

# ENGR 4038 BIOMEDICAL ELECTRONICS

**Credit Points** 10

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

**Description** This subject will cover recent advances in biomedical electronics including electronic diagnostic devices, implanted devices, human-computer-interface, bioinstrumentation and neuromorphic engineering. Topics covered span from the bio-electromagnetism and related applications to regulatory aspects (IEC standards and TGA/FDA approval processes) and electrical safety of instrumentation. This subject will have a strong practical design focus with laboratories and tutorials focused on the design of real instrumentation (including manufacturing) dealing with real biomedical signals. This subject uses basic and advanced electronic concepts including circuit simulator(s), embedded systems and requires manual assembly of circuits. Recap and catch-up modules to electronics, signal conditioning, advanced mathematics concepts such as Fourier Transform and their application to electronics as well as circuit simulator training and electronic instruments use training are provided, for students from non Electronic/Electrical background.

**School** Eng, Design & Built Env

**Discipline** Biomedical 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

## Restrictions

Students must have successfully completed 200 credit points

## Assumed Knowledge

Electronic (amplifiers and filters); computer skills; basic programming skills, basic human physiology, advanced mathematic concepts (Differential equation solution, Fourier & Laplace transformation).

## Learning Outcomes

1. Identify and describe medical diagnostic devices and biomedical technologies
2. Assess safety, risks and adherence to Standards of biomedical technologies
3. Apply fundamental principle of bio-electromagnetism to typical biomedical engineering problems
4. Design and test biopotential amplifiers in practical case studies

## Subject Content

1. Introduction to Bioelectronics - The cell and the volume conductor
2. Amplifiers and filters for biomedical signals
3. Interfaces with the 'volume conductor'
4. Electrical safety
5. Biomedical technologies and their Standards

## Special Requirements

Essential equipment

Access to a computer at SCEM computer Labs

Access to specialisation lab (electronic) and/or Lab in Box

## 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	2 submissions required	30	N	Individual	Y
Professional Task	2 submission required	40	N	Individual	Y
Final Exam	2 hours	30	N	Individual	Y

Teaching Periods

## Autumn (2024)

### Penrith (Kingswood)

**On-site**

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View timetable ([https://classregistration.westernsydney.edu.au/even/timetable/?subject\\_code=ENGR4038\\_24-AUT\\_KW\\_1#subjects](https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=ENGR4038_24-AUT_KW_1#subjects))

### Parramatta City - Macquarie St

**On-site**

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## Sydney City Campus - Term 2 (2024)

### Sydney City

**On-site**

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