ETSIT
Escuela Técnica Superior de Ingenieros de Telecomunicación

Numerical Algorithms (NA)			
Code number:	45032	Number of ECTS:	6 ECTS
Semester:	Autumn	Language:	English

Lecturer(s) and contact:

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Learning goals:

At the end of this sections, the student should be able to:

- Understand limitations of analytical methods and the need for numerical algorithms.
- Understand how computers represent numbers and how these impact mathematical computations on computers.
- Understand how we describe errors and approximations that result from using computers to solve mathematical equations and approximate mathematical functions.
- Learn how to solve a system of linear equations numerically using direct and iterative methods.
- Learn how to solve least-squares problems.
- Understand how to approximate the functions using interpolating polynomials.
- Learn how to solve definite integrals and initial value problems numerically.
- Learn the application of the FFT .
- Know how to solve complex differential problems.
- Demonstrate the applications of numerical techniques to simple problems drawn from telecommunications and electronic engineering fields.

Contents:

1. PYTHON programming.
2. Direct methods for solving of linear systems.
3. Least squares approximation.
4. Iteration: linear and nonlinear.
5. The matrix eigenvalue problem.
6. Lagrangian interpolation.
7. Numerical integration and differentiation.
8. Trigonometric interpolation.
9. Numerical solution to ordinary differential equations.
10. Numerical solution to partial differential equations.

Prerequisites:

Some background on linear algebra and calculus is strongly recommended.

Assessment:

Public presentation and discussion of assignments proposed throughout the course.