APPROVED

ENVR S8017: Environmental Biotechnology

Module Details

Module Code:	ENVR S8017
Full Title:	Environmental Biotechnology APPROVED
Valid From::	Semester 1 - 2018/19 (September 2018)
Language of Instruction:	English
Duration:	1 Semester
Credits::	7.5
Module Owner::	Caroline Gilleran
Departments:	Unknown
Module Description:	The aims of this module are to explore how organisms (including genetically modified organisms) can be applied to environmental problems and issues including waste management, water and wastewater treatment, air pollution control, bioremediation and environmental monitoring.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	**Module Learning Outcome Description**
MLO1	Appraise the influence of molecular biology and recombinant DNA technology on environmental monitoring.
MLO2	Examine and define the fundamental principles, operating criteria and design options for the major biological methods used in the treatment of wastewater, drinking water, municipal solid waste, contaminated air and soil.
MLO3	Interpret and compare national and international policies and apply the major legislative and regulatory instruments in relation to water and waste water quality, solid waste management and air treatment technology.
MLO4	Apply practical competence in selected molecular and biotechnological techniques.

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
Biotechnology and waste management EU and national policies on waste management. Biowaste composition. Disposal of solid waste and associated problems – landfill, incineration. Biological waste treatment: MBT, composting, anaerobic digestion.
Water treatment Municipal water treatment. Potable water demand and supply, International standards; Drinking water regulations 2000, management of source quality. Quality issues.
Wastewater treatment Wastewater composition. Municipal wastewater treatment: Primary, secondary and tertiary treatment. Septic tanks. EU and national policies on wastewater treatment.
Bioremediation Contaminated land and water, in situ and ex situ bioremediation techniques. Factors affecting bioremediation. Bioaugmentation techniques using GMOs. Phytoremediation.
Biotechnology and air pollution control Biotechnological approaches to air pollution: biofilters, bioscrubbers, biotrickling filters.
Biotechnology and environmental monitoring The influence of recombinant DNA technology on environmental monitoring. Biomarkers, biochemical indicators, genetic indicators of pollution, biosensors.
Sample practical classes Analysis of BOD, COD and suspended solids in waste water. Toxicity testing using plants. Drinking water quality. Oil bioremediation using microbial cultures. HPLC to detect antibiotics in water.
Sample site visits Energy recovery thermal treatment plant, Indaver, Duleek. Large scale industry, Tara Mines, Navan. Centre for Freshwater and Environmental Studies (CFES) research facilities at DkIT.

Module Assessment

Assessment Breakdown	%
Practical	50.00%
Final Examination	50.00%

Module Special Regulation

Assessments

Full Time On Campus

No Course Work

No Project

Practical

Assessment Type	Practical/Skills Evaluation	**% of Total Mark**	30
Marks Out Of	0	**Pass Mark**	0
Timing	Every Week	**Learning Outcome**	4
Duration in minutes	0		

Assessment Description
A 3-hour practical session each week 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 Chemistry module).

Assessment Type	Practical/Skills Evaluation	**% of Total Mark**	20
Marks Out Of	0	**Pass Mark**	0
Timing	End-of-Semester	**Learning Outcome**	4
Duration in minutes	60		

Assessment Description
Students will be assessed by a practical skills based exam.

Final Examination

Assessment Type	Formal Exam	**% of Total Mark**	50
Marks Out Of	0	**Pass Mark**	0
Timing	End-of-Semester	**Learning Outcome**	1,2,3
Duration in minutes	120		

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*
Lecture	Contact	Lecture	Every Week	3.00	3
Practical	Contact	Practical class	Every Week	3.00	3
Independent Study	Non Contact	Independent study	Every Week	5.00	5
Directed Reading	Non Contact	Supplementary reading material will be posted on moodle.	Every Week	1.00	1
				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

Jördening H.J., Winter, J.. (2005), Environmental biotechnology: concepts and applications., Wiley-VCH.

Scragg, A. H.. (2005), Environmental biotechnology, 2nd. Oxford University Press.

Supplementary Book Resources

Clark, D.P.. (2012), Biotechnology, Update ed.. Elsevier/Academic, Amsterdam, [ISBN: 9780123850638].

Madigan et al.. (2011), Brock Biology of Microorganisms, 13th. Pearson Education.

Supplementary Article/Paper Resources

Silva, A.B., Costa, M.F., Duarte, A.C.. (2018), Biotechnology advances for dealing with environmental pollution by micro(nano)plastics: Lessons on theory and practices, Current Opinion in Environmental Science & Health, Volume 1, p.30–35.

Sharma, B., Kumar-Dangi, A., Shukla, P.. (2018), Contemporary enzyme based technologies for bioremediation: A review, Journal of Environmental Management, 210, p.10-22.

Wang. P., Wang, H., Qui, Y., Ren, L., Jiang, B.. (2018), Microbial characteristics in anaerobic digestion process of food waste for, Bioresource Technology, 248, p.29.

Other Resources

Website, EU database,
http://europa.eu/index_en.htm

Website, Irish government departments,
http://www.irlgov.ie

Website, Sustainable Energy Authority of Ireland,
http://www.seai.ie

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

Website, Composting and Anaerobic Digestion Association of Ireland,
http://www.cre.ie/web/

Journal search database, Science direct,
http;//www.sciencedirect.com