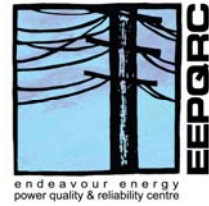


# Quality of Electrical Supply course



5 – 6 July 2012 University of Wollongong

A professional development course in power engineering presented by the Endeavour 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 Endeavour 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.

*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. Duane Robinson* is a Senior Lecturer in the School of Electrical, Computer and Telecommunications Engineering. His areas of research include modelling, analysis and control of power distribution systems, energy efficiency in networks and at point of utilisation, Sustainable building practices, micro grids and distributed generation and power quality and mitigation techniques

*Dr. Ashish Agalgaonkar* is a Lecturer in the School of Electrical, Computer and Telecommunications Engineering. His areas of research include impact of distributed generation on distribution systems, load modeling, system stability and microgrids.

*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.

*Professor David Sweeting* is principal of Sweeting Consulting Services specialising in HV electrical distribution and power quality reviews for distributors and customers.

*Professor 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.

*Professor Peeter Mutik* is Chief Engineer with Alstom Grid and has many years experience in a wide variety of electric power projects.

*Professor Leith Elder* is Senior Engineer Network Research with Essential Energy and has wide experience in dealing with problems of network design and operation, especially in rural areas.

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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\$1,210 including GST.

## Course Outline

The course is conducted over two days commencing at 8:30 am on Thursday 5 July, 2012 and comprises lectures, computer laboratories and demonstrations. Present course outline is:

### Day 1

- **Introduction:** Overview of power quality issues and their increasing significance, definitions, problems and causes.
- **Modelling and Calculations:** 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 Variations & Voltage Unbalance:** 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.
- **Case Studies:** Power quality case studies and solutions given by industry experts.
- **Panel Session:** Open forum for course participants to ask specific power quality questions of industry experts.
- **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.
- **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: Ms Raina Lewis  
School of Electrical, Computer and Telecommunications Engineering  
University of Wollongong  
Ph: 02 4221 3335  
Fax: 02 4221 3236  
Email: Raina\_Lewis@uow.edu.au

Course enquiries: Dr Vic Smith  
Endeavour Energy Power Quality and Reliability Centre  
University of Wollongong  
Ph: 02 4221 4737  
Fax: 02 4221 3236  
Email: v.smith@elec.uow.edu.au

## Registration Form

Please enroll me in the two-day course “Quality of Electrical Supply” to be held in Wollongong, Australia from 5 July – 6 July 2012.

Cost per person: AUD\$1,210 inclusive of GST

Please register before 15 June 2012 (please see Note below).

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. Registrants will be notified on the 18<sup>th</sup> June 2012 if the course cannot proceed due to insufficient numbers. 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.