

AN100 : Numerical Analysis part I

ECTS credits :

5.00

Evaluation :

S1: ET(2h,E,sd,sc) x1

Number of hours :

Lecture :	20.00
Tutorial classes :	24.00
Individual work :	22.00

Teacher(s) :

DOBRZYNSKI Cécile
SANTUGINI Kevin
TURPAUT Rodolphe

Title :

Numerical Analysis part I

Abstract :

The goal of this lecture is to introduce the basic methods of numerical analysis. This introduction covers all the aspects of the methods from the mathematical analysis to the practical aspects. Topics include interpolation, quadrature and numerical methods for ODE. Links to applications are given.

Plan :

1 - Interpolation

Lagrange and Hermite polynomials, divided differences. Interpolation residual, Runge phenomenon.

2 - Quadrature

General definitions. Classical methods: rectangles, trapezoidal rule, Simpson's method.

Newton-Cotes methods.

Gauss methods: Gauss-Legendre, Gauss-Lobatto. Other scalar products: Gauss-Laguerre, Gauss-Chebyshev...

3 - Numerical methods for ODEs.

Classical one-step methods: Euler, Runge, Heun.

Runge-Kutta methods: formalism, Butcher tableau, order conditions, A-stability.

Multistep methods: Adams, BDF and predictor-corrector methods, order conditions, 0-stability, convergence, A-stability.

Document(s) :