ESIROI
ÉCOLE D'INGÉNIEURS
UNIVERSITÉ DE LA RÉUNION

DEPARTMENT : *CPI*
SEMESTER : *S4*

IDENTIFICATION

Course code : E2CP4B3
ECTS : 2.5

DURATION

Lectures :	8
Tutorial classes :	10
Labs :	12
Total :	30

Project :
Personnal work :

ASSESSMENT

2 Written exams (2h/2h) + 1 Lab report

TEACHING MATERIALS

LANGUAGE

English

CONTACT

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UE : BATIMENT-ENERGIE

COURSE : Numerical Analysis and Scientific Computing

SCOPE OF THE COURSE

OBJECTIVES

1. Solving an algebraic equation : bisection method ; Newton's method ; comparison of the two methods.
2. Approximate solution of an ordinary differential equation : Euler's method ; Runge–Kutta method ; comparison of results with an analytical solution (accuracy and computation time).
3. Multidimensional linear discrete problem leading to the solution of an invertible (or Cramer) linear system using Gaussian elimination with partial pivoting.

COMPETENCE AND SKILLS

— Study the effect of parameter variations on computation time, result accuracy, and solution shapes.
— Use standard computational libraries to solve a scientific problem expressed as equations.
— Use standard libraries to display results graphically.
— Consider practical aspects : impact of rounding errors, computation time, and memory storage.

PROGRAM

1. Sensitivity analysis : studying the influence of parameters on computation time, accuracy, and solution shapes.
2. Implementation of computational libraries for the numerical solution of modeled scientific problems.
3. Use of display libraries for graphical representation of results.
4. Consideration of numerical constraints : rounding errors, computational cost, and memory management.

BIBLIOGRAPHY

REQUIREMENTS

Thermodynamics, Balances and TransfersHeat TransferAlgorithms and Programming