and DC servo applications
- 08** Day 3: AC motor drives, variable frequency drives, soft starters and synchronous motor drives
- 09** Day 3: utility applications including HVDC transmission, static VAR compensators and renewable integration
- 10** Day 3: power quality, harmonic mitigation, active power filters and electromagnetic interference standards

Upcoming dates



Dates	Venue	Format	Fee per delegate
5 to 7 October 2026	Lagos, Nigeria	Classroom	USD 995
26 to 28 October 2026	Durban, South Africa	Classroom	R14,950
18 to 20 November 2026	Gaborone, Botswana	Classroom	R14,950
14 to 16 December 2026	Online	Online	R6,500

Fees and how to register

This 3 day course is **R6,500** per delegate online, **R14,950** in the classroom in South Africa, Botswana, Namibia, Lesotho and Eswatini, and **USD 995** in the classroom elsewhere in Africa. In-house training is quotation on request. Book 2 or more delegates on this course and save 10%.

To register or request an in-house proposal, visit www.afrisciencegroup.com, email info@afriScience.co.za, or WhatsApp us on **+27 63 479 1136**.

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