

ELEC 3011 POWER AND MACHINES

Credit Points 10

Description This subject develops an understanding of the basic concepts of power and machines, including modern power systems and transformers, in addition to the fundamentals of electromechanical energy conversion. Students engage in practical activities to develop knowledge and skills in magnetic circuits, balanced and unbalanced three-phase power systems, and transformers. These concepts comprise essential knowledge for electrical engineers.

School Eng, Design & Built Env

Student Contribution Band HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 3 subject

Pre-requisite(s) ELEC 2001 OR ELEC 2013

Learning Outcomes

1. Analyse magnetic circuits with and without permanent magnet materials
2. Analyse magnetically coupled circuits.
3. Analyse balanced and unbalanced 3-phase power systems.
4. Apply theoretical knowledge of electrical and magnetic circuits
5. Analyse the construction and performance of 3-phase and single phase transformers at different loads.
6. Evaluate basic concepts of energy conversion.
7. Conduct laboratory experiments in a safe, responsible and professional manner that replicates real-world scenarios

Subject Content

1. Historical Development, Arguments of AC versus DC.
2. Balanced and unbalanced three phase power systems, Single phase and three-phase circuits.
3. General arrangement of a power system, interconnected systems, standard voltage levels.
4. Distribution systems and substations, load characteristics and tariff structure and objectives of system protection and earthing systems.
5. Magnetic circuits with permanent magnets, fundamentals and properties of permanent magnet materials
6. Transformers (Construction, Equivalent circuits, Performance, Losses and efficiency, Voltage regulation and tests of transformers), Determination of equivalent circuit parameters and Three-phase transformers
7. Electromagnetic energy conversion principles; DC and AC machine fundamentals, Practical considerations and design limitations.

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

| Item | Length | Percent | Threshold | Individual/Group Task |
|--------------------|-------------------------|---------|-----------|-----------------------|
| Intra-session Exam | 1.5 hours | 25 | N | Individual |
| 6 x Laboratories | 3 hours (per practical) | 25 | N | Group |
| Final Exam | 2 hours | 50 | N | Individual |

Teaching Periods

Spring Penrith (Kingswood)

Day
Subject Contact

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC3011_22-SPR_KW_D#subjects)

Parramatta - Victoria Rd

Day
Subject Contact

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC3011_22-SPR_PS_D#subjects)

Sydney City Campus - Term 3

Sydney City
Day
Subject Contact

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC3011_22-SC3_SC_D#subjects)