

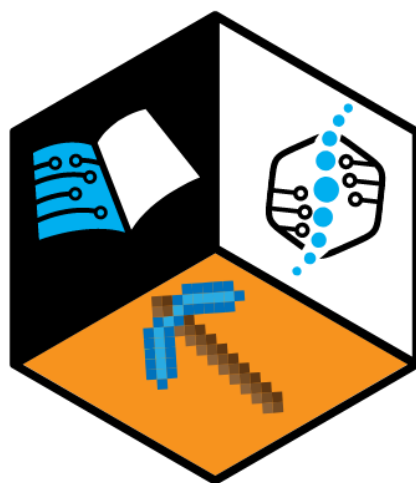
# NANOWARE Curriculum

## MODULE 2: NANOMATERIALS

### ASSESSMENT

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**DELIVERABLE: R1/T1.1**



# NANOWARE

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DIGICULT

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## Contents

1. Assessment.....	3
1.1 Knowledge Assessment .....	3
1.2 Skills Assessment.....	7

# 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 2.1(multiple choice or true/false):**

**Natural nanomaterials:**

[Are engineered to be used in nature]

**[Occur naturally in the world]**

[Are used to eliminate pollution]

[generic feedback]: Learners understand the difference between natural and artificial nanomaterials.

**Question 2.2 (multiple choice or true/false):**

**Artificial nanomaterials:**

**[Occur because of human activity]**

[Occur naturally]

[Are bioproducts of environmental phenomena]

[generic feedback]: Learners understand the difference between natural and artificial nanomaterials.

Question 2.3 (multiple choice or true/false):

Fullerenes are:

**[Allotropes of carbon]**

[Bulk metals]

[Organic matter]

[generic feedback]: Learners are becoming familiar with the different types of nanomaterials.

Question 2.4 (multiple answers correct):

The following nanomaterials occur naturally in the world:

**[Volcanic ash particles]**

**[hemoglobin]**

[pollution particles]

[welding fumes]

[generic feedback]: Learners understand the difference between natural and anthropogenic nanomaterials.

Question 2.5 (multiple answers correct):

Anthropogenic nanomaterials are:

**[Incidental]**

[Natural]

[Found in space]

**[Intentionally produced]**

[generic feedback]: Learners understand the difference between natural and anthropogenic nanomaterials.

**Question 2.6 (multiple answers correct):**

**Nanomanufacturing uses the following approach:**

[linear]

[nonlinear]

**[top-down]**

**[bottom-up]**

**Question 2.7 (multiple answers correct):**

**Nanotechnology can produce:**

[Organic foods]

[Compostable packaging]

**[stronger materials]**

**[lighter materials]**

[generic feedback]: Learners understand the properties of nanomaterials.

**Question 2.8 (matching):**

**Match the terms with their definitions.**

1 Nanomaterials: Any organic, inorganic, or organometallic material that present chemical, physical, and/or electrical properties that change as a function of the size and shape of the material.

2 Anthropogenic nanomaterials: Incidental and intentionally produced/engineered nanomaterials - the result of direct or indirect human influence.

3 Incidental nanomaterials: Unintentionally produced nanomaterials – the result of any form of direct or indirect human influence or anthropogenic process.

4 Artificial nanomaterials: Nanomaterials that occur because of human activity.

5 Nanocomposites: Hybrid materials that combine two or more materials, at least one of which is a nanomaterial.

[generic feedback]: Learners understand the different types of nanomaterials and their characterization.

### Question 2.9 (matching):

**Match the concepts with their explanations.**

1 Fullerenes: Allotropes of carbon

2 Nanotubes: Tubular fullerenes

3 Buckyballs: Nanometer-sized carbon molecules shaped like soccer balls—tightly bonded hexagons and pentagons.

4 Dendrimers: Complex, treelike nanoparticles built from linked, branched units that compose extremely strong structures.

5 Nanocomposites: Hybrid materials that combine two or more materials, at least one of which is a nanomaterial

[generic feedback]: Learners can distinguish between different syntheses and characterizations of nanomaterials.

### Question 2.10 (matching):

Match the problems with their solutions.

**1 Scientists seek better ways to treat wounds: Nanoparticles can be incorporated into bandages to trap microbes and enhance tissue regeneration.**

**2 Scientists seek better ways to treat cancer: Nanoparticles can be manipulated so as to detect and attach themselves to specific proteins or diseased cells without harming healthy tissue.**

**3 Scientists want to create fine particles in nano dimensions using bulk materials: They should perform top-down nanomanufacturing.**

**4 Scientists want to create nanomaterials by assembling fine particles: They should perform bottom-up nanomanufacturing.**

**5 Scientists want to explore the combination of materials, using at least one nanomaterial: They should create nanocomposites.**

[generic feedback]: Learners appreciate the vast potential of nanomaterials.

## 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!

Electronic engineers are seeking ways to create smaller, faster, and lower consumption systems. What can they do?

Answer: They can use nanotechnology to create nanostructures and devices within the nanometer range.