



Certificate in  
**BEST PRACTICE IN  
ELECTRICAL ENGINEERING**  
IN MINING, BUILDING, INDUSTRY AND UTILITIES



**12 MODULES OVER 3 MONTHS**  
**COMMENCEMENT DATE:** 15 June 2010



Don't miss this great training opportunity  
presented by leading electrical engineers.

**SESSIONS WILL COVER THE FOLLOWING KEY AREAS:**

- Understanding Electrical Drawings
- Electrical Power Distribution Fundamentals
- Circuit Breakers and Switchgear
- Power Cables
- Earthing and Lighting Surge Protection
- Power System Protection
- Electrical Safety and Wiring Regulations
- Testing, Troubleshooting and Maintenance of Electrical Engineering
- Energy Use and Efficiency

Presented by  
**George  
Marx**

Pr Eng, B Sc (Eng)  
Senior Engineer



**WHY SHOULD YOU ATTEND?**

- Gain skills and know-how in the latest technologies in electrical engineering
- Gain a clear picture of the latest developments and future directions in electrical engineering from experts in the field
- Learn how to make reliable, well grounded and commercially viable technical, financial and management decisions in electrical engineering.
- Learn how successful electrical engineers communicate their vision and values to build up a super effective team.

**ENROL NOW:** Fax the enrolment form to us,  
or email [enquiries@eit.edu.au](mailto:enquiries@eit.edu.au)

# BENEFITS OF E-LEARNING

- Upgrade your skills and refresh your knowledge without having to take valuable time away from work
- Receive information and materials in small, easy to digest sections
- Learn while you travel - all you need is an Internet connection
- Have constant support from your course instructor and coordinator for the duration of the course
- Interact and network with participants from around the globe and gain valuable insight into international practice
- Receive a certificate of completion for CPD purposes

## PRESENTATION FORMAT

The certificate program is conducted by E-Learning, and features real-world applications using a multi-pronged approach involving self-study, interactive on-line webinars and homework assignments with a mentor on call.

The course consists of 12 modules over a period of 3 months. All modules involve a practical component or group activity. For each module there will be an initial reading assignment along with course work or problems to be handed in. Participants will have ongoing support from their instructor via phone, fax and e-mail.

Course reading material will be delivered in electronic (PDF) format in advance of on-line presentations. Presentations and group discussions will be conducted using a live interactive software system. Assignments will be submitted via e-mail.

You will receive 4 technical manuals in hard copy upon completion.

## LIVE WEBINARS

During the program you will participate in 6 live interactive sessions with the instructor and other participants from around the world.

Each webinar will be scheduled at 2 varying times, so you can select one that is most convenient for you. All you need to participate is an adequate Internet connection and a headset with a microphone.

The software package and setup details will be sent to you prior to the course. Session times to be confirmed upon registration.

## PRESENTED BY GEORGE MARX

Pr Eng, B Sc (Eng) Senior Engineer



With over 25 years experience since earning his electrical engineering degree, George commenced in Power System Protection and then migrated to EMC and Power Systems. George's portfolio of achievements includes EMC design of Power Systems, Switch Mode Power Supplies, UPS and high precision Servo Amplifiers for high reliability military applications. Other projects he has engaged in include: Battery and Inverter Design for industrial systems, such as solar panel applications, vehicle management, specialised computer systems and high current starter for vehicle plants. Video systems for UAV's and the design of a high resolution IR Camera for industrial and military application.

George has developed and presented several courses for Technikon SA (now UNISA) and has founded an IT company which specialize in Wireless Internet and networks – ICT consultation.

When George takes a break from his hectic schedule of electrical engineering design, he enjoys wildlife photography, and outdoor activities in the african bush.

An experienced and enthusiastic instructor and professional engineer, with a wealth of knowledge under his belt, you will gain much from his practical approach and entertaining style.

## 12 MODULES OVER 3 MONTHS

### OVERVIEW

The course delivers a critical blend of knowledge and skills, covering technology in electrical engineering, industry analysis and forecasts, leadership, management and everything that is relevant to a modern electrical engineer. You will not only hear from outstanding experts in each of the key areas but undertake practical sessions and exercises.

This course is not intended as a substitute for a 4 or 5 year engineering degree or diploma, or for an accomplished and experienced professional electrical engineer who is working at the leading edge of electrical practice in these varied fields. It is however, intended to be the distillation of the key skills and know-how in practical, state-of-the-art electrical engineering.

### CASE STUDY - INDUSTRIAL PLANT

This unique case study is a common thread throughout the course and provides a practical method of learning. Delegates will have the opportunity to test ideas and make decisions based on the materials studied. The case study involves the study of a hypothetical Industrial Plant using simulation software. The delegates will use this software to apply what they have learnt through a virtual system in order to determine details of a specific plant unit and develop troubleshooting techniques. The case study is exciting, intense, useful and fun.

### WHO SHOULD ATTEND

This course is designed for people from an electrical background. It has been developed for those whose time is limited and who work in a critical role or situations where a lengthy time away for study is impossible.

- Electrical Engineers and Technicians
- Project Engineers
- Instrumentation and Design Engineers
- Electrical Technicians
- Field Technicians
- Maintenance Engineers and Supervisors
- Energy Management Consultants
- Automation and Process Engineers
- Project and Production Managers
- Consulting Engineers
- Chemical and Mechanical Engineers
- Graduate Engineers

### FREE REFERENCE MANUALS

VALUED AT OVER US\$400

(RECEIVED UPON COMPLETION)

Not only do you take away detailed notes for all the modules covered but you will also receive a comprehensive collection of four electrical manuals covering such subjects as:

- Safe Operation & Maintenance of Circuit Breakers and Switchgear
- Practical Power Distribution
- Practical Power System Protection for Engineers and Technicians
- Practical High Voltage Safety Operating Procedures



# COURSE OUTLINE

## MODULE 1

### SETTING THE SCENE

- Issues, timing, instructors and protocols to be followed during the exercises. Participants will be introduced to each other and their assigned team.

### UNDERSTANDING ELECTRICAL DRAWINGS

- Engineering drawing for electrical engineers
- Symbols used in electro technology and governing standards
- Single line and 3-line diagrams
- Cabling and wiring drawings
- Layout drawings
- Advances arising from computer aided drafting (CAD)

## MODULE 2

### ELECTRICAL POWER DISTRIBUTION FUNDAMENTALS

- Common distribution system alternatives
- Planning of power distribution system
- Fault level in electrical systems and their role in the choice of equipment
- Fault current evaluation of simple power distribution systems
- In-plant generation requirements and alternatives
- Distribution equipment sizing
- Power distribution system automation
- Maintenance and asset management in distribution systems

## MODULE 3

### CIRCUIT BREAKERS AND SWITCHGEAR

- Circuit breaker basics
- Difference between isolator and circuit breaker
- Principle of arc quenching
- Major components
- Enclosures for indoor use and IP ratings
- HV circuit breakers
- Common types of HV circuit breakers (inc SF6)
- Outdoor construction examples
- Operating principles of different type of CBs
- Maintenance aspects of HV circuit breakers
- LV circuit breakers
- Common types of LV circuit breakers (ACB, MCCB, Motor CB and Miniature CB)
- Selection of circuit breakers and switchgear, their ratings and specifications

## MODULE 4

### POWER CABLES

- Introduction
- Basic theory
- Selection of cables and installation
- Joints and termination
- Jointing and termination practice
- Commissioning and periodic testing
- Failure modes and fault detection
- New trends in cable technology

## MODULE 5

### EARTHING AND LIGHTING SURGE PROTECTION

- Electrical system earthing
- Earth electrode systems
- Earthing design of substations
- Lightning and protection against lightning
- Lightning protection of structures, electrical lines and substations

- Lightning protection of marine electrical systems
- Surge protection
- Electrical noise and mitigation-role of earthing

## MODULE 6

### POWER SYSTEM PROTECTION

- Need for protection
- Fuses
- Instrument transformers
- Tripping power source
- Relays and relay coordination
- Principles of unit protection
- Switchgear (busbar) protection
- Transformer protection
- Motor protection relays
- Generator protection

## MODULE 7

### ELECTRICAL SAFETY AND WIRING REGULATIONS

- An Introduction to Electrical Safety, National Wiring Regulations e.g., AS/NZ 3000
- Role of protective earthing in electrical safety
- Hazards due to electrical arcing and heating
- Safety aspect in electrical design and selection
- Safe operation and maintenance
- Substation safety

## MODULE 8

### TESTING, COMMISSIONING, TROUBLE SHOOTING AND MAINTENANCE OF ELECTRICAL ENGINEERING

- Fundamentals of testing
- Insulation testing
- High potential tests
- Oil testing
- TAN Delta testing
- Partial Discharge (PD) testing
- Impulse testing
- Transformer testing
- Cable testing

## MODULE 9

### ENERGY USE AND EFFICIENCY

- What is energy efficiency?
- Alternative energy sources
- Electrical energy generation/usage
- Energy efficient practices in electricity use
- Energy cost structures
- Introduction to energy audits

## MODULE 10

### PROJECT MANAGEMENT OF ELECTRICAL PROJECTS

- Fundamentals of project management
- Time management
- Cost management
- Integrated cost and time management
- Management of the project team
- Risk management

### CONTRACT LAW

- Elements of contracts
- Performance and breaches of contracts
- Time extensions and liquidated damages

### PREPARATION FOR PRESENTATIONS

Each team will prepare for the presentations. The instructors will spend time with each group to ensure that their materials are presented as effectively and practically as possible

## MODULE 11

### BUDGETING AND FINANCE OF ELECTRICAL PROJECTS

- Introduction
- Basic accounting concepts
- Budget preparation and control
- Estimation and costing
- Time value of money and discount rates
  - DCF, NPV and IRR
- Capital budgeting

## MODULE 12

### DELEGATE PRESENTATIONS

Throughout the technical modules, participants operating in small teams, complete a series of exercises based on constructing a new plant. Time will be set aside to collate the exercises into a presentation. During this session, each team will present its plans to the other teams.

### REVIEW OF EXERCISES AND CASE STUDY

A review will be made on the exercises and submissions and builds on previous sessions. The instructors will participate here.

## HARDWARE AND SOFTWARE REQUIREMENTS

All you need to participate is an adequate Internet connection, PC, speakers and a microphone. The software package and setup details will be sent to you on the commencement date of the course.

## CERTIFICATION

Participants completing all the assignments, and achieving 60% or more for their final mark, will receive the Engineering Institute of Technology Certificate in Best Practice in Electrical Engineering in Mining, Building, Industry and Utilities



## ON-SITE TRAINING

All courses are available on an on-site basis, presented at the venue of your choice, saving delegates travel time and expenses, thus providing your company with even greater savings.

For more information or a **FREE detailed proposal** contact: [enquiries@eit.edu.au](mailto:enquiries@eit.edu.au)