



Title:	Environmental Instrumentation APPROVED
Long Title:	Environmental Instrumentation
Module Code:	ENVI6002
Duration:	1 Semester
Credits:	5
NFQ Level:	Fundamental
Field of Study:	Environmental Science
Valid From:	Semester 1 - 2019/20 (September 2019)
Module Delivered in	9 programme(s)
Module Coordinator:	Donagh OMahony
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Module Description:	This module provides an introduction to environmental measuring technologies. The module will draw extensively from EPA resources and reports with particular reference to sources and types of pollution arising from industrial facilities, agriculture, transport and energy production.
Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Identify the various sources of pollution that contribute to the potential degradation of the environment with particular reference to industrial and agricultural development in Ireland.
LO2	Use EPA resources and reports to obtain scientific information on environmental issues with particular reference to air quality, water quality and climate change.
LO3	Use in line probes to acquire and analyse data on a variety of water and air quality parameters.
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 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>	
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	

Module Content & Assessment

Indicative Content

Sources of Pollution and IPPC licensing

Pollution: Main sources of contamination in soil, air and water. Introduction to air and water emission monitoring. European legislation, Water framework directive, CAFE Directive.

Water and Air Quality

Groundwater vs surface water. Inline measurement of pH, conductivity, turbidity, DO, TOC, phosphates, nitrates, chlorine etc. Introduction to potable water and wastewater treatment, both industrial and municipal. Ambient air vs stack emissions. Measurement of CO, CO₂, ozone, particulates, SOX and NOX.

Waste and recycling:

Incineration, site remediation, hazardous waste, carbon footprint, introduction to recycling. Air abatement techniques.

Climate Change

Effects such as air temperature, CO₂ levels and ocean acidity. Sources and relative contribution of greenhouse gases. Mitigation strategies.

Assessment Breakdown	%
Course Work	100.00%

Course Work				
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Short Answer Questions	Assessment of lecture material	1,2	30.0	Week 7
Short Answer Questions	Assessment of lecture material	1,2	40.0	Week 13
Practical/Skills Evaluation	Experiment and lab assessment	3	30.0	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

Workload: Full Time				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Course material	2.0	Every Week	2.00
Lab	Experiment and assessment	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Study lecture 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	Course material	1.5	Every Week	1.50
Lab	Experiment and assessment	1.5	Every Week	1.50
Lecturer-Supervised Learning (Contact)	Directed study	1.0	Every Week	1.00
Directed Learning	Study	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

Module Resources

Supplementary Book Resources

- Al Gore 2006, *An Inconvenient Truth*, Bloomsbury London [ISBN: 0-7475-8906-2]
- Pradyot Patnaik 2010, *Handbook of Environmental Analysis: Chemical Pollutants in Air, Water, Soil, and Solid Wastes, Second Edition, 2 Ed.*, CRCpress [ISBN: 9781420065817]

Recommended Article/Paper Resources

- EPA 2017, *Air Quality in Ireland 2016* [ISSN: 978-1-840]
- EPA 2013, *Integrated Water Quality Report 2011*
- EPA 2017, *National Ambient Air Quality Monitoring Programme 2017-2022*
- EPA 2017, *Water Quality in Ireland 2010-2015*
- EPA 2013, *Emissions from IPPC Industry: Quantifying Pollution Trends & Regulatory Effectiveness*
- EPA 2013, *Air Quality Monitoring Report*

Other Resources

- Website: EPA Environmental Protection Agency
<http://www.epa.ie>
- Website: Robert Emmet Hernan Environmental matters on the island of Ireland
<http://www.irishenvironment.com/>

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_SCHQA_8	<u>Bachelor of Science (Honours) in Analytical Chemistry with Quality Assurance</u>	2	Mandatory
CR_SESST_8	<u>Bachelor of Science (Honours) in Environmental Science and Sustainable Technology</u>	2	Mandatory
CR_SINEN_8	<u>Bachelor of Science (Honours) in Instrument Engineering</u>	2	Mandatory
CR_SCHEM_7	<u>Bachelor of Science in Analytical and Pharmaceutical Chemistry</u>	2	Mandatory
CR_SPHYS_7	<u>Bachelor of Science in Applied Physics and Instrumentation</u>	2	Mandatory
CR_SPHYS_6	<u>Higher Certificate in Science in Applied Physics and Instrumentation</u>	2	Mandatory
CR_SCHEM_6	<u>Higher Certificate in Science in Chemistry</u>	2	Mandatory
CR_SOMNI_8	<u>Physical Sciences (Common Entry)</u>	2	Mandatory
CR_SOMNI_7	<u>Physical Sciences (Common Entry)</u>	2	Mandatory