SENSORS AND ACTUATORS (MASTED-01-13)				
DEGREE PROGRAM:	Master in integrated STEAM Education (MASTED)			
SEMESTER: First	**TYPE:** Basic	**CREDITS:** 3 ECTS	**WORKLOAD:** 75 hours	**MENTORING:** 5 hours/week
LANGUAGE: Portuguese/English				

OBJECTIVES	
General	To acquire the fundamental knowledge and practice of implementing the main types of sensors and actuators used in technologies to support STEAM education.
Specific	• to Know and use programmable electronic rapid prototyping systems used in STEAM education support technologies. • To Know and use the main types of sensors used in technologies to support STEAM education using programmable electronic systems. • To Know and use the main types of actuators used in technologies to support STEAM education using programmable electronic systems.

SUBJECT MATTER
This course is eminently practical. Students should be able to consolidate the knowledge acquired through the practical application of the contents presented by the lecturer in real projects. It will include topics on: Programmable systems for rapid prototyping; Types Interfaces of Sensor and Actuators; Analog Interfaces; Digital interfaces; Sensors and Actuator

COMPETENCES
• C1: Developing knowledge and understanding in sensors and actuators. • 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. • C14: Developing advanced digital competences. • C15: Developing digital pedagogy competences to use, plan and implement new technologies.

LEARNING OUTCOMES	
Knowledge	• Fundamental knowledge and practice of implementing the main types of sensors and actuators used in technologies to support STEAM education.
Skills	• Ability to create systems that are able to interact with the surrounding environment using inputs from sensors and outputs to actuators. • Ability to use sensors and outputs for improving STEAM education
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. • Disposition to flexibility and ongoing learning.

TEACHING METHODS
Classes will be theoretical-practical, where small projects will be solved based on the aforementioned contents. A practical experimental laboratory project will enable students to deepen the knowledge acquired in class, in a completer and more comprehensive project. Students will be invited to direct the project's theme to the teaching area in which they work, aligning visual, mechanical, and logical aspects with subjects covered in the classes they usually teach. Students will be encouraged to use their creativity in order to incorporate the course contents in their teaching experience.

EVALUATION
Grading will therefore be done through a practical experimental lab project, with two reporting phases, followed by a presentation and discussion. Each phase will have a 50% weight for the final grade.

PRECONDITIONS
None

DEPARTMENT	Electronics and Instrumentation
LECTURERS	José Brito
LITERATURE	• Michael Shiloh, Massimo Banzi (2021). Getting Started With Arduino: The Open Source Electronics Prototyping Platform, O'Reilly UK Ltd., 4th edition. • Francisco C. A. Alegria (2021). Sensores e Atuadores, IST Press. • Jonh Park and Steve Mackay (2003). Practical Data Acquisition for Instrumentation and Control Systems, 1st Edition, Oxford.