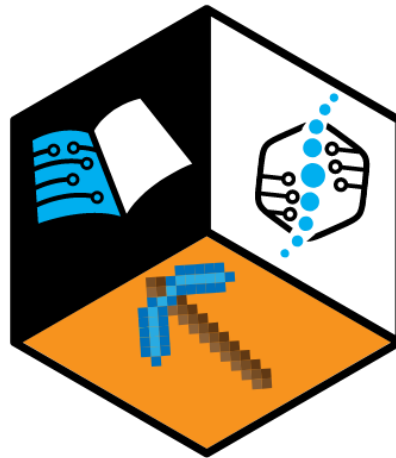


MODULE 1-WHAT IS NANOTECHNOLOGY?

RESULT: R1/T1.3. LESSON PLAN



NANOWARE

31.01.2023

Authored by: Anna Stamouli

Project Number: 2021-2-PL01-KA220-SCH-000051200



Co-funded by
the European Union

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



Table of Contents

Lesson Information	3
Lesson Procedure	3
Activity 1: “What is Nanotechnology” video.	4
Materials Needed	4
Activity Procedure.....	4
Activity 2: Measure your hand in manometers!.....	4
Materials Needed	4
Activity Procedure.....	4
Activity 3: “Intro to Nano” video	5
Materials Needed	5
Activity Procedure.....	5
Activity 4: “History of Nanoscience” video	5
Materials Needed	5
Activity Procedure.....	5



Lesson Information

Title: What is nanotechnology?

Subject:

Grades: 9-12

Brief Description: Students will understand the basic principles and differences in Macro, Micro, and Nano technology and they will learn the basics about the history and evolution of nanotechnology.

Objectives: Students will be able to:

Distinguish between macro, micro and nano scales.

Apprehend the nanoscale and learn to calculate in nanometres.

Learn historical facts about the history and evolution of nanotechnology.

Duration: 2 lessons for theory and video-watching, 2 lessons for activities (each lesson lasts 40 minutes)

Lesson Procedure

This lesson introduces students to the basic concepts and differences in scales: it distinguishes between macro, micro and nano scales and provides real-life examples to which students can relate. Consequently, the lesson aims at helping students perceive the idea of nanoscale, by learning the basics of manometers and by highlighting the differences in mater-properties at this scale, so as to ease students into the idea of manipulation of matter.

Lastly, the lesson will present historical facts about the history and evolution of nanotechnology, so as to help students understand its importance in real life.

First, ask students to look around and choose an item.

- The scale of anything visible to the naked eye is macro!

Then, ask students to find a dust particle.



- The scale of dust particles is micro, and you need a microscope to see them! (At this point, you may need a photo of a microscope, and a photo taken through a microscope to show a magnified image of an object).

Then ask students to look at a strand of hair and when confusion sets in, show them the following video!

Activity 1: “What is Nanotechnology” video.

Students will watch a video introducing nanoscale and nanotechnology with a help of a strand of hair!

Materials Needed

- Internet connection, YouTube access.

Activity Procedure

Win your students’ attention by showing them this introductory video:

<https://www.youtube.com/watch?v=xW8Oocsw9s>

Then discuss various complex materials and structures and see if students can guess their scale.

Activity 2: Measure your hand in manometers!

Students will measure their hands (or any common item of their preference) and then convert the result into nanometres.

Materials Needed

- Any common item measurable by a ruler. A ruler for each student. A calculator.
- A classroom board where the following is clearly written:
1 millimetre = 1,000,000 nanometres
1 centimetre= 10,000,000 nanometres

Activity Procedure

Students will work alone or in groups or in pairs. They will measure their hands (if they think it is fun!) or any other common item in the classroom with rulers. Afterwards, they will convert their result into nanometres.



Activity 3: “Intro to Nano” video

Students will watch a video introducing nano in a fun and informative way.

Materials Needed

- Internet connection, Vimeo access.

Activity Procedure

Show “*Intro to Nano*” to your students: <https://www.nisenet.org/whatisnano>
(<https://vimeo.com/11362918>).

Then, discuss how material properties (physical and chemical) in different scales can be used in various industries, like medicine.

Activity 4: “History of Nanoscience” video

Students will watch a video introducing the history of nanoscience from ancient times to modern extraordinary applications, like the latest nanochip technology.

Materials Needed

- Internet connection, YouTube access.

Activity Procedure

Show “*History of Nanoscience*” to your students: <https://www.youtube.com/watch?v=YHPiQuZ0U0>

Then, discuss existing applications of nanotechnology and even urge students to come up with new ones!