

# ELEC 4009 INSTRUMENTATION AND MEASUREMENT

**Credit Points** 10

**Coordinator** Titus Jayarathna ([https://directory.westernsydney.edu.au/search/name/Titus Jayarathna/](https://directory.westernsydney.edu.au/search/name/Titus%20Jayarathna/))

**Description** Through practical exercises students will engage with engineering measurement and instrumentation systems. Students determine the most appropriate measurement method and instrument, such as multimeters, digital oscilloscopes and interfacing modules, for particular applications. They will gain experience with the measurement of physical quantities and the instrumentation required to accurately present information to a controller. Additionally, transducers used to measure common physical quantities are presented in detail, while instrumentation includes a detailed analysis of zero-span circuits, Wheatstone bridges, instrumentation amplifiers, isolation amplifiers, voltage-to-current and voltage-to-frequency modules used for faithful signal transmission, digital-to-analogue and analogue-to-digital circuits to deepen student learning.

**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/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Undergraduate Level 4 subject

**Pre-requisite(s)** ELEC 2001 OR ENGR 2001

## Learning Outcomes

1. Use a variety of transducers to measure physical parameters and estimate the errors involved in making measurements.
2. Integrate theory and practice to the selection of electronic components fit to specs: "fit for the job"
3. Integrate theory and technical competencies to the design and test of electronic instrumentation.
4. Interface a wide variety of transducers/sensors.
5. Utilise A/D and D/A converters in the context of digital control.
6. Utilise embedded systems in the context of digital control.

## Subject Content

1. Estimation of errors in measurements.
2. Transducers, primary & secondary sensors.
3. General measurement systems.
4. Design of Signal Conditioners.
5. Effects of loading in electronic circuits.
6. Noise in measurements.
7. Aspects of grounding practices.
8. A-D/D-A Conversions

## 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
Practical	2 submissions required	30	N	Individual
Applied Project	2 submissions required	40	N	Individual
Practical Exam	2 hours	30	N	Individual

Teaching Periods

## Sydney City Campus - Term 2 (2023)

### Sydney City

#### On-site

**Subject Contact** Titus Jayarathna ([https://directory.westernsydney.edu.au/search/name/Titus Jayarathna/](https://directory.westernsydney.edu.au/search/name/Titus%20Jayarathna/))

View timetable ([https://classregistration.westernsydney.edu.au/odd/timetable/?subject\\_code=ELEC4009\\_23-SC2\\_SC\\_1#subjects](https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC4009_23-SC2_SC_1#subjects))

## Spring (2023)

### Penrith (Kingswood)

#### On-site

**Subject Contact** Titus Jayarathna ([https://directory.westernsydney.edu.au/search/name/Titus Jayarathna/](https://directory.westernsydney.edu.au/search/name/Titus%20Jayarathna/))

View timetable ([https://classregistration.westernsydney.edu.au/odd/timetable/?subject\\_code=ELEC4009\\_23-SPR\\_KW\\_1#subjects](https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC4009_23-SPR_KW_1#subjects))

## Parramatta City - Macquarie St

#### On-site

**Subject Contact** Titus Jayarathna ([https://directory.westernsydney.edu.au/search/name/Titus Jayarathna/](https://directory.westernsydney.edu.au/search/name/Titus%20Jayarathna/))

View timetable ([https://classregistration.westernsydney.edu.au/odd/timetable/?subject\\_code=ELEC4009\\_23-SPR\\_PC\\_1#subjects](https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ELEC4009_23-SPR_PC_1#subjects))

## Sydney City Campus - Term 1 (2024)

### Sydney City

#### On-site

**Subject Contact** Titus Jayarathna ([https://directory.westernsydney.edu.au/search/name/Titus Jayarathna/](https://directory.westernsydney.edu.au/search/name/Titus%20Jayarathna/))

View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=ELEC4009\\_24-SC1\\_SC\\_1#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC4009_24-SC1_SC_1#subjects))

## Spring (2024)

### Penrith (Kingswood)

#### On-site

**Subject Contact** Titus Jayarathna ([https://directory.westernsydney.edu.au/search/name/Titus Jayarathna/](https://directory.westernsydney.edu.au/search/name/Titus%20Jayarathna/))

View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=ELEC4009\\_24-SPR\\_KW\\_1#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC4009_24-SPR_KW_1#subjects))

## **Parramatta City - Macquarie St**

### **On-site**

**Subject Contact** Titus Jayarathna ([https://directory.westernsydney.edu.au/search/name/Titus Jayarathna/](https://directory.westernsydney.edu.au/search/name/Titus%20Jayarathna/))

View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=ELEC4009\\_24-SPR\\_PC\\_1#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC4009_24-SPR_PC_1#subjects))

## **Sydney City Campus - Term 3 (2024)**

### **Sydney City**

#### **On-site**

**Subject Contact** Titus Jayarathna ([https://directory.westernsydney.edu.au/search/name/Titus Jayarathna/](https://directory.westernsydney.edu.au/search/name/Titus%20Jayarathna/))

View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=ELEC4009\\_24-SC3\\_SC\\_1#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ELEC4009_24-SC3_SC_1#subjects))