APPROVED

SCIA S8015: Environmental Chemistry

Module Details

Module Code:	SCIA S8015
Full Title:	Environmental Chemistry APPROVED
Valid From::	Semester 1 - 2018/19 (September 2018)
Language of Instruction:	English
Duration:	1 Semester
Credits::	7.5
Module Owner::	Siobhan McCarthy
Departments:	Unknown
Module Description:	Following this course, students will be able to critically assess and analyse the chemical processes that occur in the environment, with reference to the impacts of various natural and human inferences on associated biogeochemical cycles.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	**Module Learning Outcome Description**
MLO1	Appraise the role of environmental chemistry and biochemistry in the geosphere.
MLO2	Evaluate the fundamental processes that drive biogeochemical cycles at a local scale.
MLO3	Evaluate the effects of human-related pressures on biogeochemical cycles at a global scale, including global climate change.
MLO4	Describe and relate aspects of environmental chemistry and biochemistry to the physical environment.
MLO5	Quantify and assess changes in key chemical cycles in the environment.

Pre-requisite learning
Module Recommendations *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 DkIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).*
No recommendations listed

Module Indicative Content
Environment and its chemistry Structure and composition of main spheres in the environment; inter-relation of different spheres.
Atmospheric chemistry Composition of the atmosphere, chemical processes, solubility of atmospheric pollutants in water; large-scale climate effects, including human related climate change, chemistry of acid deposition. Air quality standards. Gas sampling and analytical techniques.
The lithosphere Composition and structure; weathering; leaching; soil chemistry; mineral resources and pollution; geochemical solubility.
The hydrosphere Chemical composition and physical properties; water cycle; equilibria in aqueous systems; water pollution; large-scale human-related effects e.g. ocean acidification.
The biosphere Composition, major and minor elements; toxicology of heavy metals and organic pollutants, bioaccumulation.
Biogeochemical cycles for various elements. Biogeochemical cycling of for C, N, P, and S, and effects of human-related pressures.
Site Visits Site Visits will be conducted to nearby industry to gain insight into the systems in place which aim to mitigate against environmental pollution. Example industry includes Tara Mines in Navan, Indaver Incinerator in Co. Meath and the Xerox plant in Dundalk.
Practicals A range of practicals which addressing issues relating to soil-water chemical interactions and air pollution will be conducted. An empahsis will be placed on the appropriate use of instrumentation for the analyses, identification and quantification of enivornmental consitutents and pollutatants e.g.: Use of AAS to determine the effect of bioremediation on arsenic polluted water; Comparison of CE and HPLC techniques for the determination of a range of antibiotics in waste water.

Module Assessment

Assessment Breakdown	%
Course Work	10.00%
Practical	30.00%
Final Examination	60.00%

Module Special Regulation

Assessments

Full Time On Campus

Course Work

Assessment Type	Presentation	**% of Total Mark**	10
Marks Out Of	0	**Pass Mark**	0
Timing	End-of-Semester	**Learning Outcome**	3,4
Duration in minutes	0		

Assessment Description
Review of relevant literature and media articles. Students will submit a report and complete a presentation on a chosen topic

No Project

Practical

Assessment Type	Practical/Skills Evaluation	**% of Total Mark**	30
Marks Out Of	0	**Pass Mark**	0
Timing	n/a	**Learning Outcome**	1,2,5
Duration in minutes	0		

Assessment Description
Range of practicals quantifying chemical composition of air, water and solid environmental samples and site visits will provide the student with the opportunity to back up the theory covered in formal lectures with practical experience. Students will be assessed weekly by a variety of methods including written reports, in-class quizzes and presentations(assessments for site visits will be shared with the Environmental Biotechnology module) .

Final Examination

Assessment Type	Formal Exam	**% of Total Mark**	60
Marks Out Of	0	**Pass Mark**	0
Timing	End-of-Semester	**Learning Outcome**	1,2,3,4
Duration in minutes	0		

Assessment Description
End-of-Semester Final Examination

Reassessment Requirement

A 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 On Campus

Workload Type	*Contact Type*	*Workload Description*	*Frequency*	*Average Weekly Learner Workload*	*Hours*
Practical	Contact	A range of skills will be implemented in the practicals. For example, students will will collect and analyse water and soil samples on the AAS and Lachat for heavy metals and nutrients. Students will design experiments to assess the impact of heavy metals on Gammarus. There will be site visits and fieldtrips to related facilities.	Every Week	3.00	3
Lecture	Contact	Lectures will cover the chemical and physical properties and processes of the lithosphere, atmosphere, hydrosphere and biosphere. Environmental issues and solutions related to each of the spheres will be evaluated.	Every Week	3.00	3
Independent Study	Non Contact	To include student project focused on compilation of news articles on environmental chemistry and biogeochemistry.	Every Week	4.00	4
Directed Reading	Non Contact	Relevant literature will be provided through a VLE	Every Week	2.00	2
				Total Weekly Learner Workload	12.00
				Total Weekly Contact Hours	6.00

This module has no Part Time On Campus workload.

Module Resources

Recommended Book Resources

Manahan, S.. (2017), Environmental Chemistry, 10. CRC Press, [ISBN: 9781498776936].

Baird,C. and Cann, M.. (2012), Environmental chemistry, 5th. W.H. Freeman and Co., New York.

Weathers, K.C., Strayer, D.L. and Likens, G.E. (Editors). (2012), Fundamentals of ecosystem science, Elsevier, Amsterdam.

Supplementary Book Resources

Dunnivant, F.M.. (2004), Environmental laboratory exercises for instrumental analysis and environmental chemistry [electronic resource], ebrary, Inc via DkIT library. Wiley, [ISBN: 978-0-471-488].

This module does not have any article/paper resources

Other Resources

Website, Environmental Protection Agency,
http://www.epa.ie

Website, Earth Observatory,
https://earthobservatory.nasa.gov/

Website, Copernicus,
http://www.copernicus.eu/