NANOWARE Curriculum

MODULE 1: WHAT IS NANOTECHNOLOGY?

ASSESSMENT

DELIVERABLE: R1/T1.1

NANOWARE

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Contents

1. Assessment

The following sections aim to support you in the self-reflection process of your knowledge and skills. Answer the questions wisely based on what you have learned. Tips and feedback will be provided to motivate you learn more about the topic!

1.1 Knowledge Assessment

This part includes quiz-like questions for you to reflect on your knowledge!

Take your time to answer the ten (10) following questions!

Question 1.1 (multiple choice or true/false):

What does nano stand for?

[One tenth]

[One billionth]

[One hundredth]

[generic feedback]: The learner must now be able to understand how small nanoscale is.

Question 1.2 (multiple choice or true/false):

What is nanotechnology?

[The manipulation of matter at the nanoscale]

[The observation of atoms and molecules]

[The technology of very small devices]

[generic feedback]: The learner should appreciate the fact that nanotechnology intervenes in matter at the nanoscale and can alter its properties up to a certain degree.

Question 1.3 (multiple choice or true/false):

What does microscopy do?

[It views and studies structures and properties of materials]

[It alters the structure of materials]

[It studies properties of matter at the nanoscale]

[generic feedback]: By now, the learner should be able to distinguish between scientific fields working at different scales.

Question 1.4 (multiple answers correct):

Microtechnology is the technology that:

[creates miniature components, equipment, and systems for multidisciplinary purposes]

[uses miniature components, equipment, and systems for multidisciplinary purposes]

[uses microscopes to observe nanoparticles]

[alters matter properties at the nanoscale]

[generic feedback]: The learner should a have a clear idea about the uses of different technologies.

Question 1.5 (multiple answers correct):

Nanoparticles were used:

[In the 4th century AD by Romans]

[In prehistoric Eurasia]

[In schools, during WW1]

[In the Middle Ages]

[generic feedback]: The learner must be able to distinguish between the use of nanoparticles and the creation of nanotechnology

Question 1.6 (multiple answers correct):

This person is considered the father of nanotechnology:

[Marie Curie]

[Louis XIV of France]

[Richard Feynman]

[Nori Taniguchi]

Question 1.7 (multiple answers correct):

Nanotechnology evolved thanks to the development of:

[microscopes]

[computers]

[STM & AFM]

[generic feedback]: The learner must understand that, historically, nanotechnology took a lot of effort and many years to reach the state it is in today.

Question 1.8 (matching):

Match the terms with their definitions.

Macroscale: The geometry on the order of millimeters and above.

Microscale: The scale that refers to submillimeter length scales down to the micrometer range.

Nanoscale: This scale (1-100 nm) refers to matter measured in extremely small units of length called nanometers.

Microtechnology: The technology that creates or uses miniature components, equipment, and systems for multidisciplinary purposes.

Nanotechnology: The understanding and control of matter at the nanoscale.

[generic feedback]: The learner must now be able to distinguish between different scales and technologies.

Question 1.9 (matching):

Match the concepts with their explanations.

Micrometer: 10^{-6} (a millionth) of a meter.

Nanometer: 10^{-9} (a billionth) of a meter.

Microscope: The device used to view and study structures and properties of materials.

Nanoparticle: A particle of matter that is between 1-100 nm in diameter.

Nanostructure: A structure that ranges between 1-100 nm in at least one dimension.

[generic feedback]: The learner should be able to grasp the difference between different units of measurement.

Question 1.10 (matching):

Match the components with their scale.

A strand of hair: Macro

A red blood cell (about 7 micrometers in diameter): Micro

The DNA helix (0,002 micrometers wide or 2 nm wide): Nano

[generic feedback]: The learner will get familiarized with distinguishing between different scales.

1.2 Skills Assessment

This is the part where your knowledge is being put into action!

Train your brain with the skills you gained through this module and think through a possible answer to the following assignment!

A scientist wants to intervene in the structure of matter to create objects with new properties. Which technology should they use?

Answer: They should use Nanotechnology

(Nanotechnology is the ***understanding and control of matter at the nanoscale*** (NGS, 2022). At this scale, materials present ***unique physical, chemical, mechanical, and optical properties***; the manipulation of materials in the nanoscale can produce ***new structures, materials and devices*** thanks to their special properties).