

Title	Describe biofilms, microbial biodeterioration, biodegradation, and bioremediation		
Level	6	Credits	4

Purpose	People credited with this unit standard are able to describe: biofilms; biodegradation; the biodeterioration of materials and methods of prevention; and the bioremediation of environmental contaminants.
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Classification	Science > Microbiology
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Available grade	Achieved
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Guidance Information

- Glossary
Biodegradation is the process whereby large, complex compounds are broken down by microorganisms, their enzymes or secretions into smaller less complex compounds. These may be aerobic or anaerobic processes.
Biodeterioration is 'any undesirable change in the properties of a material caused by the vital activity of microorganisms' defined by Hueck, H.J. (1965). *The biodeterioration of materials as part of hylobiology*. Mater.org.,1(1), 5-34.
Bioremediation is the process that uses microorganisms, fungi, green plants or their enzymes to return the natural environment altered by contaminants to its original condition. This includes phytoremediation.
- Recommended for entry: Unit 8023, *Demonstrate and apply knowledge of microorganism biochemical pathways*; or demonstrate equivalent knowledge and skills.

Outcomes and performance criteria

Outcome 1

Describe biofilms.

Performance criteria

- Formation of a biofilm is described in terms of the five stages of biofilm development.
- The advantages of biofilm formation are described in relation to the microorganism forming the biofilm.

- 1.3 Advantages and disadvantages of biofilm formation are described in terms of human activity.

Range human activity includes – industrial, medical.

Outcome 2

Describe biodegradation.

Performance criteria

- 2.1 The role of microorganisms is described in relation to biodegradation of natural materials.
- 2.2 The role of microorganisms is described in relation to biodegradation of xenobiotic compounds.

Outcome 3

Describe the biodeterioration of materials and methods of prevention.

Range four of – textiles, timber, fuels, glass, stone, concrete, rubber, leather, metals.

Performance criteria

- 3.1 Impact of biodeterioration on materials is described.
- 3.2 Chemical and/or physical methods for the prevention of biodeterioration are described.

Outcome 4

Describe the bioremediation of environmental contaminants.

Range environmental contaminants include but are not limited to – sewage, oils, pesticides, mine tailings.

Performance criteria

- 4.1 Bioremediation is described in terms of the environmental contaminant.
- 4.2 Microbial mode of action is described in relation to the environmental contaminant.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	22 December 1996	31 December 2014
Revision	2	19 February 1998	31 December 2014
Review	3	23 November 1999	31 December 2014
Review	4	21 May 2010	31 December 2025
Rollover	5	27 January 2015	31 December 2025
Review	6	27 September 2018	31 December 2025
Review	7	30 November 2023	31 December 2025

Consent and Moderation Requirements (CMR) reference	0113
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.