

# Quality of Electrical Supply course



26-27 June 2008 University of Wollongong

A professional development course in power engineering presented by the Integral Energy Power Quality and Reliability Centre, School of Electrical, Computer and Telecommunications Engineering, University of Wollongong.

## Course Objectives

The rapidly increasing installation of electronic equipment such as digital controls, computers and sensitive process control equipment has increased the susceptibility of utility customers to supply disturbances. In addition, the application of power electronic equipment with its higher energy efficiency and more effective control features has in turn often increased the level of disturbances that might affect customer equipment. Utilities are committed to be more customer-focused and to be able to give advice to customers who may have power quality concerns. The Quality of Electrical Supply course will give a practical understanding of the principles, practices and problems associated with supply quality.

This course will cover all power quality problems including voltage sags, harmonics, transients and light flicker. Delegates will learn analysis fundamentals, instrumentation techniques and methods of improving power quality by both network and plant modifications. A feature of the course will be a number of hands-on computer investigations for "what-if" scenarios. Course participants will also be presented with practical case studies of power quality problems and solutions from local industry experts.

## Course Benefits

Following the course you will have gained knowledge and skills to assist you in the following:

- a systematic understanding of the various power quality problems, including the causes of power disturbances and the types of load affected.
- the estimation of the orders of magnitude of problem situations through computer simulation.
- knowledge of the standards for particular types of disturbances and actions if standard limits are exceeded.
- distinguishing the different types of available power quality monitoring equipment and their particular applications.
- knowledge of how utilities and customers can improve their power quality.

## Who Should Attend?

Managers, utility specialists and senior technical staff who wish to advise customers on power quality concerns, or who service large customers or who wish to understand aspects of network design, construction and maintenance techniques for maximising quality of supply. Personnel working in all areas of power system design who wish to know how the system interacts with the end-user will also gain from this course.

## The Venue

The course will be held in the School of Electrical, Computer and Telecommunications Engineering, Building 35, University of Wollongong, Northfields Avenue, Wollongong.

## About the Speakers

**Associate Professor Sarath Perera** is Technical Director of the Integral Energy Power Quality and Reliability Centre and an Associate Professor in the School of Electrical, Computer and Telecommunications Engineering. His research interests include power quality, distribution system reliability, EMC and power system simulation techniques.

**Professor Danny Soetanto** is Professor of Power Engineering in the School of Electrical, Computer and Telecommunications Engineering. His research interests include power electronic applications in industry and electrical transmission and distribution networks.

**Associate Professor Kashem Muttaqi** is an Associate Professor in the School of Electrical, Computer and Telecommunications Engineering. His areas of research cover distributed generation, renewable energy and distribution system automation.

**Dr. Phil Ciufo** is a Senior Lecturer in the School of Electrical, Computer and Telecommunications Engineering. His areas of research include AC machine analysis and control, power system analysis, smart grids and distributed generation.

**Dr. Vic Smith** is a Research Engineer with the Integral Energy Power Quality and Reliability Centre at the University of Wollongong. His research interests include investigation and modelling of power quality phenomena.

**Mr. Sean Elphick** is a Professional Officer with the School of Electrical, Computer and Telecommunications Engineering. He is active in the areas of power quality monitoring and data analysis.

**Dr. Robert Barr** is principal of Electric Power Consulting Pty Ltd and has dealt with a wide range of power quality and general electricity industry problems.

**Dr. Peeter Muttik** is Chief Engineer, Systems with Areva T&D Australia Ltd and has many years experience in a wide variety of electric power projects.

**Mr. Alex Baitch** is principal of BES (Aust) Pty Ltd and has extensive experience in power system engineering and quality of electrical supply.

**Mr. Kam Yang** is Technical Marketing Manager – Pyrotex Wiring Systems with Tyco Thermal Controls and has a wide knowledge of harmonic and EMC effects in cabling systems.

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## Training Investment

The course investment provides for an inclusive industry related training package with course notes, lunches and morning and afternoon tea. Course fee per person is AUD\$1,000 including GST.

## Course Outline

The course is conducted over two days commencing at 8:30 am on Thursday 26 June, 2008 and comprises lectures, computer laboratories and demonstrations:

### Day 1

- Introduction: Overview of power quality issues and their increasing significance, definitions, problems and causes.
- Modelling and Analysis: Review of power system analytical techniques including harmonic calculations.
- Load Behaviour: Typical nonlinear loads (e.g. VSDs, rectifiers, AC phase control, computers, etc.), how they affect power quality and how they are affected by power quality problems.
- Voltage Fluctuations: Causes, effects on loads, measurement and limits, mitigation.
- Transient overvoltages: Types, causes, effects on loads, mitigation, analysis methods.
- Harmonics: Relationship between voltage and current distortion, sequence properties of harmonics, causes of harmonic production, harmonic calculation methods, effects on electrical equipment, mitigation.

### Day 2

- Long duration voltage variation: Effects on connected equipment, voltage regulation and its improvement by capacitors, SVCs, etc, causes of voltage unbalance and its effects.
- Voltage sags and interruptions: Causes, effects, fault & motor starting considerations, customer & network solutions.
- Standards: Philosophy behind standards, voltage fluctuation and harmonic standards from Australia, IEC & IEEE, state codes & regulations.
- Power Quality Monitoring: Power quality instrumentation, surveying practices, data evaluation and power quality indices.
- Case Study No.1: Practical voltage sag problems and their solutions.
- Case Study No.2: Practical harmonic problems and their solutions.
- Case Study No. 3: Wiring and earthing problems which lead to poor power quality.
- Power Quality Demonstrations: Laboratory demonstration of different power quality phenomena and instrumentation.

## Accommodation

Arrangements for accommodation are the responsibility of participants and costs are not included in the course fee. A list of hotels and motels in the Wollongong area will be supplied to participants upon registration.

## Enquiries

Registration enquiries: Please call Ms Esperanza Riley at the School of Electrical, Computer and Telecommunications Engineering, Uni. of Wollongong Ph: 02 4221 3580 Fx: 02 4221 3236 E: eriley@uow.edu.au

Course enquiries: Please call Dr Vic Smith at the Integral Energy Power Quality and Reliability Centre, Uni. of Wollongong Ph: 02 4221 4737 Fx: 02 4221 3236 E: v.smith@elec.uow.edu.au

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# Registration Form

**Please enroll me in the two-day course “Quality of Electrical Supply” to be held in Wollongong, Australia from 26-27 June 2008.**

**Cost per person:** AUD\$1,000 inclusive of GST

**Please register before 16 June 2008**

Surname.....Given Name.....  
Organisation.....Job title/position.....  
Postal Address.....  
State.....Postcode.....Country.....  
Telephone.....Fax.....  
Mobile.....Email.....  
Special dietary requirements.....

**Methods of Payment**

If you wish to pay by **credit card**, please fill out the details below and **fax to +61 2 4221 3236**.

Please debit (circle):    Bankcard        Visa        Mastercard

Card number:

             

Expires:   /      in the amount of

AUD\$.....

Name on card: .....

Signature: .....

Email for receipt: .....

**Cheque payable to “The University of Wollongong”**

**Mail to:**        PQ Course Registration  
                  School of Electrical, Computer and Telecommunications Engineering  
                  University of Wollongong NSW 2522  
                  Australia

**Note:** There is no guarantee that economic participation levels for this course can be achieved. The program may be changed at any time due to unforeseen circumstances. If the course can not proceed for any reason, UOW will not accept liability of whatsoever kind for expenses incurred by any person or corporation with the sole exception of the course investment, which will be refunded in full.

