

Academic Year: ( 2023 / 2024 )

Review date: 21-04-2023

Department assigned to the subject: Mathematics Department

Coordinating teacher: PEREZ PARDO, JUAN MANUEL

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 1

## OBJECTIVES

Introduction to popularization and research in applied and computational mathematics. Students will have a first contact with research through participation in seminars and will learn about research topics in the Department of Mathematics. Students will be introduced to the use and management of professional software that allows the creation and sharing of code, results, their visualizations and descriptions with rich text both statically and interactively (Latex, Jupyter Notebook, Mathematica and / or Maple) . The use of this software allows and expands the ability to share results and collaborative work, fundamental aspects in research and the applications of mathematics to society. On the other hand, it constitutes a very important tool for the teaching of Mathematics since it allows the creation of didactic and dissemination resources.

Basic skills:

- CB9: That students know how to communicate their conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way.
- CB10: That students possess the learning skills that allow them to continue studying in a way that will have to be largely self-directed or autonomous.

General Competences:

- CG3: Be able to promote new scientific-technological developments in a work environment.
- CG5: Be able to communicate their conclusions clearly and precisely.
- CG6: Be able to study and research independently.
- CG7: Be able to work in a team and manage the working time available.

Specific Competences:

- CE1: Understand and use mathematical language.
- CE3: Be able to abstract structural properties and distinguish them from those that are purely occasional.
- CE4: Be able to solve mathematical problems, planning their solution according to the available tools and time and resource constraints.
- CE14: Acquire an entrepreneurial and innovative spirit.

## DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to research and doctoral topics in the Department of Mathematics
2. Introduction to Notebooks for Scientific Use
3. Introduction to Latex
4. Numerical and symbolic calculus software
5. Data visualization tools
6. Data interaction tools (e.g. widgets)

## LEARNING ACTIVITIES AND METHODOLOGY

- AF1: Theoretical Lessons
- AF2: Practical Lessons
- AF3: Office hours
- AF4: Group work
- AF5: Individual student work
- AF6: Final Assessment

- AF7: Attendance to scientific seminars
- AF7: Participation in a round table with researchers from the Department of Mathematics.

#### ASSESSMENT SYSTEM

- SE1: Class participation
- SE2: Individual or group work carried out during the course
- SE3: Final assessment

<b>% end-of-term-examination:</b>	25
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	75

#### BASIC BIBLIOGRAPHY

- Frank Mittelbach, Michel Goossens The LaTeX Companion (2nd Edition), Addison-Wesley, 2004
- Hans Petter Langtangen A Primer on Scientific Programming with Python (5th Edition), Springer, 2016

#### ADDITIONAL BIBLIOGRAPHY

- Donald E. Knuth The TeXBook, Addison-Wesley, 1990
- K. L. Turabian A Manual for Writers of Term Papers, Theses, and Dissertations, University of Chicago Press, 1996
- N.E. Steenrod How to write Mathematics, American Mathematical Society, 1983
- S. Krantz A primer of mathematical writing, American Mathematical Society, 2017
- W. C. Booth, G. G. Colomb, J. M. Williams, J. Bizup, and W. T. FitzGerald The Craft of Research, University of Chicago Press, 2016

#### BASIC ELECTRONIC RESOURCES

- Jupyter Team, <https://jupyter.org>. . The Jupyter Notebook Documentation: <http://jupyter-notebook.readthedocs.io/en/latest/>