ELEC 4002 POWER ELECTRONICS

Credit Points 10

Legacy Code 300772

Coordinator Jamal Rizk (https://directory.westernsydney.edu.au/search/name/Jamal Rizk/)

Description The subject covers various types of power electronics systems, their applications and use in Electrical Drive Systems. It also covers application considerations and modern developments in electronic systems. This course provides the fundamentals of Power Electronics and Industrial Electronics.

School Eng, Design & Built Env

Discipline Electronic Engineering

Student Contribution Band HECS Band 2 10cp

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

Level Undergraduate Level 4 subject

Pre-requisite(s) ELEC 2010 AND
ELEC 2004

Assumed Knowledge

Basic knowledge of power frequency devices and systems.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Describe various power electronic systems and their requirements.
2. Describe power semiconductor devices characteristics.
3. Describe and analyze various types of: Diodes (uncontrolled) rectifiers AC-DC rectifiers Non-isolated DC-DC converters DC-AC converters (Inverters).
4. Examine the nature and analyze operation of semiconductor power switching devices and configuration for energy conversion purposes.
5. Describe new developments in power electronic system and some of the environmental issues associated with energy conversion systems.

Subject Content

Power Semiconductor Switches
Line-Frequency Diode Rectifiers: Line-Frequency ac Uncontrolled dc
Line-Frequency Phase-Controlled Rectifiers and Inverters: Line-Frequency ac Controlled dc
dc-dc Switch-Mode Converters
Switch-Mode dc-ac Inverters: dc Sinusoidal ac
Resonant Converters: Zero-Voltage and/or Zero-Current Switchings

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.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Practical	Laboratories - 3 hours per week for 6 weeks. Mandatory to pass labs	20	N	Individual	Y
Intra-session Exam	1 hour 30 minutes	20	N	Individual	Y
Final Exam	2 hours	60	N	Individual	Y

Prescribed Texts

- Mohan, N., Undeland, T. and Robbins, W. , Power Electronics: Converters, Applications and Design, 3rd ed., John Wiley, 2003.

Teaching Periods

Autumn (2025)

Penrith (Kingswood)

On-site

Subject Contact Jamal Rizk (https://directory.westernsydney.edu.au/search/name/Jamal Rizk/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC4002_25-AUT_KW_1#subjects)

Parramatta City - Macquarie St

On-site

Subject Contact Jamal Rizk (https://directory.westernsydney.edu.au/search/name/Jamal Rizk/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC4002_25-AUT_PC_1#subjects)

Sydney City Campus - Term 1 (2025)

Sydney City

On-site

Subject Contact Ehsan Gatavi (https://directory.westernsydney.edu.au/search/name/Ehsan Gatavi/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC4002_25-SC1_SC_1#subjects)

Sydney City Campus - Term 3 (2025)

Sydney City

On-site

Subject Contact Ehsan Gatavi (https://directory.westernsydney.edu.au/search/name/Ehsan Gatavi/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC4002_25-SC3_SC_1#subjects)