

**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>	2019 - 2020

**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

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1107 - Degree in Mathematics	7 - Information technology	Basic Training

**Coordination**

<b>Name</b>	<b>Department</b>
ARANDIGA LLAUDES, FRANCESC	255 - Applied Mathematics
MARQUINA VILA, ANTONIO	255 - Applied 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.

## OUTCOMES

### 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

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 will need the score 1.i subfields of 1.ii exceed 40% of the maximum score.

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

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**

### 1.- Contenidos

Se mantienen los contenidos inicialmente indicados en la guía docente.

### 2.- Volumen de trabajo

Se mantiene el peso de las diferentes actividades que suman las horas de dedicación en créditos ECTS marcadas en la guía docente original.

### 3.- Metodología docente

Las clases de teoría se sustituyen o bien para videoconferencias síncronas con BBC o por realización de actividades propuestas por el profesor con la ayuda de los foros del aula virtual y del correo electrónico. En prácticas y seminarios se realizan las actividades propuestas por los profesores y las dudas se solucionan o bien por videoconferencias síncronas con BBC o bien con la ayuda de los foros del aula virtual y del correo electrónico. Se preparan vídeos explicativos de las prácticas que los estudiantes pueden consultar. Se resuelven dudas vía Foro del Aula Virtual, correo electrónico y en las mismas videoconferencias.

### 4.- Evaluación

Se harán pruebas objetivas (tipo cuestionarios, tareas, etc) en el aula virtual para evaluar la teoría. Se modifica la ponderación: 40% para la teoría. 50% para las prácticas. Los seminarios se quedan en el 10% No habrá que tener nota mínima para sumar las distintas partes.

### 5.- Bibliografía

La bibliografía se mantiene.