

## SUBJECT TEACHING GUIDE

### 314 - Computational Mathematics

#### Master's Degree in computing engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Master's Degree in computing engineering			Type and Year	Compulsory. Year 1
Faculty	Faculty of Sciences				
Discipline	COMPUTATIONAL MATHEMATICS				
Course unit title and code	314 - Computational Mathematics				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION				
Name of lecturer	SIXTO HERRERA GARCIA				
E-mail	sixto.herrera@unican.es				
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 1. DESPACHO PROFESORES (1034)				
Other lecturers	LAUREANO GONZALEZ VEGA				

3.1 LEARNING OUTCOMES
- To understand and correctly apply the symbolic and numerical methods used for the algorithmic treatment of scientific and engineering problems.
- To understand and correctly apply the statistics, data mining and artificial intelligence methods commonly used to model, design and develop application, services and expert systems based on knowledge.

**4. OBJECTIVES**

The algorithms, and the mathematical principles in which they are based, of the symbolic and numerical computation, and their application, using the corresponding software, to scientific and engineering problems.

The statistics, data mining and artificial intelligence methods commonly used to model, design and develop application, services and expert systems based on knowledge.

**6. SUBJECT PROGRAM**

CONTENTS

1	Symbolic computation and applications: Linear algebra, Non-linear equations, computational numbers' theory. Numerical Method and application: Error treatment, scientific computation, linear algebra, iterative methods and optimization.
2	Statistical, data mining and artificial intelligence methods and algorithms to model, design and develop application, services and expert systems based on knowledge.

**7. ASSESSMENT METHODS AND CRITERIA**

Description	Type	Final Eval.	Reassessn	%
Exam covering the concepts explained in the subject - Statistics and Artificial Intelligence	Activity evaluation with Virtual Media	No	Yes	12,50
Exam covering the concepts explained in the subject - Numerical and Symbolic computation	Written exam	No	Yes	12,50
Evaluation of the reports of practices - Statistics and Artificial Intelligence	Work	No	Yes	37,50
Evaluation of the reports of practices - Numerical and Symbolic computation	Work	No	Yes	37,50
TOTAL				100,00

Observations

Observations for part-time students

The same evaluation applied to the full time students will be applied to the partial dedication students but taking into account their disponibility to define the dates to deliver the corresponding reports..

**8. BIBLIOGRAPHY AND TEACHING MATERIALS**

BASIC

T. Hastie, R. Tibshirani, J. Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer-Verlag, 2001.

Christopher M. Bishop. Pattern Recognition and Machine Learning, Springer, 2006.

Castillo, E., Gutiérrez, J.M., Hadi, A.S. Sistemas Expertos y Modelos de Redes Probabilísticas. Springer, 1997.

Kalyanmoy Deb, Optimization for Engineering Design: Algorithms and Examples. PHI Learning Pvt, 2009

Joachim von zur Gathen, Jürgen Gerhard, Modern Computer Algebra. Cambridge University Press, 2013 (tercera edición).

Robert M. Corless, Nicolas Fillion, A Graduate Introduction to Numerical Methods. Springer, 2013.

