University of the West of England
BRISTOL

MODULE SPECIFICATION

Part 1: Information			
Module Title	Environmental Microbiology		
Module Code	USSKN9-15-3	Level	3
For implementation from	September 2018		
UWE Credit Rating	15	ECTS Credit Rating	
Faculty	Health and Applied Sciences	Field	Applied Sciences
Department	Department of Applied Sciences		
Contributes towards	BSc (Hons) Environmental Science MSci (Hons) Environmental Science BSc (Hons) Biological Sciences MSci (Hons) Biological Sciences		
Module type:	Standard		
Pre-requisites	USSK5C-30-1 Life on Earth USSKAQ-30-2 Microbial Life **OR** USSKN7-15-2 The Microbial World		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

This module will explore the functional processes and interactions of microorganisms within terrestrial and aquatic ecosytems. The following syllabus topics will be investigated:

Microbial Metabolism: students will understand the molecular mechanisms by which microbes can utilise nutrients within various ecosystems, including photoautotrophs, chemolithotrophs and heterotrophs. This will include an in depth understanding of the various energy generating mechanisms utilised by microbes.

Microbial Ecology: students will learn about the diversity of microorganisms that can live in a range of environments, including terrestrial environments (soil and sediments), aquatic environments (oceanography and limnology), aeromicrobiology and extreme environments (hydrothermal vents and astrobiology). This will include an understanding of the environmental selection pressures that give rise to the characteristic microflora found within each environment, including the impact of a changing climate.

Microbial interactions: students will learn how microorganisms can interact directly with humans, animals and plants through symbiosis (including mutualistic, commensalistic, or parasitic relationships).

Bioremediation and water treatment: students will use their knowledge of microbial metabolic processes to

investigate the use of naturally occurring or introduced microorganisms for the breakdown of environmental pollutants (organic and metal pollutants). This will also include an in depth study of traditional and novel approaches to production of drinking water and wastewater treatment processes.

Microbial genomics: students will learn about the composition and expression of the microbial genetic material (metagenomic and whole transcriptome studies, and bioinformatic analysis), and how this impacts on microbial evolution, taxonomy, population genomics and phylogeography.

Biotechnology: students will learn how microorganisms can be exploitation for industrial purposes, including energy generation through biofuels, anaerobic digestion and microbial fuel cells.

Part 3: Assessment

The controlled component is a written exam. The exam will be 3 hours duration (consistent with the Department's assessment strategy for Level 3 modules) in which students will be expected to answer three essay questions. This assessment will provide students with an opportunity to demonstrate in depth knowledge on the module subject matter, with the expectation that students will be required to show evidence of critical analysis of the controversies that exist in this field of study. The process of revision and examination is known to strengthen the memory pathways for future use of relevant material and is an essential employability skill.

The coursework will comprise of a 2000 word laboratory report and associated critical review of the literature, based on practical experimental work undertaken during the course of the module. This will develop key skills in experimental design, data collection and handling, statistics and data interpretation, as well as critical analysis of results to formulate evidenced conclusions. A critical review of the literature will be included within this laboratory report, to ensure students can place this experimental work within contemporary scientific knowledge.

Identify final timetabled piece of assessment (component and element)	Component A1	
% weighting between components A and B (Standard modules only)	**A:** **60%**	**B**: **40%**

First Sit	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**
1. Examination (2 hours)	100%
Component B **Description of each element**	**Element weighting** **(as % of component)**
1. Laboratory report and critical literature review	100%
Resit (further attendance at taught classes is not required)	
Component A (controlled conditions) **Description of each element**	**Element weighting** **(as % of component)**
1. Examination (2 hours)	100%
Component B **Description of each element**	**Element weighting** **(as % of component)**
1. Data handling and critical literature review	100%

Part 4: Teaching and Learning Methods

Learning Outcomes	On successful completion of this module students will be able to: • Understand the molecular mechanisms associated with microbial metabolism

(component A)

- Critically evaluate the role microorganisms play in various environmental ecosystems and understand the environmental selection pressures that give rise to the characteristic microflora found within each environment (component A).
- Evaluate the relative importance of microbial interactions with humans, animals and plants in functioning ecosystems (component A).
- Critically assess the role of microorganisms in bioremediation, water treatment and energy generation processes, including the current state of novel technological approaches (component A and component B).
- Statistically analyse laboratory data, enabling interpretation of complex data sets in the context of existing knowledge (component B).
- Understand the genomic diversity of microorganisms and how this can be utilised for biotechnology applications (component A and component B).

Key Information Sets Information (KIS)

Key Information Set - Module data

Number of credits for this module				15
Hours to be allocated	Scheduled learning and teaching study hours	Independent study hours	Placement study hours	Allocated Hours
150	36	114	0	150

Contact Hours

The table below indicates as a percentage the total assessment of the module which constitutes a;

Written Exam: Unseen or open book written exam
Coursework: Written assignment or essay, report, dissertation, portfolio, project or in class test
Practical Exam: Oral Assessment and/or presentation, practical skills assessment, practical exam (i.e. an exam determining mastery of a technique)

Total Assessment

Total assessment of the module:	
Written exam assessment percentage	60%
Coursework assessment percentage	40%
Practical exam assessment percentage	0%
	100%

Reading List

All students will be encouraged to make full use of the print and electronic resources available to them through membership of the University. These include a range of electronic journals and a wide variety of resources available through web sites and information gateways. The University Library's web pages provide access to subject relevant resources and services, and to the library catalogue. Many resources can be accessed remotely. Students will be presented with opportunities within the curriculum to develop their information retrieval and evaluation skills in order to identify such resources effectively.

This guidance will be available either in the module handbook, via the module information on Blackboard or through any other vehicle deemed appropriate by the module/programme leaders.

Indicative Reading List	**https://uwe.rl.talis.com/lists/1E73F8EC-AC2D-2E6B-CFD3-976ED57759C5.html?draft** **Textbooks** • Pepper, I. L., Gerba, C. P. and Gentry, T. J. (2014) ***Environmental Microbiology***. 3rd Ed. New York: Academic Press. • Crawford, R. L. (2007) ***Manual of environmental microbiology***. 3rd Ed. American Society for Microbiology. • Prescott, Harley and Klein (2008) ***Microbiology***. 7th Ed. New York: McGraw Hill. **Recommended Journals** • **Environmental Microbiology;** Society for Applied Microbiology and John Wiley & Sons Ltd. • **Applied and Environmental Microbiology (AEM);** American Society for Microbiology.

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