MATH-250 **Numerical analysis**

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Cursus	Sem.	Type
Mathematics	BA4	Obl.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Written
Workload	150h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

Construction and analysis of numerical methods for the solution of problems from linear algebra, integration, approximation, and differentiation.

Content

- Representation of numbers on computers
- Interpolation, numerical integration and differentiation
- Direct and iterative methods for the solution of large systems of equations
- Fourier transform and data compression

Keywords

numerical algorithms
numerical linear algebra

Learning Prerequisites

Required courses

Analysis I and II
Linear Algebra

Recommended courses

Elements of scientific programming

Learning Outcomes

By the end of the course, the student must be able to:

- Choose a convenient method to solve a specific problem
- Interpret the computational results in view of the existing theory
- Estimate numerical errors
- Apply numerical algorithms to solve specific problems

Transversal skills

- Use a work methodology appropriate to the task.
- Give feedback (critique) in an appropriate fashion.
- Use both general and domain specific IT resources and tools
- Access and evaluate appropriate sources of information.

Teaching methods

Ex cathedra lectures and exercises in the classroom and on the computer

Expected student activities

Attendance of lectures
Doing exercises
Implementing simple programming tools
Solving basic applied mathematics problems

Assessment methods

Form of examination
17% project or homework. 83% exam.

Resources

Bibliography

Lecture notes accompaying the course will be provided.
Complementary reading:

- A. Quarteroni, R. Sacco et F. Saleri : « Méthodes Numériques Algorithmes, analyse et applications » Springer, 2007, ISBN 978-88-470-0495-5.A.
- Quarteroni, R. Sacco et F. Saleri : « Numerical Mathematics » Springer, 2007, ISBN 978-3-540-34658-6.A.
- Quarteroni et F. Saleri : « Calcul Scientifique : Cours, exercices corrigés et illustrations en MATLAB et OCTAVE », Springer, 2006, ISBN 978-88-470-0487-0. Edition Française

Ressources en bibliothèque

- Numerical Mathematics / Quarteroni
- (version électronique)
- Calcul Scientifique / Quarteroni
- An Introduction to Numerical Analysis / Suli
- Méthodes Numériques / Quarteroni
- (version électronique)

Prerequisite for

Computational linear algebra
Advanced numerical analysis
Numerical integration of dynamical systems
Other Master courses in numerical analysis and applied mathematics