

**COURSE DATA****Data Subject**

|                      |                     |
|----------------------|---------------------|
| <b>Code</b>          | 34160               |
| <b>Name</b>          | Computational tools |
| <b>Cycle</b>         | Grade               |
| <b>ECTS Credits</b>  | 6.0                 |
| <b>Academic year</b> | 2020 - 2021         |

**Study (s)**

| <b>Degree</b>                                    | <b>Center</b>                                 | <b>Acad. year</b> | <b>Period</b> |
|--|---|-------------------|---------------|
| 1107 - Degree in Mathematics                     | Faculty of Mathematics                        | 1                 | Second term   |
| 1928 - Double Degree Program Physics-Mathematics | Double Degree Program Physics and Mathematics | 1                 | Second term   |

**Subject-matter**

| <b>Degree</b>                                    | <b>Subject-matter</b>          | <b>Character</b> |
|--|--------------------------------|------------------|
| 1107 - Degree in Mathematics                     | 7 - Information technology     | Basic Training   |
| 1928 - Double Degree Program Physics-Mathematics | 1 - Primer Curso (Obligatorio) | Obligatory       |

**Coordination**

| <b>Name</b>                    | <b>Department</b>         |
|--------------------------------|---------------------------|
| ARANDIGA LLAUDES, FRANCESC     | 255 - Applied Mathematics |
| BAEZA MANZANARES, ANTONIO      | 363 - Mathematics         |
| YAÑEZ AVENDAÑO, DIONISIO FELIX | 363 - Mathematics         |

**SUMMARY**

The purpose of the subject of Computer Tools subject is the provision of those specific computer skills needed by the student along the degree in mathematics. It is, therefore, an eminently methodological subject, in the sense of the above provision, but by no means devoid of specific mathematical contents such as functional calculus, basic linear algebra and solving linear and nonlinear equations, from the computational techniques which are illustrated, whether symbolic or numeric.

Through the presentation by the student or exercises and assignments, you will be entered into the system



using LaTeX for scientific writing with mathematical language.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

The necessary basic knowledge for the start of this course will have completed courses in computer science, mathematical analysis and linear algebra I and geometry.

## COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

### 1107 - Degree in Mathematics

- Capacity for analysis and synthesis.
- Capacity for organization and planning.
- Solve problems that require the use of mathematical tools.
- Ability to work in teams.
- Learn autonomously.
- Adapting to new situations.
- Apply the knowledge in the professional world.
- Expressing mathematically in a rigorous and clear manner.
- Reason logically and identify errors in the procedures.
- Capacity of abstraction and modeling.
- Participate in the implementation of software and learn mathematical software.
- Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.
- Visualize and interpret the solutions obtained.

## LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

Introduction to general programs of symbolic computation: Mathematica, MatLab or equivalent.

Introduction of the idea of precision in the calculations and the knowledge of numerical representation in the computer to control such accuracy.

Deepening the knowledge of MatLab through basic issues as the basic matrix calculation and the solution of nonlinear equations.



Introduction to the LaTeX system for scientific writing with symbology of mathematical language.

## DESCRIPTION OF CONTENTS

### 1. Basic algorithms in Matlab

Programming in Matlab.  
Basic matrix calculation.  
Algorithms for solving nonlinear equations.

### 2. Edition of scientific texts (LaTeX)

Introduction to LaTeX language  
Integrated environments LaTeX (WinEdt or equivalent)

### 3. Representations and numerical calculations with finite precision

Representations of integer numbers.  
Representations of real numbers.  
Sources of error in numerical computations

### 4. Symbolic computation

Introduction to symbolic computation with Mathematica, Matlab or equivalent.  
Representation, differentiation and integration of functions of one variable

## WORKLOAD

| ACTIVITY                                     | Hours         | % To be attended |
|--|---------------|------------------|
| Computer classroom practice                  | 30,00         | 100              |
| Theory classes                               | 30,00         | 100              |
| Other activities                             | 7,50          | 100              |
| Preparation of evaluation activities         | 20,00         | 0                |
| Preparing lectures                           | 37,50         | 0                |
| Preparation of practical classes and problem | 25,00         | 0                |
| <b>TOTAL</b>                                 | <b>150,00</b> |                  |



## TEACHING METHODOLOGY

The development of the course is structured around three axes: the theory sessions, practical sessions (in the classroom with computer) and tutorials and seminars.

As regards the former, the teacher will develop the main agenda items, using computer classroom where necessary to illustrate a particular point. The student must attend at the time of preparation of the classes scheduled for their optimal use. The practical classes so that students will check the level of acquired knowledge, facing relatively complex problems and analyzing the results. As before, students must prepare such sessions to perform experiments in the schedule.

## EVALUATION

Learning assessment of knowledge and skills achieved by students will be continuously throughout the course and will consist of the following blocks of assessment:

Theory and practice: since the objectives of the course Computer Tools focus on the strengthening of computer calculation techniques, this evaluation will be conducted in two stages:

- i. Continuous assessment of participation and reporting, with code results and comments in the practice sessions (up to 4 points, ie, 40% of the final grade).
- ii. Final evaluation, consisting of a theoretical and practical examination rated up to 5 points, ie 50% of the final grade.

Seminars and tutorials: participation in these sessions with a maximum score of 1 point, ie measured, 10% of the final grade)

To pass the course it is necessary that the score subfields 1.i and 1.ii exceed 40% of their maximum scores.

Grades earned in paragraph 1.i be kept in the two calls of the academic year in which they are made, since its assessment would only be possible throughout the semester and never in the extraordinary call.

## REFERENCES

### Basic

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Referencia b1: Gilat, A. (2005). Matlab. Una introducción con ejemplos prácticos. Barcelona, Ed. Reverté.

Referencia b2: Cordero, A. (2005). Métodos numéricos con MATLAB, Valencia: Ed. UPV.



Referencia b3: Baez, D. (2007) Introducción a Mathematica. (electrónico)

#### Additional

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Referència c1: Abell, M.L. (2008). Mathematica by example. Academic Press, 4 edition.

Referència c2: Cortés, R. et al. (2003). Breve manual de mathematica (electrónico)

Referencia c3: Karris, S.T. (2007). Numerical analysis usign Matlab and Excel (electrónico)

#### ADDENDUM COVID-19

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**

In the event of a closure of the facilities due to the health situation, and if this affects all or part of the classes of the subject, these will be replaced by classes where physical attendance will be replaced by online synchronous classes following the established schedules, and with asynchrony work from home.

In the event of a closure of the facilities due to the health situation, and if this affects any of the face-to-face tests of the subject, these will be replaced by tests of a similar nature but in virtual mode through the supported computer tools by the University of Valencia. The evaluation percentages will remain the same as those established in the guide.