

COMPUTATIONAL TOOLS FOR DATA SCIENCE (MASTED-01-08)				
DEGREE PROGRAM:		Master in integrated STEAM Education (MASTED)		
SEMESTER: First	TYPE: Basic	CREDITS: 6 ECTS	WORKLOAD: 150 hours	MENTORING: 5 hours/week
LANGUAGE: Portuguese/English				

OBJECTIVES

General	To guarantee the minimum knowledge on programming languages (namely Python) and data manipulation and visualization, for students to be able to complete the master degree.
Specific	<ul style="list-style-type: none"> • To understand and write basic Python scripts; • To know and implement different approaches for data access; • To write code to perform numerical computation and manipulate and present data; • To understand that data can be visualized using different types of graphics; • To know and use different libraries for simple data modelling and image processing.

SUBJECT MATTER

The Computational Tools for Data Science aim to enable students to simultaneously know the instruments at their disposal in the Python language and implement practical solutions that they have structured for concrete situations.

The course initially focuses on the explanation of typical tasks and their corresponding libraries, with some practical demonstrations, and then there is also an emphasis on the practical implementation of systems that use these functionalities. In particular, visualisation and Simple Image Manipulation and Processing in Python

COMPETENCES

- C1: Developing knowledge and understanding in Computational tools for data science.
- C2: Developing advanced cognitive and procedural skills associated with knowledge development and creation.
- 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.

LEARNING OUTCOMES

Knowledge	<ul style="list-style-type: none"> • Knowledge of basic Python programming language, its syntax and programming environment. • Knowledge of data access methods. • Knowledge of Python visualizations
Skills	<ul style="list-style-type: none"> • To recognize the different approaches to presenting data, using different types of graphs. • To explore the data modelling libraries and functions. • To present some image processing libraries and functions.
Attitudes/values	<ul style="list-style-type: none"> • 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 teaching methodology involves presenting the fundamental concepts and practical examples for each topic, in the classroom. Students will then develop projects that encompass several aspects of the syllabus.

EVALUATION	
<p>Grading is done through 5 mini-projects throughout the course, with a written report. Each project has a weight of 20% in the final grade. The minimum grade for each project is 8.</p>	
PRECONDITIONS	
None	
DEPARTMENT	Computer Science
LECTURERS	José Brito
LITERATURE	<ul style="list-style-type: none"> • Andreas C. Müller, Sarah Guido (2016) Introduction to Machine Learning with Python: A Guide for Data Scientists. O'Reilly Media. • Wes McKinney (2017) Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython. O'Reilly Media. • Peters Morgan (2018) Data Analysis From Scratch With Python: Beginner Guide using Python, Pandas, NumPy, Scikit-Learn, IPython, TensorFlow and Matplotlib. AI Sciences LLC. • Fabio Nelli (2018) Python Data Analytics: With Pandas, NumPy, and Matplotlib. Apress. • Kieran Healy (2019) Data Visualization: A Practical Introduction. Princeton University Press. • Danyel Fisher, Miriah Meyer (2018) Making Data Visual: A Practical Guide to Using Visualization for Insight. O'Reilly Media.