

SCIA S8016: Microbial Ecology

Module Details	
Module Code:	SCIA S8016
Full Title:	Microbial Ecology APPROVED
Valid From::	Semester 2 - 2017/18 (February 2018)
Language of Instruction:	
Duration:	1 Semester
Credits::	7.5
Module Owner::	Bridget Kelly
Departments:	Unknown
Module Description:	This module will examine the relationship between micro-organisms and various environments and will furnish students with training in relevant microbial ecological methods.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	Module Learning Outcome Description
MLO1	Distinguish between the different types of microbial communities in the environment and how they develop.
MLO2	Discuss and differentiate the various forms of microbial interactions between plants and animals.
MLO3	Appraise and evaluate the principles and applications of a range of microbial ecology techniques.
MLO4	Identify and categorise microorganisms associated with soil and water and evaluate methods used in their microbiological testing.
MLO5	Compare and contrast a range of biotechnological aspects of microbial ecology.
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 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).</i>	
No recommendations listed	

Module Indicative Content
Microbial Communities Development of microbial communities, Dynamics, Population selection within communities, Succession within microbial communities, Adaptations to environmental conditions, Biofilms
Soil and aquatic environments Microorganisms found in soil and terrestrial ecosystems. Microbes in marine and fresh water aquatic ecosystems, the significance of waterborne disease, the microbiological testing of water.
Microbial interactions Interactions with plants, mycorrhizae, plant pathogens. Interactions with animals, rumen digestion, mutualistic associations between microorganisms and animals.
Quantitative microbial ecology Sample collection, Detection of microbial populations, Direct and indirect enumeration of microorganisms in the environment. Nonculturable bacteria. Molecular methods to detect environmental samples for microbial diversity.
Biotechnological characteristics of microbial ecology Microbial biomining and bioleaching, bioremediation of various ecosystems, Microbial control of pests and diseases
Microbial processes in Biogeochemical cycles Element cycling (such as nitrogen, sulphur, phosphorus, iron), interrelationships between the different element cycles. Winogradsky column.
Practical component Microbial Ecology practicals will align with theory and will be selected from the following: Environmental Sampling for microbiological analysis; Identification and quantification of microbes in water; Soil microbial community analysis, PCR and qPCR applications for soil and water microbes, Biofilm growth of soil isolates, enrichment of soil samples for antibiotics/xenobiotic degrading microorganisms, Winogradsky column preparation. Field trip to Ballyhaise Agricultural College.

Module Assessment	
Assessment Breakdown	%
Project	20.00%
Practical	30.00%
Final Examination	50.00%
Module Special Regulation	

Assessments

Full Time On Campus			
No Course Work			
Project			
Assessment Type	Project	% of Total Mark	20
Marks Out Of	0	Pass Mark	0
Timing	n/a	Learning Outcome	1,2,4,5
Duration in minutes	0		
Assessment Description Students will conduct research and produce a report on an area relevant to current trends in microbial ecology. Students will also individually present in a succinct 3 minute presentation on an aspect of the report.			
Practical			
Assessment Type	Practical/Skills Evaluation	% of Total Mark	30
Marks Out Of	0	Pass Mark	0
Timing	n/a	Learning Outcome	3
Duration in minutes	0		
Assessment Description Students will participate in laboratory based practical sessions. Formative assessments will be performed (e.g. quizzes, review exercises) Summative assessment may take the form of graded laboratory reports and/or graded lab skill assessments			
Final Examination			
Assessment Type	Formal Exam	% of Total Mark	50
Marks Out Of	0	Pass Mark	0
Timing	End-of-Semester	Learning Outcome	1,2,4,5
Duration in minutes	0		
Assessment Description End-of-Semester Final Examination			

Module Workload

Workload: Full Time On Campus

<i>Workload Type</i>	<i>Contact Type</i>	<i>Workload Description</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>	<i>Hours</i>
Lecture	Contact	No Description	Every Week	3.00	3
Practical	Contact	No Description	Every Week	3.00	3
Directed Reading	Non Contact	No Description	Every Week	2.00	2
Independent Study	Non Contact	No Description	Every Week	4.00	4
				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

Barton, L. L. and Northup, D. E.. (2011), Microbial Ecology, 1st. Wiley, p.407, [ISBN: 9780470048177].
Atlas, R. M. and Barton, R.. (2003), Microbial Ecology: Fundamentals and Applications, 4th. Pearson, p.640, [ISBN: 978-080530655].
Paulson, I. T. and Holmes, A. J.. (2014), Environmental Microbiology: methods and Protocols, 2nd. Humana Press, [ISBN: 978-162703711].
Christon J. Hurst, Ronald L. Crawford, Jay L. Garland, David A. Lipson. (2007), Manual of Environmental Microbiology, 3rd. American Society for Microbiology Press, p. 1293.
Bridget Kelly. (2018), Microbial Ecology Laboratory Manual, DkIT.

Recommended Article/Paper Resources

Microbial Ecology. Microbial Ecology,
<https://link.springer.com/journal/248>
Environmental Microbiology. Environmental Microbiology,
<http://tpps://onlinelibrary.wiley.com/journal/14622920>

Other Resources

Website, Society for Applied Microbiology,
<http://www.sfam.org.uk>
Website, SGM- Society for General Microbiology,
<http://www.sgm.ac.uk>
Website, American Society for Microbiology,
<http://www.asm.org>