

# ELEC 2008

## MICROCONTROLLERS AND

## PLCS

**Credit Points** 10

**Legacy Code** 300044

**Coordinator** Karthick Thiagarajan (<https://directory.westernsydney.edu.au/search/name/Karthick Thiagarajan/>)

**Description** Through completion of an applied project students will develop an understanding of the hardware, architecture and the assembly language of microcontrollers in addition to the control of a mechanical system with a programmable logic controller (PLC). The subject looks at the applications of timers, interrupts and serial ports. Furthermore, the general approach in designing a microcontroller in mechanical systems will be studied. Students will use an Omron PLC to control a factory represented by four pneumatic cylinders. After covering the Ladder Logic programming language, they will move on to cover sequential programming and numerical manipulation using PLCs.

**School** Eng, Design & Built Env

**Discipline** Plant and Machine Operations

**Student Contribution Band** HECS Band 2 10cp

Check your fees via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Undergraduate Level 2 subject

**Pre-requisite(s)** ELEC 2004 OR

ELEC 1003 OR

ELEC 1009

**Assumed Knowledge**

Fundamentals of electronics are required.

## Learning Outcomes

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

1. Design small-scale microprocessor controlled mechanical systems.
2. Write software instructions to implement various microcontroller operations.
3. Program a PLC to control a mechanical system.
4. Use Ladder Logic to execute complex logic operations.
5. Use sequential programming and feedback from a mechanical system to control a complex sequence of tasks.
6. Use a PLC to perform numerical manipulation

## Subject Content

1. Basics of number systems and Boolean algebra, hardware architecture of microcontrollers.
2. Assembly languages.
3. Timers, interrupts and their applications in microcontrollers.
4. Procedures of designing microcontroller based systems.
5. Operation of a pneumatic-mechanical system .
6. Ladder logic.
7. Sequential programming.
8. Numerical manipulation with PLCs.

## 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 |
|-----------------|-------------------------------|---------|-----------|------------------------|-----------|
| Applied Project | 50-100 Rungs of Programs      | 40      | N         | Individual             | Y         |
| Practical       | 2 hours per week for 12 weeks | 30      | N         | Group/ Individual      | N         |
| Final Exam      | 2 Hours Open Book             | 30      | N         | Individual             | N         |

Prescribed Texts

Mazidi, MA, McKinlay, RD & Causey, D 2016, *The PIC microcontroller and embedded systems : using Assembly and C for PIC18*, 2nd edn, MicroDigitalEd, Desoto, USA.

Teaching Periods

## Spring (2025)

### Penrith (Kingswood)

**Hybrid**

**Subject Contact** Karthick Thiagarajan (<https://directory.westernsydney.edu.au/search/name/Karthick Thiagarajan/>)

View timetable ([https://classregistration.westernsydney.edu.au/odd/timetable/?subject\\_code=ELEC2008\\_25-SPR\\_KW\\_3#subjects](https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC2008_25-SPR_KW_3#subjects))

## Parramatta City - Macquarie St

**Hybrid**

**Subject Contact** Karthick Thiagarajan (<https://directory.westernsydney.edu.au/search/name/Karthick Thiagarajan/>)

View timetable ([https://classregistration.westernsydney.edu.au/odd/timetable/?subject\\_code=ELEC2008\\_25-SPR\\_PC\\_3#subjects](https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC2008_25-SPR_PC_3#subjects))