



<b>Title:</b>	Signal Measurement <b>APPROVED</b>
<b>Long Title:</b>	Signal Measurement
<b>Module Code:</b>	PHYS6050
<b>Duration:</b>	1 Semester
<b>Credits:</b>	5
<b>NFQ Level:</b>	Fundamental
<b>Field of Study:</b>	Physics
<b>Valid From:</b>	Semester 1 - 2019/20 ( September 2019 )
<b>Module Delivered in</b>	<a href="#">3 programme(s)</a>
<b>Module Coordinator:</b>	Donagh OMahony
<b>Module Author:</b>	Stephen Hegarty
<b>Module Description:</b>	This course is intended to introduce the student to the measurement of digital and analogue signals and lay the foundations for further study and applications. The module includes extensive laboratory based practical work to support and apply the lecture material. Emphasis is also placed on simulation tools to enhance understanding and ability to modify.
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Perform measurements with electrical meters.
LO2	Construct and explain the principles of electrical networks relevant to instrumentation.
LO3	Simulate and verify DC and AC electrical signal propagation in instrumentation networks.
LO4	Describe, build and test simple digital circuits.
LO5	Report and interpret electrical measurement results.
<b>Pre-requisite learning</b>	
<b>Module Recommendations</b> <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 MTU 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>	
<b>Incompatible Modules</b> <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	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Requirements</b> <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	

**Module Content & Assessment**

**Indicative Content**

**Electrical Concepts**

Voltage, current and resistance. Resistors in series/parallel. Kirchoff's laws. Loading of sources by meters. Capacitance. Capacitors in series and in parallel. RC circuits; charge and discharge curves, time constants. Inductance

**Introduction to Digital technology**

Analogue and digital signals. Number systems and alphanumeric codes. Boolean algebra, de Morgan's laws. Truth tables, OR, AND, NOR gates. NAND Boolean algebra. Simple combinational and sequential logic circuits. Common logic families and their characteristics.

**AC signals introduction**

Time-varying quantities, period, frequency, peak and rms values. Sine, triangle, square wave modulation.

**Lab program**

Fundamental aim of lab program is to ensure competence in using basic signal measurement • How to connect a voltmeter or ammeter • Use of an oscilloscope for capturing "simple" signals • Measurement of phase differences between signals • Simple signal conditioning (integrator/differentiator) • Construction of representative combinational and sequential logic circuits

**Simulation programme**

• Simple circuit creation • Steady state and transient simulation • Voltage and current extraction from model • AC sweep simulation • Phase extraction from model

**Assessment Breakdown**

	%
Course Work	100.00%

**Course Work**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Short Answer Questions	1 hour written exam	2,4	25.0	Week 6
Practical/Skills Evaluation	Formal lab exam	1,2,3,4,5	25.0	Week 12
Short Answer Questions	1 hour written exam	2,4,5	25.0	Week 13
Written Report	Lab reports	1,2,3,4,5	25.0	Every Week

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**

<b>Workload: Full Time</b>				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Presentation of indicative content	2.0	Every Week	2.00
Lab	Students will apply lecture material	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Lab reports / study of lecture material	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

<b>Workload: Part Time</b>				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Delivery of indicative content	2.0	Every Week	2.00
Lab	Application of lecture material	2.0	Every Second Week	1.00
Independent & Directed Learning (Non-contact)	Lab reports and study of lecture material	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				6.00
Total Weekly Contact Hours				3.00

Module Resources
<i>Recommended Book Resources</i>
• <b>Hugh D Young 2012, <i>University Physics with Modern Physics</i>, 13th edition Ed. [ISBN: 9780321696861]</b>
<i>Supplementary Book Resources</i>
• <b>Thomas L. Floyd 2015, <i>Digital Fundamentals</i>, 11th edition Ed. [ISBN: 9780132737968]</b>
<i>This module does not have any article/paper resources</i>
<i>This module does not have any other resources</i>

**Module Delivered in**

<b>Programme Code</b>	<b>Programme</b>	<b>Semester</b>	<b>Delivery</b>
CR_SINEN_8	<a href="#"><u>Bachelor of Science (Honours) in Instrument Engineering</u></a>	1	Mandatory
CR_SPHYS_7	<a href="#"><u>Bachelor of Science in Applied Physics and Instrumentation</u></a>	1	Mandatory
CR_SPHYS_6	<a href="#"><u>Higher Certificate in Science in Applied Physics and Instrumentation</u></a>	1	Mandatory