



Biomedical Electronics

Bachelor of Engineering (Honours) or Bachelor of Engineering

	PLACES	DURATION	WORK PLACEMENT	PROGRAMME DIRECTOR
SE709	16	4 YEARS	YES	Dr Chris Kufazvinei BSc, PhD E: chris.kufazvinei@itcarlow.ie
NFQ LEVEL 8				
SE727	16	3 YEARS	NO	
NFQ LEVEL 7				

What is Biomedical Electronics?

Biomedical electronics involves the application of electronic circuits and technologies for treating medical conditions, monitoring health problems and improving the quality of life for patients.

Major advances have occurred which have led to highly sophisticated medical devices, e.g.:

- Medical implants (cardiac defibrillators, pacemakers, deep brain neuro-stimulators, gastric stimulators, cochlear implants & insulin pumps).
- Medical monitors (ECG, EEG, & blood pressure);
- Diagnostic equipment (ultrasound, MRI, PET, CT, & X-ray);
- Life support (ventilators, incubators, anaesthetic machines);
- Surgical equipment (endoscopy & electrosurgical).

Course Structure

A blended mix of theory classes, practical experiments and laboratory sessions combined with project-based learning (PBL) elements (hands-on) with medical device equipment and software tools.

Is this course for you?

- Learn electronic circuit design, & analysis techniques for medical devices,
- Master problem solving and critical thinking,
- Knowledge of treatment methods of medical conditions & disorders,
- Develop practical abilities in prototyping, design, & teamwork skills.

If you want to work in a high-tech industry that is advancing medical devices for state-of-the-art healthcare, then this is the course for you.

Career Opportunities

Excellent career prospects exist for graduates within the medical devices sector in Ireland and abroad:

- The global medical devices market in 2020 was valued at €390 billion,
- Ireland is one of Europe's largest MedTech hotspots, which is home to 300+ companies that employ over 32,000 people, which is the highest number of MedTech personnel per capita in Europe,
- Exports of medical devices and diagnostic products now represent 8% of Ireland's total merchandise exports, which is worth €12.6 billion in exports annually,
- MedTech companies require a continuous supply of graduates with electronic engineering skills and domain knowledge of the medical devices sector.

Employment roles include:

- Research and development (R&D),
- Design of electronic circuits and systems for medical technologies,
- Advanced manufacturing processes,
- Specialist rehabilitation engineering,
- Wearable and connected health products,
- Clinical medicine & pharmaceutical products,
- Engineering consultancy on biomedical technologies.

Further Studies

Graduates can progress to taught masters (NFQ Level 9) in Master of Science in Medical Device Regulatory Affairs or postgraduate research study at Masters (NFQ Level 9) or Doctorate (NFQ Level 10) level.

What subjects will I study?

YEAR 1 (Level 7 & 8)

Semester 1

Mathematics and Computer Applications 1
Electrical and Electronic Fundamentals
Programming Systems
Physiology and Cell Biology 1

Semester 2

Mathematics and Computer Applications 2
Electrical and Electronic Circuits
Technical Communications
Prototyping
Physiology and Cell Biology 2

YEAR 2 (Level 7 & 8)

Semester 3

Engineering Mathematics 1
Analogue and Digital Electronics 1
System Design and Test
Computer Programming
Fundamentals of Microbiology 1

Semester 4

Engineering Mathematics 2
Analogue and Digital Electronics 2
Embedded Systems 1
Fundamentals of Microbiology 2
Medical Devices and Instrumentation

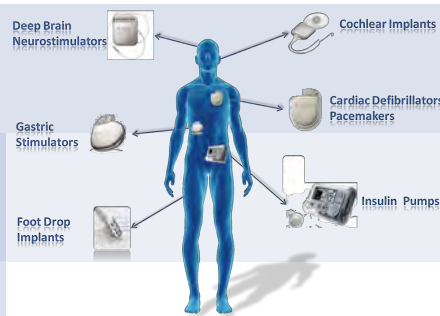
YEAR 3 (Level 7 only)

Semester 5

Engineering Mathematics 3
Embedded Systems 2
Digital Communications
Analysis of Analogue Circuits
Molecular Biology & Immunology 1

Semester 6

Network Automation and Programmability
Development Project
Software Defined Radio
Molecular Biology & Immunology 2
Medical Device Standards and Regulations



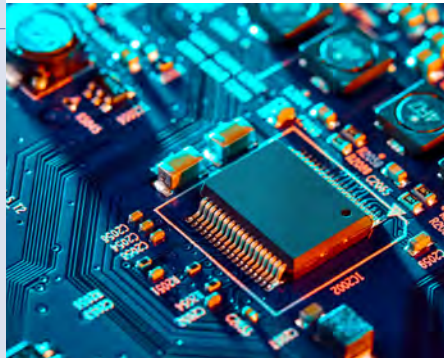
YEAR 3 (Level 8 only)

Semester 5

Engineering Mathematics 3
Embedded Systems 2
Digital Communications
Analysis of Analogue Circuits
Molecular Biology & Immunology 1

Semester 6

Work Placement
Medical Device Standards and Regulations



YEAR 4 (Level 8 only)

Semester 7

Research Project (Capstone Medical Device Project)
Microelectronic Design 1
Hardware Description Language
Signals and Systems 1
Power Electronics for Biomedical Systems

Semester 8

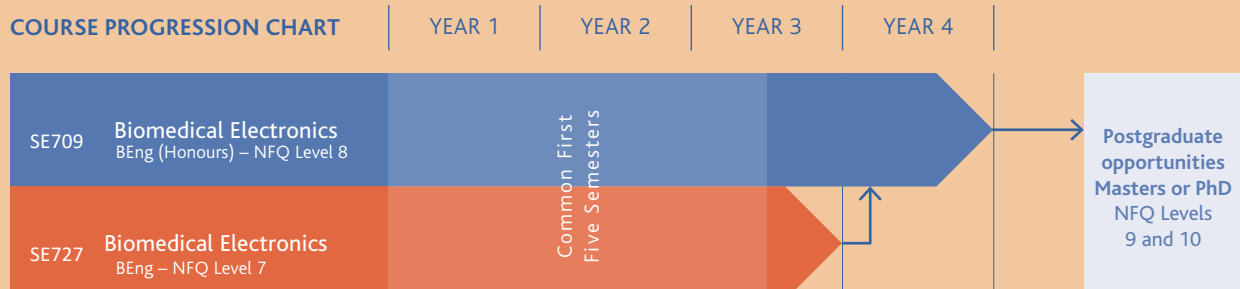
Research Project (Capstone Medical Device Project)
Digital Systems
Signals and Systems 2
Professional Studies
Biomedical Signal Processing



SPECIAL FEATURES

- This course strikes the perfect balance between theory, practical laboratory classes (electronics/biology) and hands-on project-based learning exercises.
- State-of-the-art laboratory equipment and resources on campus as well as computer software, tools & simulation labs, e.g. Proteus, Cadence, Vivado and MATLAB.
- Work placement and project collaboration opportunities exist with leading global medical device companies which are based here in Ireland, examples include Boston Scientific, Medtronic, BD, Stryker, Cook Medical & Abbott.

COURSE PROGRESSION CHART



FOR FURTHER INFORMATION: www.setu.ie