



Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science, and Sustainability

Unit Title: POWER SYSTEM ANALYSIS

Unit ID: ENGIN3102

Credit Points: 15.00

Prerequisite(s): (ENGIN2104 or ENGIN2404)

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 031301

Description of the Unit:

This course provides an introduction to power system engineering fundamentals covering methods of power system analysis and design. You will be learning 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.

Does Recognition of Prior Learning apply to this Unit? No

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 and submitted all major assessment tasks.

CourseLevel:

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

Graduate Attributes

The Federation University Federation graduate attributes (GA) are entrenched in the [Higher Education Graduate Attributes Policy](#) (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni Courses. Graduate attribute attainment typically follows an incremental development process mapped through Course progression.

One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all attributes must be directly assessed in each Course

Graduate attribute and descriptor		Development and acquisition of GAs in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K3, S1-S3	1,2,3
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	S1, S2, A3	2,3
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	S1-S3	1,2,3
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K3, S3, A2	1,2,3
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	K2, A2	1,2,3

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 course. Experimental work and/or projects to verify students' ability to apply knowledge and skills acquired in the course.	Quiz/Assignment/ Simulation/Workshop/Report	20% - 30%
K1 - K2, S2	Questions and problems related to the materials covered in the course.	Mid-semester Test/On-line Quiz/Class-test	20% - 40%
K3, S1, S3, A2	Conceptual questions and numerical problems related to the materials covered in the course.	End of Semester Final Test	30% - 50%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MiCS Mapping has been undertaken for this Unit No

Date:

Adopted Reference Style:

Other (IEEE)

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

Fed Cite - [referencing tool](#)