



# Aston CPD Centre

BIRMINGHAM

**Six Module Distance  
Learning Course in  
Electricity Distribution**

## Aims and Objectives

This unique six module *Electricity Distribution* course is designed to develop theoretical knowledge of electrical engineering obtained at college or university to an understanding of the practicalities of modern power distribution and the commercial, legal and technical factors that underpin them. Because they are distance learning, study may be commenced at any time. Written by a consultant engineer with extensive experience both in the UK and overseas, they provide thorough and detailed coverage of heavy current technology at distribution voltages up to 132kV. Modules are extensively illustrated in colour with photographs and diagrams. Assignments include design studies based upon typical new business and network reinforcement projects.

## Study of Individual Modules

Any single module of the *Electricity Distribution* course may be studied in isolation by students interested in a particular subject area. However where a student intends to try a single module of the course before deciding to proceed further we strongly recommend starting at Module 1 *Network Design*.

## Timescale

Six weeks are allowed for each module including preparation and submission of the assignment. Completion therefore requires a total of 36 weeks or 7 months of study time. Aston CPD may allow further time on application and in exceptional circumstances, however there is an absolute time limit of 12 months.

## Delivery of Modules and Return of Assignments

Modules are supplied digitally in .pdf format as e mail attachments. A supplementary copy of the course or module can also be dispatched on CD-ROM to the student's home or company address on request. Colour printed material can be supplied on application although this will incur an additional charge. Students should be aware that although teaching material sent to overseas addresses is always by air mail, delays of up to two weeks can be expected. Assignments should be sent to Aston CPD administration or to the tutor as e mail attachments in .pdf, .doc or .docx format.

## Student Support

The course tutor will reply to student's e-mailed questions within 24 hours of receipt including weekends. Student's assignments will be scored and the design exercises will be constructively criticised. Modules are all supported by PowerPoint presentations and module 1 of the course is accompanied by a mathematical primer.

## Module 3 Substitution

Students who have no vocational interest in overhead lines but who have completed modules 1 and 2 may substitute either of our standalone courses *Substation Design, Earthing and Bonding* or *Power Transformers and Tapchangers* for module 3 *Overhead Lines* at no extra cost (normally these courses incur an extra fee). Students wishing to exercise this option must inform CPD administration on completion of module 2.

## Award of Certificate

Students taking single modules of the *Electricity Distribution* course will be awarded a **Course Completion Certificate**. All six modules must be completed for the award of the **Certificate of Competence in Electricity Distribution**.

## Course Tutor

The course tutor enjoyed a long career in a large UK electricity utility, where he obtained experience at all levels from junior operational engineer through to senior manager.

Over the last ten years he has worked as a consultant in the UK, overseas, in utilities and process industries including major oil refineries.



## Content - Electricity Distribution Course

**Module 1 Network Design** - Historic perspective, Energy loss and voltage regulation, Optimisation of conductor cross sectional area, Kelvin's law, Transmission and distribution voltages, Network development for new business, Network reinforcement, Radial and ring circuits, Distribution in urban areas, Distribution in rural areas, Industrial networks, Supply to large commercial developments, LV network design overhead, LV network design underground, Arrangement of HV switchgear, LV cable selection and volt drop, Distribution substation location, Substation mutual support, LV earthing systems. Supported by two PowerPoint presentations and a mathematics primer.

**Module 2 Power Cables** - Early cables, Cable electrical basics, Capacitance, Skin effect, Early twentieth century LV cables, Early twentieth century HV cables, Electric insulation versus thermal insulation, Screened and belted designs, Oil and gas filled designs, Polymeric and elastomeric insulated and jacketed low voltage cables, Service cables, Polymeric and elastomeric insulated and jacketed high voltage cables, Cable current rating, Thermal resistivity, Single versus three core cable, Special bonding, Selection of cable route, Cable fault finding, bridge and pulse methods. Supported by a PowerPoint presentation.

**Module 3 Overhead Lines** - Advantages and disadvantages of overhead line versus cable, Types of support single and H, Earthed and unearthed construction, Mechanical design of overhead lines, Life factors, Stays, Foundations, Soil mechanics, Crossarm design, Conductor separation, Wind induced oscillation, Conductor vibration, Conductor characteristics, SCA conductors, Gap conductors, Connectors, Conductor current rating, Sag and tension, Wind and ice loading, Change of state equation, Route selection, Ground and structure clearances, Sag templates, Survey and profiling, Insulators, Insulator grading, Effects of lightning and protection. Supported by a PowerPoint presentation.

**Module 4 HV Switchgear** - The role of HV switchgear in networks, Switch fuses, Current interruption in circuit breakers, Current interruption by mineral oil, in vacuum and in SF<sub>6</sub>, Puffer type SF<sub>6</sub> circuit breakers, Vacuum in SF<sub>6</sub> circuit breakers, Ring Main Units, Symmetrical and asymmetrical conditions, Switchgear ratings, Locking and interlocking devices, Testing for internal arc fault, Withdrawable and fixed pattern switchgear, Switchgear ancillaries, Measurement CTs & VTs, Cable terminations, Bay controllers, Switchgear specification for purchase, Switchgear testing. Supported by a PowerPoint presentation.

**Module 5 System Protection** - Electromagnetic and microprocessor protection relays, Overcurrent and earth fault protection, Short circuit calculation, Relay time/current curves, Time, current and IDMT based systems, Fuses, Pilot wire protection, Unit protection, Buchholz relays, Discrimination, Intertripping, Auto reclosing of overhead lines, Protection of LV systems. Supported by a PowerPoint presentation.

**Module 6 System Operation** - Safety Rules, Operative training & competence, Safety documentation Permit to Work and Sanction for Test, Points of Isolation, Circuit earthing, Safety locking & safety notices, Key interchange schemes, Operational procedures, Switching schedules, Reliability of supply, Reliability improvement schemes, Voltage control and regulation. Supported by a PowerPoint presentation.

## CPD Hours

Each module and completed assignment is valued at 35 hours of CPD the whole course is therefore 210 hours of CPD.

## Contact Address and Telephone Numbers

Aston CPD Centre, Aston House, 6 Greville Drive, Edgbaston, Birmingham B15 2UU. For technical enquiries: Dr. M. Sadeghzadeh 0778894 7658 or course tutor Geoff Jackson 01452 840064. For course availability: Andrew Carter 07780 561764 E mail: [enquiries@astoncpdcentre.co.uk](mailto:enquiries@astoncpdcentre.co.uk) Website & Mailing Subscription <http://www.astoncpdcentre.co.uk>



## BOOKING FORM

Student name.....

Address (Company address if company sponsored).....

Postcode (UK only).....

Tel. No:..... Fax. No:.....

E Mail address.....

**Please enrol me onto the following course(s)**

Tick box	Course
<input type="checkbox"/>	Electricity Distribution Module 1 <i>Network Design</i> @ £320 (\$550US)
<input type="checkbox"/>	Electricity Distribution Module 2 <i>Power Cables</i> @ £320 (\$550US)
<input type="checkbox"/>	Electricity Distribution Module 3 <i>Overhead Lines</i> @ £320 (\$550US)
<input type="checkbox"/>	Electricity Distribution Module 4 <i>HV Switchgear</i> @ £320 (\$550US)
<input type="checkbox"/>	Electricity Distribution Module 5 <i>System Protection</i> @ £320 (\$550US)
<input type="checkbox"/>	Electricity Distribution Module 6 <i>System Operation</i> @ £320 (\$550US)
<input type="checkbox"/>	<b>All Six Electricity Distribution Modules at a Discounted Price of £1800 (\$3100US)</b>

When you have completed the form either e mail it back to us or post it. Payment may be made by either a purchase order on Aston CPD or by cheque made out to Aston CPD. On receipt of payment your registration will be confirmed by e mail and your chosen module (or if you have applied for several modules, your first module) will be forwarded as an e mail attachment. **Please note that the course must be completed within 12 months from the date of issue of the first module.**

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