SUBJECT TEACHING GUIDE

341 - Computation of Mathematical Functions

Master's Degree in Mathematics and Computing

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	Master's Degree in Mathematics and Computing			Type and Year	Optional. Year 1
Faculty	Faculty of Sciences				
Discipline					
Course unit title and code	341 - Computation of Mathematical Functions				
Number of ECTS credits allocated	3	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	JOSE JAVIER SEGURA SALA
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Office	Facultad de Ciencias. Planta: + 1. DESPACHO PROFESORES (1045)
Other lecturers	

3.1 LEARNING OUTCOMES
- Understanding the basic properties and applications of some of the most common mathematical functions.
- The design and implementation of numerical algorithms for computing mathematical functions.
- Analysis of the adequacy of the different methods of computation according to the function and its range of application.

4. OBJECTIVES
The main goal of this course is to provide a general view of the properties, applications and methods of computation of some basic mathematical functions, both elementary and special functions. The numerical methods considered will be put in practice and algorithms for the computation of some mathematical functions will be developed.

6. SUBJECT PROGRAM	
CONTENTS	
1	Introduction. Elementary and special functions. Hypergeometric functions. Applications.
2	Computation of elementary functions: polynomial and rational approximations; table look-up methods (or mixed); add and shift methods; range reduction.
3	Computation of special functions: convergent and divergent series; Chebyshev expansions; recurrence relations and continued fractions; integration of differential equations; quadrature methods.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Exercises based on LAB assignments.	Laboratory evaluation	No	Yes	40,00
Individual projects.	Work	No	Yes	60,00
TOTAL				100,00
Observations				
Observations for part-time students				
In the case of part time students, the individual projects can be assigned at the end of the course instead of during the course.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Gil A., Segura J., Temme N.M. Numerical methods for special functions. SIAM 2007
Muller, J.M. Elementary functions : algorithms and implementation. Birkhäuser 1997
Temme N.M. Special functions: An introduction to the classical functions of Mathematical Physics. John Wiley & Sons 1996.