

2024 / 25

School of Science and Computing

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🌐 www.wit.ie/schools/science_computing



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TU**

Ollscoil
Teicneolaíochta
an Oirdheiscirt

South East
Technological
University

Module Descriptor

Introduction to Convergent Technologies (Computing and Mathematics)

Introduction to Convergent Technologies (A29442)

Short Title: Int to Convergent Technologies
Department: Engineering Technology
Credits: 5

Level: Advanced

Description of Module / Aims

This module aims to build on the students undergraduate knowledge and introduce him / her to the state-of-the-art in convergent technologies for advanced bio-medical and electro-mechanical applications. A selection of convergent technologies for advanced bio-medical and electro-mechanical applications and industry roadmaps are presented and examined in the context of their associated regulatory frameworks.

Programmes

stage/semester/status		
TECH-0048	BSc (Hons) in Applied Computing (WD_KACCM_B)	4 / 7 / E
TECH-0048	BSc (Hons) in Applied Computing (WD_KCOMP_B)	4 / 7 / E
TECH-0048	BSc (Hons) in Computer Science (WD_KCMSC_B)	4 / 7 / E
TECH-0048	BSc (Hons) in Physics for Modern Technology (WD_KPHTE_B)	4 / 7 / M
TECH-0048	BSc (Hons) in the Internet of Things (International) (WD_KINTT_BI)	4 / 7 / M

Indicative Content

- Overview of the concept of convergent technologies.
- Review of typical industry driven technology convergence roadmaps.
- Review of key regulatory frameworks and application driven ethical considerations.
- Review of typical bio-mechanical measurement variables.
- System and block level review of available technologies for data handling, signal monitoring and waveform generation in advanced bio-medical and electro-mechanical applications
- Advanced Case Studies (Ex.: structural health monitoring, pulse oximeter, ECG, pacemaker etc.).

Learning Outcomes

On successful completion of this module, a student will be able to:

1. Demonstrate a knowledge and comprehension of the fundamental importance of convergent technologies in the development of advanced bio-medical and electro-mechanical applications.
2. Demonstrate a knowledge and comprehension of basic bio-mechanical measurement variables, signal monitoring / waveform generation and data handling technologies that are commonly employed in advanced bio-medical and electro-mechanical applications.
3. Demonstrate an ability to apply the knowledge and comprehension gained in analysing advanced bio-medical and electro-mechanical applications and able to relate system specifications to implementation technologies.
4. Demonstrate ability to develop system and block level design criteria and partial solutions for selected bio-mechanical applications.
5. Demonstrate an understanding of associated regulatory and ethical considerations.

Learning and Teaching Methods

- Lectures
- Case Studies
- Mini Projects
- Presentations

Learning Modes

Learning Type	F/T Hours	P/T Hours
Lecture	24	
Practical	12	
Independent Learning	99	

Assessment Methods

	Weighting	Outcomes Assessed
Continuous Assessment	100%	
Case Studies	50%	1,2,3,4,5
Assignment	50%	1,2,3,4,5

Assessment Criteria

Essential Material(s)

- "Institute of Electrical and Electronic Engineers." www.ieee.org

Supplementary Material(s)

- Bronzion, J.D. *Medical Devices and Systems*. : CRC Press, 2006.
- Brown, B.H., R.H. Smallwood, D.C. Barber, P.V. Lawford and D.R. Hose. *Medical Physics and Biomedical Engineering*. : Institute of Physics, 1999.
- Chan, A.Y.K. *Biomedical Device Technology: Principles & Design*. : Thomas, 2008.
- Enderle, J., S.M. Blanchard and J. Bronzino. *Introduction to Biomedical Engineering*. : Academic Press, 2005.
- Hobbie, R.K. *Intermediate Physics for Medicine & Biology*. : Springer - Verlag, 1997.
- Khandpu, R. *Bio-Medical Instrumentation: Technology & Applications*. UK: McGraw Hill, 2004.
- Prutchi, D. *Design & Development of Medical Electronic Instrumentation*. UK: Wiley Interscience, 2004.
- Stree, L.J. *Introduction to Biomedical Engineering Technology*. UK: CRC Press, 2007.
- Togawa, T. *Bio-Medical Transducers and Instruments*. UK: CRC Press, 1997.
- Webster, J.G. *Medical Instrumentation Application and Design*. UK: Houghton Wiley, 1999.