



Title:	Biomedical Electronic Systems APPROVED
Long Title:	Biomedical Electronic Systems
Module Code:	INTR7011
Duration:	1 Semester
Credits:	5
NFQ Level:	Intermediate
Field of Study:	Interdisciplinary Engineering
Valid From:	Semester 1 - 2016/17 (September 2016)
Module Delivered in	2 programme(s)
Module Coordinator:	JOSEPH CONNELL
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Module Description:	This module will introduce biomedical students to electronic circuits and systems which are used in biomedical equipment. It will enable them to make informed decisions and choices about electronic sub-systems of biomedical equipment.
Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Describe the principle of operation of electrical power supplies. Explain, analyse and quantify important parameters.
LO2	Implement a circuit using ADCs and/or DACs. Explain, analyse and quantify the important parameters and terms used when dealing with ADCs and DACs.
LO3	Implement a circuit with sensors commonly used in biomedical applications. Specify common methods for interfacing sensors to electronic systems in biomedical applications.
LO4	Explain the architecture of common electrical motors. Explain and quantify the parameters needed to specify a motor for a particular application.
LO5	Describe electrical and electronic systems designed to address safety issues when dealing with patients.
Pre-requisite learning	
Module Recommendations <i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i>	
No recommendations listed	
Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.</i>	
No requirements listed	
Co-requisites	

No Co Requisites listed

Module Content & Assessment

Indicative Content

Electrical power supplies

Theory of operation of power supplies. Commonly used terms and parameters to specify performance.

ADCs and DACs.

Common terminology when using ADCs and DACs. Theory of operation of different converter architectures and how the design affects the choice of converter for a particular application.

Safety

Techniques for guaranteeing patient and user safety when dealing with electrical equipment.

Sensor

Common sensors and how they convert physical quantities to electrical values. Limitations of sensors in accuracy, resolution, range, cost, etc. Circuitry for interfacing sensors to electronic equipment : amplifiers, buffers, filters, etc.

Motors.

Design of electrical motors. Important parameters for specifying performance.

Assessment Breakdown

%

Course Work

100.00%

Course Work

<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Practical/Skills Evaluation	Assessment of practical demonstration of theoretical concepts.	1,2,3,4	25.0	Week 4
Practical/Skills Evaluation	Assessment of practical demonstration of theoretical concepts.	1,2,3,4	25.0	Week 7
Practical/Skills Evaluation	Assessment of practical demonstration of theoretical concepts.	1,2,3,4	25.0	Week 10
Short Answer Questions	Assessment of theoretical concepts.	1,2,3,4	25.0	Sem End

No End of Module Formal Examination

Reassessment Requirement

Repeat examination

Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Theory and calculation.	2.0	Every Week	2.00
Lab	Practical experience of theoretical concepts.	2.0	Every Week	2.00
Independent Learning	Self directed study of course material	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

Workload: Part Time				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Theory and calculation.	1.5	Every Week	1.50
Lab	Practical experience of theoretical concepts.	1.5	Every Week	1.50
Independent Learning	Self directed study of course material	4.0	Every Week	4.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				3.00

Module Resources

Recommended Book Resources

- **Floyd 2011, *Electronic Devices*, 9th Ed. [ISBN: 978-013254986]**
- **Floyd 2013, *Digital Fundamentals*, 10th Ed. [ISBN: 978-129202562]**
- **John G. Webster 2014, *Measurement, Instrumentation, and Sensors Handbook*, 2nd Ed. [ISBN: 978-143984883]**

This module does not have any article/paper resources

This module does not have any other resources

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_EBIME_7	<u>Bachelor of Engineering in Biomedical Engineering</u>	5	Elective
CR_EMECH_7	<u>Bachelor of Engineering in Mechanical Engineering</u>	5	Elective