Advanced Quality of Electrical Supply

University of Wollongong
A professional development course in power engineering presented by ESAA in association with the Integral Energy Power Quality 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 assumes an understanding of power quality at a level of the Quality of Electrical Supply course 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:

- Sags, interruptions and swells.
- Transients, EMC and earthing.
- Power quality monitoring.

Following the course, participants will be able to:

- 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 transients are caused, how they propagate and can be controlled.
- Learn a PQ monitoring methodology covering disturbances to be measured, how they should be characterised and reported, and their acceptable levels.

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 Vic Gosbell** is Technical Director of the Integral Energy Power Quality Centre and has been actively engaged in teaching, research and consulting in various aspects of power quality for over twenty years.

**Dr. Sarath Perera** is a Senior Lecturer in the School of Electrical, Computer and Telecommunications Engineering. His research interests include power quality, EMC and power system simulation techniques.

**Dr. Venthanar Ilango** has been active in the School of Electrical, Computer and Telecommunications Engineering for some years in power quality related areas such as transient overvoltages.

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

**Dr. Peeter Muttik** is Chief Engineer ALSTOM T & D Systems and has wide experience in power systems analysis and design including substations and high power electronics. He is Convener of CIGRE Australian Panel 36 (EMC) and the Australian representative on the international CIGRE Committee SC36.

**Mr. Kevin Nuttall** is Network Performance and Quality Manager with ENERGEX, and his main responsibility is the management of processes to deliver customer needs in regard to reliability and power quality.

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

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.
Training Investment
The course investment provides for an inclusive industry related training package with comprehensive course notes, lunches and morning and afternoon tea.

Course Outline
The course is conducted over 3 days and comprises lectures, tutorials, computer laboratories and demonstrations:

Day 1
- **Introduction**: Overview of power quality issues and outline of the course.
- **Power system calculations**: Per unit calculations, system & load modelling.
- **Symmetrical components**: Application of symmetrical components to fault calculations.
- **Simulation techniques and software**: Power system simulation methods and their implementation in computer programs.
- **Sag causes and effects**: System & plant causes, characterisation, sag effects on various types of loads.

Day 2
- **Power conditioning**: Methods and devices for mitigating sags in domestic and commercial situations.
- **Distribution design for sag mitigation**: Designing distribution networks to minimize sags.
- **Factory sag-hardening case study**: Methods for minimizing the effects of sags in industrial situations.
- **Transients causes and propagation**: Causes (lightning, switching surges, capacitor switching), propagation (surge impedance, lattice diagrams, reflections).

Day 3
- **Transients effects and mitigation**: Effects on network and plant equipment, voltage/time characteristics, insulation coordination, optimal use of transient suppression devices.
- **EMC & earthing**: Prevention of EMI in noisy environments.
- **Power quality monitoring**: Reasons for monitoring, characterising events, instrumentation.
- **Power quality survey methodology**: 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 sent to participants upon registration.

Enquiries
Registration enquiries: Please call Margaret Thew at the ESAA Sydney Office Ph: +61 2 9261 0141 fax: +61 2 9261 3153
Course enquiries: Please call Dr Vic Smith at the Integral Energy Power Quality Centre, Uni. of Wollongong Ph: 02 4221 4737 Fx: 02 4221 3236

ESAA actively supports the continuing education requirements of the electricity business through the Short Course Program. Whilst the program strives to reflect the business needs there is no guarantee that economic participation levels can be achieved. This program may be changed at any time due to unforeseen circumstances. If the course cannot proceed for any reason, neither ESAA nor UOW will 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.