# Module Definition Form (MDF)

| Module code: MOD008713 | **Version:** 1 **Date Amended:** 29/Mar/2022 |
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| 1. Module Title |
|---|
| Plant and Microbial Sciences |

| 2a. Module Leader |
|---|
| Tim Hearn |

| 2b. School |
|---|
| School of Life Sciences at Anglia Ruskin University |

| 2c. Faculty |
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| Faculty of Science and Engineering |

| 3a. Level |
|---|
| 4 |

| 3b. Module Type |
|---|
| Standard (fine graded) |

| 4a. Credits |
|---|
| 30 |

| 4b. Study Hours |
|---|
| 300 |

**5. Restrictions**

| Type | Module Code | Module Name | Condition |
|---|---|---|---|
| Pre-requisites: | None | | |
| Co-requisites: | None | | |
| Exclusions: | None | | |
| **Courses to which this module is restricted:** | None | | |

## LEARNING, TEACHING AND ASSESSMENT INFORMATION

### 6a. Module Description

To be sustainable, the environment must meet the needs of present and future generations, while ensuring profitability, environmental health, and social and economic equity. These principles are encapsulated in the United Nations Sustainable Development Goals. We shall briefly discuss these principles and goals, which will then act as a ‘golden thread’ throughout the module, and the course.

Plants and algae account for 82% of the world’s biomass and are the basis of almost all ecosystems, as well as providing a substantial proportion of the world’s oxygen. They are thus central to planning for a sustainable future. The extraordinary diversity of plants is due to a wide variety of physiological strategies, that have allowed them to adapt to varying environments of different parts of the earth. We shall examine the relationship between the anatomy and physiology of a range of different plant species, as well as their molecular and biochemical mechanisms. Their growth and development is a major contributor to the spread and survival of plants at all stages of their life cycle, and we will analyse the links between changes in the environment and the physiological responses that enable plants to survive the challenges to which they are constantly exposed. We will investigate how plants obtain light, nutrients, and water, and how these are processed and distributed within the plant. We will then discuss the effects of environmental change on plant growth. We shall also discuss aspects of horticulture, agriculture and forestry, where the competing needs of sustainability collide. These aspects will be explored in more detail in later modules.

Microbiology is the study of microorganisms - including bacteria, archaea, fungi and protists - that are too small to be seen without magnification, and yet account for 17% of total biomass. The wide variety of different types of microorganisms is reflected in the huge diversity of their lifestyles. You’ll explore the major groups of microorganisms, learning the basic concepts of microbiology and applying them to a scientific understanding of the subject area. You’ll consider the diversity of microorganisms from many different perspectives, including their cell structure, function, taxonomy and ecology.

Microorganisms have a long, often negative, association with humans. You’ll study their importance as pathogens, and increasingly important areas such as antimicrobial resistance, but we will also look at current and potential useful applications. We will discuss how microbes can be utilised as sources of medicine, food and other products; their interaction with plants and animals; and their potential to provide solutions to some of the environmental issues generated by humans.

### 6b. Outline Content

- Introduction to the principles of sustainability and the Sustainable Development Goals
- Relevance of plants to life on earth and the challenges of being a sessile organism; abiotic stresses
- Plant taxonomy and identification
- Development, dormancy and germination of seeds, developmental plasticity in plants and the role of plant growth regulators
- Root structure and function, water potential, ion transport and the function of xylem
- Plant micronutrient nutrition and soil composition
- Perception of light in plants, phototropism, photoperiodicity and the circadian clock; phenology
- Leaf structure and gas exchange and responses to changing environmental O2 and CO2
- Photosynthesis, metabolism of more complex organic chemicals
- Phloem structure and function and the distribution of solutes
- Contribution of plants to the environment, and harnessing for biological resource production
- Temperature stress
- Structure, physiology and biochemistry of microorganisms
- Identification and classification of microorganisms
- Control of microorganisms including anti-microbial and anti-viral therapies
- Growth cycles of representative species of microorganisms
- Environmental and public health microbiology
- Interrelationships between plants animals, and the microbial world
- Social, economic and environmental aspects of exploitation of plants and microorganisms

**6c. Key Texts/Literature**

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

**6d. Specialist Learning Resources**

None

| 7. Learning Outcomes (threshold standards) | | |
|---|---|---|
| **No.** | **Type** | **On successful completion of this module the student will be expected to be able to:** |
| 1 | Knowledge and Understanding | Review the central principles of sustainability and the UN Sustainable Development Goals, with a focus on the contribution of the plant and microbial worlds. |
| 2 | Knowledge and Understanding | Describe the developmental stages of plants, their requirements for healthy growth, and how these are affected by their environment |
| 3 | Knowledge and Understanding | Discuss how plants detect and respond to changes in their environment, both natural and anthropogenic, including light, gas and water levels, micronutrients and toxins, and how factors such as climate change can affect their growth. |
| 4 | Knowledge and Understanding | Outline the taxonomic diversity of microorganisms, their ability to occupy different environmental niches, their strategies for survival, and how these are impacted by and impact on other organisms |
| 5 | Knowledge and Understanding | Discuss the relevance of microorganisms in a range of environmental, medical and industrial contexts, and in planning for a sustainable future |
| 6 | Intellectual, practical, affective and transferrable skills | Construct cogent and integrated arguments on aspects of plant and microbiology sciences that underpin sustainability, with an awareness of the connectivity of all systems on earth. |

| 8a. Module Occurrence to which this MDF Refers | | | | |
|---|---|---|---|---|
| **Year** | **Occurrence** | **Period** | **Location** | **Mode of Delivery** |
| 2025/6 | ZZF | Template For Face To Face Learning Delivery | | Face to Face |

| 8b. Learning Activities for the above Module Occurrence | | | |
|---|---|---|---|
| **Learning Activities** | **Hours** | **Learning Outcomes** | **Details of Duration, frequency and other comments** |
| Lectures | 48 | 1-5 | 12 x 3 hours + 12 x 1 hour lectures/active learning |
| Other teacher managed learning | 24 | 1-6 | 10 x 2 hour practicals/excursions + 2 x 2 hours test window |
| Student managed learning | 228 | 1-6 | Preparation for lectures, practicals, assessments and directed reading |
| TOTAL: | 300 | | |

| 9. Assessment for the above Module Occurrence | | | | | |
|---|---|---|---|---|---|
| **Assessment No.** | **Assessment Method** | **Learning Outcomes** | **Weighting (%)** | **Fine Grade or Pass/Fail** | **Qualifying Mark (%)** |
| 010 | Coursework | 1-6 | 60 (%) | Fine Grade | 30 (%) |
| **2 x 2000 word Lab reports** | | | | | |

| Assessment components for Element 010 | | | | |
|---|---|---|---|---|
| **Component No.** | **Assessment Title** | **Submission Method** | **Weighting (%)** | **Components needed for Mark Calculation?** |
| 010/1 | Lab report 1 | | 50 (%) | All |
| 010/2 | Lab report 2 | | 50 (%) | |

| **Assessment No.** | **Assessment Method** | **Learning Outcomes** | **Weighting (%)** | **Fine Grade or Pass/Fail** | **Qualifying Mark (%)** |
|---|---|---|---|---|---|
| 011 | Coursework | 1-5 | 40 (%) | Fine Grade | 30 (%) |
| **2 x 1000 word-equivalent end of trimester tests** | | | | | |

| Assessment components for Element 011 | | | | |
|---|---|---|---|---|
| **Component No.** | **Assessment Title** | **Submission Method** | **Weighting (%)** | **Components needed for Mark Calculation?** |
| 011/1 | End of trimester test 1 | | 50 (%) | All |
| 011/2 | End of trimester test 2 | | 50 (%) | |

**In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).**

**In addition, students are required to:**
**(a) achieve the qualifying mark for each element of fine graded assessment as specified above**
**(b) pass any pass/fail elements**

**[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]**