

# 2022 Continuing Professional Development Courses



**THE AUSTRALIAN POWER QUALITY & RELIABILITY CENTRE IS OFFERING THE FOLLOWING CONTINUING PROFESSIONAL DEVELOPMENT COURSES IN 2022:**

- **SUBSTATION DESIGN**
  - 6-7 APRIL 2022
- **INTEGRATION OF RENEWABLE & DISTRIBUTED GENERATION**
  - 1-2 JUNE 2022
- **APPLICATION OF THE NER FOR CONNECTION OF RENEWABLE ENERGY**
  - 29-30 JUNE 2022
- **FUNDAMENTALS OF POWER SYSTEMS PROTECTION**
  - 27-28 JULY 2022
- **INTRODUCTION TO POWER SYSTEMS**
  - 4-5 MAY 2022
- **ADVANCED QUALITY OF ELECTRICAL SUPPLY**
  - 24-25 AUGUST 2022
- **BATTERY ENERGY STORAGE**
  - 21-22 SEPTEMBER 2022
- **FUNDAMENTALS OF DISTRIBUTED ENERGY RESOURCES: INTEGRATION, IMPACTS & STANDARDS**
  - 19 OCTOBER 2022
- **APPLICATION OF AUSTRALIAN STANDARDS FOR MANAGEMENT OF HARMONICS, UNBALANCE & FLICKER**
  - 2-3 NOVEMBER 2022



**UNIVERSITY  
OF WOLLONGONG  
AUSTRALIA**

## **CUSTOMISED IN-HOUSE COURSES AVAILABLE**

We can come to you to provide customised courses on a range of topics at your location.

## **ENQUIRIES**

For more information, contact Jo Robson, University of Wollongong.

Email: [pqrc@uow.edu.au](mailto:pqrc@uow.edu.au)



## **INTRODUCTION TO PSCAD**

**23-24 FEBRUARY 2022**

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This course provides an introduction to the use of PSCAD and EMT modelling for the purposes of undertaking power system transient studies. The course has been designed to give participants with little or no experience with PSCAD, the knowledge required to build EMT models of power systems and related components, execute simulations and retrieve results for analysis. After successful completion of the course participants will:

- Have an understanding of EMT modelling, its benefits and uses within the context of the Australian power system
- Be able to navigate the PSCAD user interface and understand project structuring
- Understand how to build EMT models in PSCAD and execute simulations
- Have the ability to generate outputs from the PSCAD workspace for analysis
- Understand the key components of network modelling for the purpose of undertaking power system studies in the time-domain

## **INTRODUCTION TO PQ OF ELECTRICAL SUPPLY**

**9-10 MARCH 2022**

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This introductory course is suitable for all individuals working in the electrical power engineering industry. This includes managers, utility specialists and 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. At the conclusion of the course, participants will have gained the following:

- A systematic understanding of the various power quality disturbances and the types of load affected
- Knowledge of the standards for particular types of disturbances and actions if limits are exceeded
- The ability to distinguish the different types of available power quality monitoring equipment and their particular applications
- Knowledge of how network operators and customers can improve their power quality performance

## **SUBSTATION DESIGN**

**6-7 APRIL 2022**

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Substations are a critical component of the electricity supply network whether it be to connect generators to transmission systems or deliver electricity to end users. This course provides an overview of the substation design process and includes description of the key components of substation design. The course is suitable for all individuals working in the electrical power engineering industry. On completion of the course participants will have gained the following:

- The role and importance of substations in electricity supply systems
- An understanding of the key components of substations
- Knowledge related to substation layout and switching arrangements
- Appreciation of substation secondary systems
- An understanding on maintenance requirements for substation equipment

## **INTEGRATION OF RENEWABLE & DISTRIBUTED GENERATION**

**1-2 JUNE 2022**

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This course has been designed to assist managers, utility specialists and technical staff who wish to advise customers on renewable energy integration or who provide services to large clients. The course will also be useful for those who wish to understand aspects of network design, construction and maintenance techniques for maximising renewable energy penetration. By attending the course, you will gain knowledge and skills to assist you to:

- Appreciate different renewable and distributed generation resources, their operation, and functional aspects
- Gain an understanding of the impact of different renewable and distributed generation resources on electricity networks
- Gain knowledge of guidelines and standards for integration of these new energy resources into electricity grids
- Become aware of the design of interfaces for different types of renewable energy resources

- Have a systematic understanding of the capabilities of battery energy storage systems and how they should be designed
- Understand battery management systems and their importance

## **APPLICATION OF THE NER FOR CONNECTION OF RENEWABLE ENERGY**

**29-30 JUNE 2022**

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The course will cover a number of topics related to the application of the NER and AEMO system strength impact assessments, including modelling techniques, required for the connection of renewable energy generators. Topics to be covered include:

- Preliminary and Full Impact Assessments with real-world indicative examples and simulation outcomes. Course participants will also learn the
- The importance of detailed modelling techniques with a focus on harmonic emissions studies (these being one of the more complex and data-intensive studies required).
- Modelling techniques, data requirements and analysis of results with respect to the ability of a generator to meet their technical performance requirements.

## **FUNDAMENTALS OF POWER SYSTEM PROTECTION**

**27-28 JULY 2022**

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Power system protection is key to the operation of a safe and reliable electricity supply. This introductory course has been developed to provide course participants with an appreciation of the components and operation of power system protection schemes. Topics to be covered in the course include:

- Descriptions of the main types of protection methodologies – e.g. overcurrent, distance, unit
- How protection system grading can be achieved
- Operation of relays and other components of protection systems
- The role and importance of current and voltage transducers (CTs and VTs)
- Operation of reclosers

## **INTRODUCTION TO POWER SYSTEMS**

**4-5 MAY 2022**

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This course provides an introduction to electricity supply basics and is aimed at those transitioning to the electricity supply industry or those looking for a refresher on power systems. Topics to be covered in the course include:

- An overview of the topology of the Australian electricity supply network
- A description of electricity supply system equipment
- Basics of electricity supply system design
- Basics of power system modelling and calculations
- Characteristics of power system loads

## **ADVANCED QUALITY OF ELECTRICAL SUPPLY**

**24-25 AUGUST 2022**

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This advanced power quality course is designed for 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. Following the course, participants will be able to:

- Calculate harmonic distortion levels, apply standards for harmonics and assess the effectiveness of mitigation methods.
- Calculate unbalance factors, understand the effects of unbalance on loads and appreciate unbalance standards
- Determine sag characteristics at a site and assess for sag mitigation strategies
- Understand how power electronic devices can be used to mitigate harmonics, unbalance and sags
- Better understand power quality monitoring methodologies

## BATTERY ENERGY STORAGE

21-22 SEPTEMBER 2022

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This course has been designed to assist any individual who is interested or requires better understanding of the operation and capabilities of battery energy storage systems, their advantages and disadvantages and how they can best be integrated into the electricity networks of the future. By attending the course, you will gain knowledge and skills to assist you to:

- Appreciate different battery energy storage technologies and their relative advantages and disadvantages
- Have a systematic understanding of the capabilities of battery energy storage systems and how they should be designed
- Understand battery management systems and their importance
- Gain knowledge of guidelines and standards for integration of energy storage systems into electricity grids
- Gain a practical understanding of various power quality problems associated with energy storage systems

## FUNDAMENTALS OF DISTRIBUTED ENERGY REOSOURCES: INTEGRATION, IMPACTS & STANDARDS

19 OCTOBER 2022

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Distributed energy resources (DER) are becoming ubiquitous in modern power systems. With increasing levels of DER there are a range of technical and non-technical challenges that must be addressed. This course will provide an overview of the operation and integration of DER into the modern power system. This one day course is not highly technical in nature and is designed for those requiring an appreciation of the implications of increasing levels of DER without the need for detailed understanding. Topics to be covered include:

- The components and operation of DER systems including generators and energy storage
- Advantages and disadvantages of DER
- The impacts of DER on electricity network operation and how these may be mitigated
- The standards that apply to DER equipment and installations

## APPLICATION OF AUSTRALIAN POWER QUALITY STANDARDS

2-3 NOVEMBER 2022

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This course been designed to assist individuals dealing with allocation of power quality emissions and would be of particular interest to engineers or technical officers working for network service providers or proponents connecting large loads or generators, particularly renewable energy generators such as solar and wind farms. The course is best suited to individuals working in the power quality field with some level of background knowledge. At the conclusion of the course participants will:

- Have an understanding of the causes and effects of harmonic distortion, voltage fluctuations and flicker and unbalance and the need to limit their magnitudes in electricity supply networks
- Have an understanding of the current Australian Standards related to power quality and how they work together to maintain acceptable quality of supply
- Understand the challenges in applying the Australian Standards for allocation of harmonic distortions, voltage fluctuation and flicker and unbalance
- Have worked through a number of practical applications calculations and case studies allowing them to confidently apply the concepts and methodologies defined in AS/NZS TR IEC 61000.3.6, AS/NZS TR IEC 61000.3.7 and AS/NZS TR.3.13

## ENQUIRIES

Please email **Jo Robson**  
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[Australian Power Quality and Reliability Centre](http://www.aupqrc.com.au),  
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