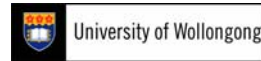


Applied Power Quality: harmonics, unbalance & sags



29-30 November 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. Electricity supply businesses need to have an ongoing awareness of problems and solutions in the power quality area.

This course is an advanced course which builds on the introductory course Quality of Electrical Supply and is designed to expand the coverage of selected power quality topics in order to give participants practical skills in the analysis and mitigation of specific problems. The selected topics for this course are:

- Harmonics
- Voltage unbalance
- Voltage sags and interruptions
- Power electronic mitigation techniques
- Power quality monitoring and reporting

Following the course, participants will be able to:

- calculate distortion levels, evaluate resonance problems, apply the AS/NZS 61000.3.6 Technical Report methodologies and the effectiveness of mitigation methods.
- apply symmetrical component theory to the calculation of unbalance factors, understand the effects of unbalance on various loads and appreciate the essentials of voltage unbalance standards
- determine sag depth at a site depending on fault location or motor start characteristics.
- assess candidates for sag mitigation and determine whether they should be applied within the plant or network.
- understand how power electronic devices can be used to mitigate power quality problems.
- learn a PQ monitoring methodology covering disturbances to be measured, how they should be characterised and reported, and their acceptable levels.

Participants will learn advanced analysis techniques and methods of improving power quality by both network and plant modifications. Course participants will have the opportunity to develop their knowledge and skills through discussion and laboratory sessions.

Who Should Attend?

Utility specialists, consultants, engineers 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.

The course assumes the participants will have an understanding of phasor calculations, simultaneous equations and Fourier analysis.

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

Professor Danny Sutanto 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.

Assoc. Professor Sarath Perera is Technical Director of the Endeavour Energy Power Quality and Reliability Centre and teaches in the School of Electrical, Computer and Telecommunications Engineering. His research interests fall within the general area of power quality.

Emeritus Professor Vic Gosbell is a Technical Advisor to Endeavour Energy Power Quality and Reliability Centre and Emeritus Professor for the School of Electrical, Computer and Telecommunications Engineering. His current research interest is power quality with an emphasis on harmonics, PQ survey measurements and standards.

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

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 Alstom Grid Australia and has wide experience in power systems analysis and design including substations and high power electronics.

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\$1,200 including GST.

Course Outline

The course is conducted over two days commencing at 8:25 am on Thursday 29 November, 2012 and comprises lectures and computer laboratories:

Day 1

- **Harmonics:** Overview of harmonics and Fourier analysis, definitions, estimation of harmonic currents due to load types, effect of system impedance, modelling harmonic loads, resonance effects, standards including AS/NZS 61000.3.6, practical mitigation techniques.
- **Voltage unbalance:** Sequence components, IEEE & IEC standard definitions of unbalance factor, load behaviour, IEC 61000-3-13 Technical Report.
- **Power electronic mitigation techniques:** Application of power electronic systems to the mitigation of voltage problems in distribution systems.

Day 2

- **Voltage sags:** Application of symmetrical components to fault calculations, sag characterisation, sag aggregation, equipment susceptibility, assessing sag distribution, influence of network design, practical mitigation techniques.
- **Power quality monitoring and reporting:** Monitoring imperatives, characterising events, instrumentation, benchmarking practices, site indices.

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 Raina Lewis at the School of Electrical, Computer and Telecommunications Engineering, Uni. of Wollongong Ph: 02 4221 3335 Fx: 02 4221 3236 E: raina_lewis@uow.edu.au

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

Registration Form

Please enrol me in the two-day course "Applied Power Quality: Harmonics, unbalance & sags" to be held in Wollongong, Australia from 29-30 November 2012.

Cost per person: AUD\$1,200 inclusive of GST

Registrations close 12 November 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: Applied 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 14th November 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.