



# Unit Outline (Higher Education)

**Institute / School:** Institute of Innovation, Science & Sustainability

**Unit Title:** POWER SYSTEM ANALYSIS

**Unit ID:** ENPG9202

**Credit Points:** 15.00

**Prerequisite(s):** Nil

**Co-requisite(s):** Nil

**Exclusion(s):** (ENGRG3201)

**ASCED:** 031301

**Description of the Unit:**

This unit provides an introduction to power system engineering fundamentals covering methods of power system analysis and design. Students will learn about the modelling of transmission lines for steady-state and transient conditions, balanced and unbalanced power system fault analysis, the basic power quality indices, and power quality analytical techniques.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

**Work Experience:**

No work experience: Student is not undertaking work experience in industry.

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

**Course Level:**

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Learning Outcomes:**
**Knowledge:**

- K1.** Identify the importance of power system control and the behaviour of major types of components used in power systems.
- K2.** Discern the variety of power system component models using the appropriate model and mathematical notation
- K3.** Explain the concept of economic dispatch and the importance and relevance of this in the context of power system analysis.

**Skills:**

- S1.** Assess the performance characteristics, dynamics and stability of power systems.
- S2.** Evaluate complex load flow problems of large power systems with appropriate models of transmission line, transformer, generator and loads.
- S3.** Investigate surge propagation and circuit interruption theories and circuit breaker operation on reliable insulation and protection of electrical networks.

**Application of knowledge and skills:**

- A1.** Investigate different types of faults in power systems.
- A2.** Interpret the different challenges associated with quality in power systems.
- A3.** Apply software tools to simulate and study characteristics and behaviour of power systems.

**Unit Content:**

Topics may include:

- Power system analysis - concepts and representation
- Modelling circuit of power system components including transformers, generators, transmission lines and loads
- Steady-state and dynamic behaviour of power systems
- Network matrices and power flow analysis
- Power system fault calculations
- Surge propagation
- Power system stability and control
- Power system protection principles
- Economic dispatch

**Learning Task and Assessment:**

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1 - K2, S1, S2, A1, A3	Relevant tasks and problems to enforce understanding of the students and help in the gradual development of knowledge and skills throughout the unit. Experimental work and/or projects to verify students' ability to apply knowledge and skills acquired in the unit.	Simulation Lab and presentation	20% - 40%
K1 - K2, S2, A3	Questions and problems related to the materials covered in the unit.	Mid-semester Test	20% - 30%
K3, S1, S3, A2	Conceptual questions and numerical problems related to the materials covered in the unit.	End of Semester Final Test	30% - 50%

**Adopted Reference Style:**

IEEE

Refer to the [library website](#) for more information

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