Introduction à l'analyse complexe et au calcul numérique

Lecturers
Artem NAPOV (Coordinator) and Michel KINNAERT

Course mnemonic
MATH-H302

ECTS credits
5 credits

Language(s) of instruction
French

Course period
First term

Campus
Solbosch

Course content

Numerical computing

- Floating point representation and arithmetic.
- Systems of linear equations.
- Nonlinear equations and systems of nonlinear equations.
- Interpolation and approximation of functions.
- Numerical integration.
- differential equations and systems of differential equations: initial value problems.

Complex analysis

- Fourier Series
- Fourier and Laplace Transforms
- Resolution of ordinary differential equations by Laplace transform
- Linear time-invariant systems and transfer function
- Impulse, unit step and frequency responses of a linear time-invariant system

Objectives (and/or specific learning outcomes)

Numerical computing: present and study basic numerical methods for the solution of considered numerical problems. Explore practical aspects with the help of GNU Octave software.

Complex analysis: Study Fourier and Laplace transforms and their applications; introduce the basic notions of the theory of signals and systems.

Pre-requisits and co-requisits

Co-requisites courses

INFO-F206 | Informatique | 5 crédits and MATH-F215 | Mécanique | 5 crédits

Teaching method and learning activities

Numerical computing: theory is exposed during the lectures; students explore the practical aspects during the class hours (using Octave software in a computer laboratory).

Complex analysis: theory lectures and exercises sessions

References, bibliography and recommended reading

Numerical computing

- A Quarteroni, R Sacco, F Saleri, *Méthodes numériques: algorithmes, analyse et applications,* Springer
- Lloyd N. Trefethen et David Bau, III, *Numerical Linear Algebra*, SIAM
- Uri Ascher et Chen Greif, *A First Course in Numerical Methods, SIAM*

Complex analysis: A.V. Oppenheim et A.S. Willsky, *Signals and systems*, 2e édition, Prentice-Hall (1997)

Other information

Place(s) of teaching

Solbosch

Contact(s)

- Artem Napov
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- Michel Kinnaert
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Evaluation method(s)

Other

Evaluation method(s) (additional information)

Single exam organized in two parts (in computer room):

- Numerical computing: exam with a written part and a part on computers covering the theoretical and (mostly) practical aspects of the course

- Written exam covering theory and exercises

Determination of the mark (including the weighting of partial marks)

Both parts are graded on a scale from 0 to 20 using half-integer grades.

- If both partial grades are greater than or equal to 8/20, the global grade is the (rounded) arithmetic mean of the two partial grades (n = round ((n^1+n^2)/2)) .
- If at least one of the partial grades is less than 8/20, the global grade is the smallest of the two partial grades (n = min(n^1,n^2)) .

The report from one session to another, and from one year to another, is accepted only for grades greater than or equal to 10.

Main language(s) of evaluation

French

Programmes

Programmes proposing this course at the Brussels School of Engineering

BA-IRBI | Bachelor in Bioengineering | unit 3

Programmes proposing this course at the faculty of Sciences

BA-IRBI | Bachelor in Bioengineering | unit 3