



<b>Title:</b>	Process Instrumentation 2 <b>APPROVED</b>
<b>Long Title:</b>	Process Instrumentation 2
<b>Module Code:</b>	PHYS6031
<b>Credits:</b>	5
<b>NFQ Level:</b>	Fundamental
<b>Field of Study:</b>	Physics
<b>Valid From:</b>	Semester 1 - 2011/12 ( September 2011 )
<b>Module Delivered in</b>	<a href="#">3 programme(s)</a>
<b>Module Coordinator:</b>	Donagh OMahony
<b>Module Author:</b>	MARTIN WOODS
<b>Module Description:</b>	This module will discuss knowledge and requirements of instrumentation used in process industries. The module will also cover scientific concepts required to support a comprehensive understanding of instrumentation.
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Describe and explain scientific concepts appropriate to instrumentation.
LO2	Discriminate between and analyse instrumentation for use in specific applications.
LO3	Describe, explain and demonstrate role of calibration in instrumentation.
LO4	Describe and explain the role of validation and compliance with international standards in instrumentation.
<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 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	
<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	
<b>Co-requisites</b>	
No Co Requisites listed	

**Module Content & Assessment**

**Indicative Content**

**Instrument Calibration Protocols and Validation**

The importance and application of correct procedural calibration procedures commonly used in industry design and application of Standard Operating Procedures (SOP's). The importance of validation in modern industry. The FDA's role, in this context, and its interaction with Irish industries. The operation and use of software used in calibration and maintenance control e.g. Compucal. Case studies to include examples of local industrial practice.

**Installation of Instrument Systems**

Installation procedures, industrial switches and cable types, junction box drawings. Loop testing; Plant commissioning; Troubleshooting procedures.

**Level Measurement**

Selection, theory, installation and applications of microwave, radar, nucleonic and ultrasonic instruments for level measurement of liquids and granular solids.

**Flow and Density Measurement**

Flow characteristics and theory; DP cells applied to flow-metering; electromagnetic, turbine, vane, vortex, ultrasonic and coriolis flow meters; cross correlation meters, mass flow measurement for liquids and solids. Measurement of the density of liquids and solids.

**Weighing Systems**

Measurement of strain; Use of strain gauges and load cells and their applications in weighing systems; Importance of meeting the requirements of quality control departments and statutory bodies.

**Temperature Measurement**

Theory, operation and applications of infra-red, total radiation and optical pyrometers; black body calibration and emissivity correction.

**Electro-pneumatic Systems**

Electro-pneumatic actuator systems and applications in manufacturing.

**Signal Response**

First and second order response of instruments: theory, interpretation of graphs and applications.

Assessment Breakdown	%
Course Work	50.00%
End of Module Formal Examination	50.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Short Answer Questions	Assessment 1	1,2,3	15.0	Week 6
Practical/Skills Evaluation	Practical	1,2,4	35.0	Every Week

End of Module Formal Examination				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	End-of-Semester Final Examination	1,2,3,4	50.0	End-of-Semester

Reassessment Requirement
<p><b>Repeat examination</b> 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.</p>

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	No Description	3.0	Every Week	3.00
Lab	No Description	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	No Description	2.0	Every Week	2.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				5.00

**This module has no Part Time workload.**

## Module Resources

### Recommended Book Resources

- N. E. Battikha, 2007, *The Condensed Handbook of Measurement and Control*, 3rd Ed., ISA [ISBN: 1556179952]
- Keith R. Cheate, 2006, *Fundamentals of Test Measurement Instrumentation*, Illustrated Edition Ed., ISA [ISBN: 1556179146]

### Supplementary Book Resources

- Robert N. Bateson, *Introduction to Control System Technology*, Prentice Hall [ISBN: 0-13-226275-4]
- David W. Spitzer 2004, *Industrial Flow Measurement*, 3rd Ed., ISA [ISBN: 1-55617-243-5]

*This module does not have any article/paper resources*

### Other Resources

- Website: *Instrument Society of America*  
<http://www.isa.org>

**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>	4	Mandatory
CR_SPHYS_7	<a href="#"><u>Bachelor of Science in Applied Physics and Instrumentation</u></a>	4	Mandatory
CR_SPHYS_6	<a href="#"><u>Higher Certificate in Science in Applied Physics and Instrumentation</u></a>	4	Mandatory