Faculty of Sciences

MATH2171 Numérical analysis I A) Approximation, interpolation, integretion

[22.5h+30h exercises] 4 credits

This course is taught in the 2nd semester

Teacher(s):   Alphonse Magnus
Language: French
Level: Second cycle

Aims

In-depth analysis of diverse methods and algorithms representative in the matter of numerical resolution by computers of significant classes of scientific or technical problems, in relation with the themes underlying the applied mathematics.

Main themes

- Approximation of functions by polynomials: Chebyshev (best approximation, polynomial series), L2 norm (best average approximation, orthogonal polynomial series, Fourier series).
- Interpolation of functions divided by polynomials: Lagrange and Newton formulas, divided differences, iterative methods of Neville, formulas of finished differences.
- Numerical integration: Gaussian methods, formulas of finished differences.
- Error estimation and applications: Peano theorem, Euler-Maclaurin formula, extrapolation to the limit (Romberg scheme, etc.) Modalities of organisation: exercises: in class, in relation with the material seen. This activity will receive a grade that will come into play in the final points. Exam: oral on the material seen in class (closed book), partially with written preparation.

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisites: 1st cycle level in numerical calculus and programming.
Support: many references are used and mentioned during the course. Course notes are supplied each year. Detailed programme can be found on the web site: http://www.math.ucl.ac.be/~magnus/num1a/m2171toc.txt.
Evaluation: oral examination at the end of the session (2h30).

Programmes in which this activity is taught

MAP2   Ingénieur civil en mathématiques appliquées

Other credits in programs

MAP22	Deuxième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(4 credits)	Mandatory
MAP23	Troisième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(4 credits)	
MATH21/E	Première licence en sciences mathématiques (Economie mathématique)	(4 credits)	Mandatory
MATH21/G	Première licence en sciences mathématiques (Général)	(4 credits)	Mandatory
MATH21/S	Première licence en sciences mathématiques (Statistique)	(4 credits)	Mandatory