

APPROVED**CHEA7003: Environmental Analysis****Module Details**

Module Code:	CHEA7003
Title:	Environmental Analysis APPROVED
Long Title:	Environmental Analysis
NFQ Level:	Intermediate
Valid From:	Semester 1 - 2019/20 (September 2019)
Duration:	1 Semester
Credits:	5
Field of Study:	4424 - Analytical Chemistry
Module Delivered in:	3 programme(s)
Module Description:	This module describes common pollutants, procedures for air and water analysis including electrochemical methods, protocols for the treatment and disposal of wastewater and solid wastes.

Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
#	Learning Outcome Description
LO1	Explain rates of transfer between environmental compartments, biogeochemical cycles, and fate of organic and inorganic pollutants.
LO2	Discuss the origin, effects and analysis protocols for common pollutants associated with air and water.
LO3	Describe the principles of electrochemical and particle size analysis for environmental and bio-generated samples.
LO4	Research and present information on a selected environmental pollution topic.
LO5	Perform practical analysis on selected environmental samples.
Dependencies	
Module Recommendations	
Incompatible Modules	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements	
No requirements listed	

Indicative Content
Atmospheric Analysis Atmosphere, natural and anthropogenic pollutants sources. Atmospheric sampling and analysis related to ozone depletion, photochemical smog, global warming and acidic rain. Chemical methods for reducing the impact of the atmospheric pollutants.
Water analysis Pollution sources and compounds, transportation and bio-accumulation, Chemical origin of water quality parameters such as dissolved oxygen, biodegradable organics, total organic carbon, suspended solids, pH, hardness, etc. Instrumental methods for analysis of trace pollutants in water.
Wastewater and wastewater treatment Processes involved in water and wastewater treatment -sedimentation, coagulation, flocculation, filtration, water softening, disinfection, activated sludge treatment
Introduction to electroanalytical methods Nernst equation, electrochemical cells, principles of potentiometric methods, pH and ion-selective electrodes.
Practical Programme Selected practicals in environmental chemistry and analysis
Research and presentation on environmental pollution topics Review of literature and examples of presentations on environmental pollution topics such as ozone depletion, acidic rain, algal bloom, heavy metals, etc.

Module Content & Assessment

Assessment Breakdown	%
Coursework	100.00%

Assessments

Coursework			
Assessment Type	Short Answer Questions	% of Total Mark	60
Timing	Every Second Week	Learning Outcomes	1,2,3
Assessment Description Theory tests. Topics may include: instruments and techniques for sampling and analysis of water and atmospheric samples; analysis of pollutants related to ozone depletion, photochemical smog, global warming, water quality parameters, trace elements in water, ion-selective electrodes, water treatment, etc.			
Assessment Type	Practical/Skills Evaluation	% of Total Mark	20
Timing	Every Second Week	Learning Outcomes	5
Assessment Description Four practicals, with associated reports and calculations to be submitted within one week of completion of each practical			
Assessment Type	Presentation	% of Total Mark	20
Timing	Week 7	Learning Outcomes	4
Assessment Description Oral presentation on an assigned environmental topic such as ozone depletion, acidic rain, algal bloom, heavy metals, etc.			
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.			

Module Workload

Workload: Full Time					
Workload Type	Contact Type	Workload Description	Frequency	Average Weekly Learner Workload	Hours
Lecture	Contact	Module Content delivery	Every Week	3.00	3
Lab	Contact	Environmental Chemistry practicals including analysis of nitrates, phosphates, metal ions by spectroscopy, as well as Karl Fisher Titrations.	Every Week	2.00	2
Independent & Directed Learning (Non-contact)	Non Contact	Student undertakes independent study.	Every Week	2.00	2
Total Hours					7.00
Total Weekly Learner Workload					7.00
Total Weekly Contact Hours					5.00

Workload: Part Time					
Workload Type	Contact Type	Workload Description	Frequency	Average Weekly Learner Workload	Hours
Independent & Directed Learning (Non-contact)	Non Contact	Student undertakes independent study.	Every Week	2.00	2
Lecture	Contact	No Description	Every Week	3.50	3.5
Lab	Contact	Environmental Chemistry practicals including analysis of nitrates, phosphates, metal ions by spectroscopy, as well as Karl Fisher Titrations.	Every Second Week	0.50	1
Total Hours					6.50
Total Weekly Learner Workload					6.00
Total Weekly Contact Hours					4.00

Module Resources

Recommended Book Resources

James E. Girard. (2014), Principles of Environmental Chemistry, 3rd Ed.. Jones and Bartlett, [ISBN: 1449650155].

Supplementary Book Resources

Douglas A. Skoog... [et al.]. (2013), Fundamentals of analytical chemistry, 9th. Chapters 18-21, Cengage Learning, Inc, Belmont, CA, USA, [ISBN: 9780495558286].

Recommended Article/Paper Resources

EPA-Ireland. Guidance on sampling,
[https://www.epa.ie/pubs/advice/drinkingwater/publicwatersupplieshandbook/Section %204.pdf](https://www.epa.ie/pubs/advice/drinkingwater/publicwatersupplieshandbook/Section%204.pdf)

Supplementary Article/Paper Resources

EPA- Ireland. Analytical Procedures,
<http://www.epa.ie/enforcement/ensuringhighqualityaqueousemissionsmonitoringdata/analyticalprocedures>

Other Resources

website, Pharmaceuticals waste management,
<https://www.epa.gov/hwgenerators/management-pharmaceutical-hazardous-waste>

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_SCHQA_8	Bachelor of Science (Honours) in Analytical Chemistry with Quality Assurance	-1	Mandatory
CR_SESST_8	Bachelor of Science (Honours) in Environmental Science and Sustainable Technology	-1	Mandatory
CR_SCHEM_7	Bachelor of Science in Analytical and Pharmaceutical Chemistry	-1	Mandatory