CREATIVE ROBOTICS (MASTED-01-14)				
DEGREE PROGRAM:		Master in integrated STEAM Education (MASTED)		
SEMESTER:	**TYPE:**	**CREDITS:**	**WORKLOAD:**	**MENTORING:**
First	Basic	3 ECTS	75 hours	5 hours/week
LANGUAGE: Portuguese/English				

OBJECTIVES	
General	To Identify and use the main robotic platforms used in an educational context.
Specific	• To understand the constituent elements of a robot. • To understand basic concepts of control and navigation of a robot in a known and unknown environment. • To understand the basic functions of accessing sensory information and acting on a robot. • To create movement sequences for robot navigation, through graphic language, in a known and unknown environment. • To adapt tools (grippers) to the robot that allow it to interact with the environment.

SUBJECT MATTER

Robotics has been widely used in learning environments. In addition to favouring the development of skills related to science and technology, robotics can also contribute to learning other areas of knowledge. In this curricular unit, students will analyze different robotic platforms used in the educational context. Multidisciplinary contexts will be explored where robotics is the vehicle for creating the student's connection to a particular learning context. This will be followed by studying the operating principle of the constituent elements of a robotic system. The study of these elements and their parameterization will be carried out from the study and application of simple examples in practical experiences using development environments based on block-based visual programming. This study will then be substantiated by experiments linking sensory elements to action elements, allowing consolidation of programming elements for flow control and cycles. Finally, the experiences will be aligned to stimulate the student's creativity and promote the design/use of tools that allow the robotic system to interact with the scene where it moves.

COMPETENCES

- C1: Developing knowledge and understanding in creative robotics.
- C2: Developing advanced cognitive and procedural skills associated with knowledge development and creation.
- C5: Developing of assess in order to evidence learning and to improve the learning process and the teaching practices.
- C9: Integrating the theoretical knowledge acquired throughout the course with field practice.
- C10: Developing communication and cooperation skills with different stakeholders.
- C14: Developing advanced digital competences.
- C15: Developing digital pedagogy competences to use, plan and implement new technologies.
- C16: Developing of professional commitment using digital technologies.

LEARNING OUTCOMES	
Knowledge	• Curricular knowledge. • Knowledge of contextual, institutional, organizational aspects of non-formal educational settings. • Knowledge of robotics
Skills	• Ability to use block-based visual programming • Ability to uses robots for improving STEAM educational settings
Attitudes/values	• Commitment for promoting the learning of all students. • Disposition to examining, discussing, questioning one's own practices. • Improvement of attitudes of research, innovation, collaboration, autonomous learning.

	• stimulate the student's creativity in order to promote the design/use of tools that allow the robotic system to interact with the scene in which it moves. • Disposition to flexibility and ongoing learning.
TEACHING METHODS	
The course comprises a combination of theoretical and practical methodologies with laboratory practices. Student assessment includes: a) delivery of periodic worksheets of experimental achievements (minimum average grade 9.5); b) completion of a written assessment test (minimum grade of 9.5); At the end of each class, the teacher will provide an activity for development outside of class and for expanding the knowledge developed in it. Thus, at the beginning of each class, a worksheet should be carried out that will allow the assessment of acquired skills and the autonomous study carried out by the student. To carry out these activities, the student may have to use the robotic platforms that will be used throughout the course, thus providing a theoretical-practical and laboratory dimension. The classes after this initial moment will follow an approach based on the realization of problems, where, gradually, new learning elements, technical or conceptual, will be added, allowing to reach a solution to the problem.	
EVALUATION	
Assessment = 0.5 x worksheets + 0.5 x written test Students who have not achieved a positive assessment in the normal season will have access to the appeal and special season as long as they have obtained a positive assessment in the worksheets.	
PRECONDITIONS	
None	
DEPARTMENT	Electronics and Instrumentation
LECTURERS	João Vilaça
LITERATURE	• Myint Swe Khine (Ed.), Robotics in STEM Education (2017), Springer International Publishing, DOI: 10.1007/978-3-319-57786-9 • Loh Sau Cheong, Transforming Classroom Practice through Robotics Education (2018), Cambridge Scholars Publishing, ISBN: 1527515761 • Munir Merdan, Wilfried Lepuschitz, Gottfried Koppensteiner, Richard Balogh, David Obdržálek, Robotics in Education (RiE 2021), Springer International Publishing, DOI:10.1007/978-3-030-82544-7 • Joe Olayvar & Evelyn Lindberg, LEGO Mindstorms EV3 Programming Basics (2016), washington State Library Library Development Team • User Guide, Mindstorms Education Ev3 (2016), LEGO.