Course: **Chemistry in use: materials in our daily life**

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Language of Instruction: English

Syllabus:

This course presents basic understanding about the materials around us. At the end the students will be able to answer:

- Why do we employ copper to manufacture wires?
- Why do we employ plastics to cover them?
- Why is a pop can made of aluminium?
- What is the strongest material known?
- How did ancient smiths produce nanostructures in their swords?

Materials development has been strongly linked with human evolution. From the caveman to the spaceman, humanity has selected and modified natural materials in order to manufacture tools to make their daily life easier. In this course we will discover where the distinctive properties of materials come from. This knowledge will help us to understand why the selection of materials was made in the manufacturing of the everyday objects.

The course will follow this structure:

- Lesson 1: Why are there different types of materials?

What are materials? To answer that we will learn the chemical composition and structure of materials and the origin of their properties, this is, why materials behave as they do. Moreover, a general classification will be established which will help us to understand the common properties of each family.

- Lesson 2: Understanding metals

If we pay attention to things around us we could notice that metals are employed to manufacture pop cans, wires, car bodies or supportive beams. In this lesson we will learn why.

- Lesson 3: Understanding ceramics

It is general knowledge that ceramics, as bricks or window glass, are hard and brittle. Comparing their properties to those of metals we can easily see how different they are. We will inquire into the reasons for such differences.

- Lesson 4: Understanding polymers

Our generation is trying to cut out disposable plastics, but is this really possible? What are the properties that make them so difficult to replace?

- Lesson 5: Combining properties of interest: composite materials

What about if we need a material as deformable as a polymer but with the resistance of a metal? Then, composite materials can come to the rescue.

- Lesson 6: Choosing the right material

Your cell phone casing was made of a plastic, instead of metal or ceramic. Can you now make an educated guess as to why? In this lesson we will learn the basic principles of material selection.

- Lesson 7: Developing new materials: is it needed?

There are thousands of materials, do we need more? What materials are scientists working on? We will find the latest in Materials Science.

References

Digital class material uploaded to the Virtual Classroom (Powerpoint presentations, informative articles in the media, videos and tv programs, etc)

Evaluation

The assessment of student progress will be carried out based on the following activities:

- Proposed teamwork projects and presentations (25% of the grade).
- Online questionnaires (Kahoot) (25% of the grade).
- Final exam (50% of the grade).

Didactic method

The didactic model employed to teach the mentioned contents will be founded on active learning, based on a student-centered approach.