Module Specification

Environmental Microbiology

Version: 2023-24, v5.0, 16 Jun 2023

Contents

Part 1: Information

Module title: Environmental Microbiology

Module code: USSKN9-15-3

Level: Level 6

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Health & Applied Sciences

Department: HAS Dept of Applied Sciences

Partner institutions: None

Field: Applied Sciences

Module type: Module

Pre-requisites: Microbial Life 2023-24, The Microbial World 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Pre-requisites: Students must have taken either USSKAQ-30-2 Microbial Life or USSKN7-15-2 The Microbial World

Features: Not applicable

Educational aims: This module builds on the fundamental microbiology content delivered at level 2. It will explore the functional processes and interactions of microorganisms within terrestrial and aquatic ecosytems.

Outline syllabus:

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: Teaching and learning methods

Teaching and learning methods: See Assessment

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 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

MO2 Evaluate the relative importance of microbial interactions with humans, animals and plants in functioning ecosystems

MO3 Critically assess the role of microorganisms in bioremediation, water treatment and energy generation processes, including the current state of novel technological approaches

MO4 Statistically analyse laboratory data, enabling interpretation of complex data sets in the context of existing knowledge

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/EB8D327C-A044-A3E2-4D5C-9E2E7D8F839E.html?lang=en-GB&login=1

Part 4: Assessment

Assessment strategy: Assessment 1 is 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.

Assessment 2 is an online exam with a 24hr window for completion. 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.

Assessment tasks:

Report (First Sit)
Description: Analytical report including critical literature review (2000 words)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3, MO4

Examination (Online) (First Sit)
Description: Online Examination (24 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Report (Resit)
Description: Analytical report including critical literature review (2000 words)

Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3, MO4

Examination (Online) (Resit)
Description: Online Examination (24 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Environmental Science [Sep][FT][Frenchay][3yrs] BSc (Hons) 2021-22

Biological Sciences [Sep][FT][Frenchay][3yrs] BSc (Hons) 2021-22

Environmental Science [Sep][FT][Frenchay][4yrs] MSci 2021-22

Biological Sciences [Sep][FT][Frenchay][4yrs] MSci 2021-22

Biological Sciences [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21

Biological Sciences [Sep][SW][Frenchay][5yrs] MSci 2020-21

Environmental Science [Sep][SW][Frenchay][4yrs] BSc (Hons) 2020-21

Environmental Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2020-21

Environmental Science {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2020-21

Environmental Science [Sep][SW][Frenchay][5yrs] MSci 2020-21

Biological Sciences {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2020-21

Biological Sciences {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2020-21

Biological Sciences {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2019-20

Biological Sciences {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2019-20

Environmental Science {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2019-20

Environmental Science {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2019-20