Unit 13: Microbiology for Health Science

Delivery guidance

Approaching the unit

This unit covers both practical aspects of microbiology and the positive and negative effects of micro-organisms on humans. It gives learners the opportunity to understand the requirements of micro-organisms to live and flourish and then allows them to put that knowledge into the wider context.

Delivering the learning aims

Learning aim A covers the requirements of micro-organisms to thrive and gives learners a chance to use practical techniques to look at the growth of micro-organisms. Learners would benefit from the opportunity to visit a microbiological laboratory to see the techniques being used in a realistic setting.

Learning aims B and C allow learners to study the effects of microorganisms on human health and how the human body reacts to infection. This is then extended to look at how populations are affected and the measures that are used to control this. There is an opportunity to invite an epidemiologist or public health expert to give a talk about their work to learners.

Learning aim D covers the positive uses of microbiology for health benefits, especially in the food industry. Visits to settings such as a cheese manufacturer would benefit learners, giving them a chance to put their learning into context.

Assessment model

Learning aim	Key content areas	Recommended assessment approach
A Understand the concepts of microbiology relevant to health science	**A1** Micro-organisms **A2** Requirements of micro-organisms for growth **A3** Structure and reproduction of micro-organisms **A4** Methods of controlling micro-organisms	A report, based on individual research, on the requirements to thrive for four named micro-organisms.
B Examine the role of micro-organisms in human health and disease	**B1** Epidemiology **B2** Transmission routes **B3** Role of normal flora and the human body **B4** Types of infections **B5** Role of the immune system	A report, based on individual research, into the positive and negative aspects of human interaction with micro-organisms.
C Investigate the impact of diseases and their treatment in a global context	**C1** Factors in controlling diseases globally **C2** Controlling a global disease outbreak **C3** Consequences to society of a disease outbreak	
D Investigate the health benefits of micro-organisms	**D1** Using micro-organisms in food production	A report, based on individual research, looking at two different

	D2 Further uses of micro-organisms	microbes that give positive benefit to society.

Assessment guidance

This unit is internally assessed. There is a maximum number of three summative assignments for this unit. Tutors should refer to the assessment guidance in the specification for specific detail, particularly in relation to the requirements for Pass, Merit and Distinction grades.

It is suggested that learning aim A is assessed via a written report based on individual research. In their report learners should justify the methods used to control two different micro-organisms. This should be linked to the structure and requirements for growth of those micro-organisms and the methods used to control their transmission.

Learning aims B and C should be covered in a single written report based on individual research. The report should cover the reasons for, and consequences of, the spread of diseases becoming more global. Learners should examine the effectiveness of the factors involved in controlling diseases globally in the context of the outbreak of two separate diseases and how the immune system protects individuals from disease. Throughout their report learners should refer to specific examples of disease-causing micro-organisms where appropriate and relevant.

Learning aim D could also be covered in a written report based on individual research. This should look at two different microbes that give positive benefits to society. Within their report learners should consider both the positive and negative benefits that micro-organisms can have for humans.

Getting started

This gives you a starting place for one way of delivering the unit, based around the recommended assessment approach in the specification.

Introduction
Introduce this unit by discussing examples, which learners can identify, of how micro-organisms can have both positive and negative effects for society.
Learning aim A: Understand the concepts of microbiology relevant to health science
• Learning aim A is an overview of the concepts of microbiology as relevant to health science. • For A1, A2 and A3 learners could work in small groups to research a presentation on one of the micro-organism groups detailed. They should detail the requirements of that group for growth, including their structure and method of reproduction. Learners could then present their work to the rest of the class, who could make notes on the groups they have not researched themselves, with tutor input to rectify any omissions or misunderstandings. • For A4 learners look at how micro-organisms are controlled. They should conduct practical investigations using spread plates and impregnated discs to demonstrate antibiotic and disinfectant efficacy. A health worker, such as a nurse, could be invited to speak about how they protect themselves from microbial infection.
Learning aim B: Examine the role of micro-organisms in human health and disease
• For B1 a tutor-led discussion on the terms used in epidemiology would introduce this learning aim. • For B2 learners could research the different transmission routes, then present them on an annotated poster. • For B3 independent research into the role of the normal flora of the human body could be written up in note form, using examples to illustrate all the points. • For B4 the class could split into small groups and share the different examples between them. They could then do a presentation to the rest of the class, handing out the presentation notes so everyone has a copy of everything.

- B5 could take the form of a tutor-led session explaining the immune response, followed by individuals producing an annotated flow chart featuring the different stages.

Learning aim C: Investigate the impact of diseases and their treatment in a global context

- For C1, a good introduction to this section would be inviting an infection control nurse, or someone with a similar job, to talk about their role in controlling the spread of disease. Learners could then use the internet to research the role of epidemiologists and the World Health Organization severity level rating.
- For C2, independent research on the internet followed by a class discussion may be one way to cover how the role of authorities and the international community, the resources required and any other factors combine to control a global disease outbreak.
- For C3, the consequences for society of a disease outbreak could be covered through a class discussion, using any examples learners may have experienced as a starting point.

Learning aim D: Investigate the health benefits of micro-organisms

- Learning aim D could be covered by inviting speakers from relevant companies, e.g. cheese manufacturers, medical supply manufacturers, and/or visits to the producers themselves.
- For D1 and D2, individual research to look at the situations not covered by speakers and visits could fill in the gaps in this learning aim.

Details of links to other BTEC units and qualifications, and to other relevant units/qualifications

This unit links to:

- Unit 2: Anatomy and Physiology for Health and Social Care
- Unit 5: Principles of Safe Practice in Health and Social Care
- Unit 6: Promoting Public Health

Resources

Textbooks

Madigan, M T, Martinko, J M, Bender, K S, Buckley, D H and Stahl – *Biology of Microorganisms*, 14th edition (Pearson, 2014) ISBN 978129201831

Taylor, J – *Bath Advanced Science – Microorganisms and Biotechnology*, 2nd edition (Nelson Thornes, 2001) ISBN 9780174482550

Waites, M J, Morgan, N L, Rockey, J S and Higton, G – *Industrial Microbiology – An Introduction* (Wiley-Blackwell, 2011) ISBN 9780632053070

Any current Level 3 Science textbook with a section on microbiology and infectious diseases could also be used for reference.

Journals

New Scientist
Microbiology Today
Scientific American

Websites

Discovery Education
www.discoveryeducation.com
Has ideas for simulations of the spread of contagious diseases.

Education World
www.educationworld.com
Provides an introduction with short videos about three pandemics in history. Could be used as an introduction to the unit.

Microbiology Society
https://microbiologysociety.org/
A membership organisation for scientists who work in all areas of microbiology; includes online teaching resources.

Microbiology Society online journal, Microbiology Today
https://microbiologysociety.org/publications/microbiology-today.html
Videos and information relating to microbiology.

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