ThinkBS 205 Software Tools for Mathematics (Intermediate)

Offered in Universidad San Jorge

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Course Description:

The principal objective of this course is to give a short introduction to different technologies widely used in the world of mathematics and engineering to solve, visualize and communicate results.

This course is divided into four parts to analyze four different kinds of software for mathematics: R, for basic data analysis and visualization; Matlab/Octave, to develop simple programs to solve algebraic or numerical problems; Python, for visualizing time series and perform Furier analysis; LaTex, to be able to produce documents with LaTex in a mathematical context.

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| R | Matlab/Octave | Python | Latex |
| * Introduction to R. * Data types and objects manipulation. * Data exploration, descriptive statistics and visualization. * Defining functions. * Control structures: for, while and conditional if | * Introduction to Matlab and Octave as free software alternative. * Solving systems of equations. Diagonalization of matrices. * Differential and integral calculation. | * Introduction to Python. Data types and variables. Control structures. * Scipy, numpy and matplotlib. * Fourier analysis with Python | * Starting with LaTeX: The environment, main elements of a document, ect. * Writing Mathematics in LaTeX * Images, Tables, lists and other elements in Latex |

Bibliography:

1. Rossant, C. (2018). IPython Interactive Computing and Visualization Cookbook.Packt Publishing Ltd.  
2. Overleaf documentation <https://www.overleaf.com/learn/latex/Main_Page>  
3. G. Grätzer: Math into LATEX. Birkhäuser-Springer (2000).  
4. H. Kopka y P. W. Daly: A Guide to LATEX

Mode of Delivery : (in class / online / blended) Blended

Prerequisites by topic: None.

Language of Instruction: English

Course Objectives: To give a short introduction to different technologies widely used in the world of mathematics and engineering to solve, visualize and communicate results.

Course Contents:

R - Matlab/Octave – Python - LaTeX

Learning Outcomes of the Course Unit:

1. To use R for basic data analysis and visualization.

2. To develop simple programs in Matlab/Octave to solve algebraic or numerical problems.

3. To use Python for visualizing time series and perform Fourier analysis.

4. To be able to produce documents with LaTeX in a mathematical context.