



Course Description

In an increasingly technical and specialized world, the need of a scientific and technologically literate citizenship has never been greater. Understanding the principles underlying scientific and technological knowledge and the practices and processes related to it is crucial to critical thinking and active collaboration in the problems of today's society. Nevertheless, numerous reports warn about the incapacity of the educational system to offer quality scientific and technological education able to respond to such demands. (European Commission, 2015; OECD, 2005, 2006; Osborne y Dillon, 2008; UNESCO, 2008)

As a result, the European Union elaborates the report "Science education for a responsible citizenship" (UE, 2015) emphasising the need to teach sciences from a multidisciplinary STEM approach (Science, Technology, Engineering and Mathematics) that can contribute to our understanding and knowledge of problem solving as well as to guarantee equal opportunities for all students to excel at science learning. STEM Education implies:

- Responding to economic challenges present in all nations,
- Identifying the evolving needs of workers towards a more flexible knowledge and new skills to adjust to today's work and social requirements, and
- Emphasizing the need to resolve technological and environmental problems through scientific education of students. (Bybee, 2013, NRC, 2014, EU, 2015).

That is, STEM education is a model aimed to collaborate with promote and improve the study of the different disciplines its name stands for, specially focusing on their relevance and social responsibilities.

STEAM education guarantees the transversal aspects of education in order to achieve a greater contextualization and significant learning.

Competences

Upon completion of this course, participants will be able to:

- Check and develop their pedagogical and communication skills.
- Know, in a practical way, how STEAM in the early education stage plays a positive role in improving creativity, innovation, commitment, problem-solving skills and other cognitive benefits of students, and in terms to improve teamwork, communication and adaptability skills for the future.
- Know how to orient a STEAM curriculum to activity, causing children to rush through various activities and materials.
- Be able to focus students on a specific problem, emphasizing the use of science, technology, engineering, art or mathematics and other interrelated knowledge to solve real problems.
- Integrate game elements, methods and frameworks into educational activities, so as to cultivate their interest in exploring activities, promote their scientific attitude and mastery of knowledge and skills, and lay the foundation for their practice and problem solving.

Methodology

The motto of this course is "Learning by Doing".

We will make a tour through all the fields forming STEAM education and we will develop several multidisciplinary projects in relation to specific fields.

At the end of the course, participants will have created their own STEAM project based on a curricular subject and using the necessary programming tools and/or game.

Results

The skills acquired by the participants can be useful for:

- Promoting the use of programmes to create stories, games and activities in an intuitive way.
- Providing students with knowledge that will help them later during their careers.
- Selecting materials that allow to execute all the ideas of the group.
- Designing a modern classroom that meets present and future needs.
- Enhancing students' critical and transversal thinking, achieving a meaningful learning that will enable them to solve problems inside and outside the classroom.
- Educating more competitive citizens for the present and the future in an organic way, enhancing their interest towards STEAM fields.
- Being able to attract the attention and curiosity of their students, and therefore promoting the technical vocations of the future.
- Assisting in the research of new ICT educational tools, even in their invention.

DAY 1. Lego Duplo. A day for the little ones.

9.00- Welcome Session.
9.30

9.30- What does STEAM Education mean?
10.00

10.00- Why is it necessary to talk about robotics and programming in a STEAM Classroom?
11.00

11.00- Coffee Break.
11.15

11.15- Which software and materials can we use in our projects? EARLY MACHINES LEGO EDUCATION – This activity includes gears, levers, pulleys, wheels and axles, and a plastic punch-out sheet with eyes, sails, scales and wings. Hands-on learning provides a medium for building ideas and models while practising important skills such as
12.00 communication, collaboration, critical thinking and creativity. For more than 40 years, LEGO Education has been developing solutions based on a well-established educational theory that children learn best and remember more through hands-on experiences.

12.00- Break
12.15

12.15- CREATIVE BUILDERS LEGO EDUCATION – In this activity, we try to develop an understanding of 2D and 3D shapes. The game is designed to encourage collaboration and storytelling. It also helps develop the use of descriptive language and a sense of the
14.00 different roles and emotions that relate to community life.

DAY 2. Stories and programming: the development of creativity.

9.00- Workshop1: STORY TALES WITH LEGO EDUCATION – In this activity we try to promote creativity, imaginative storytelling and language development with this unique and
11.00 engaging storytelling game. In your class, students will naturally collaborate and develop speaking and listening skills as they build their stories and role plays.

11.00- Coffee Break.
11.15

11.15- Introduction for the Workshop 2 : BEEBOT. SEQUENTIAL PROGRAMMING IN A BEE.
12.00

12.00- Break
.12.15

BEEBOT: Our robotic bee friend is a perfect starting point for teaching control, directional language, and programming. It is also a fantastic resource for transdisciplinary activities and with it, meaningful game-based learning is possible! Students will also find it more accessible to everyone, including those with auditory or visual processing needs.

DAY 3. A step forward.

9.00- 11.00 Workshop 1: LEGO Education WeDo 1.0 – This set allows us to build and program robots by using motors, sensors and LEGO pieces.

11.00- 11.15 Coffee Break.

11.15- 14.00 Workshop 2: SCRATCH JUNIOR – Coding is the new literacy! With ScratchJr, young children can program their own interactive stories and games. In the process, they learn to solve problems, design projects, and express themselves creatively on the computer.

DAY 4. Engineering.

9.00- 11.00 Workshop 1: SIMPLE MACHINES LEGO EDUCATION – Engineering, mechanics, physics, science, ... and much more. Fun as a way to reach the little ones.

11.00- 11.15 Coffee Break.

11.15- 14.00 Workshop 2: ARTIFICIAL INTELLIGENCE. Artificial intelligence seems like an endless world, even for adults. But from an early age you can understand how machines learn from simple models, with hundreds of examples...

DAY 5. My own STEAM project.

9.00-11.00 Participants will choose a curricular topic of any subject and design a project to implement in their classroom, based on the STEAM methodology (part 1).

11.00-11.15 Coffee Break.

11.15-12.30 Participants will choose a curricular topic of any subject and design a project to implement in their classroom, based on the STEAM methodology (part 2).

12.00-12.45 Project presentation

12.45-13.00 Break

13.00–14.00 Final evaluation of projects and Goodbye Session.