

UE Differential Calculus, Wavelets and Applications



Level
Baccalaureate
+5



ECTS
6 credits



Component
UFR IM2AG
(informatique,
mathématiques
et
mathématiques
appliquées)



Semester
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** GBX9AM50

Presentation

Description

The course is structured in two parts, treated respectively and independently by Sylvain Meignen and Kevin Polisano. The first part is devoted to differential calculus and its applications in image restoration and edge detection. The second part is dedicated to the construction and practical use of the wavelet transform. Wavelets are basis functions widely used in a large variety of fields: signal and image processing, data compression, smoothing/denoising data, numerical schemes for partial differential equations, scientific visualization, etc. Connections between the two parts will be made on the aspects of denoising, edge detection and graph analysis.

Course outline

Part I: Differential Calculus

1. Differentiability on normed vector spaces
2. Image restoration
3. Edge detection

Part II: Wavelets and Applications

1. From Fourier to the 1D Continuous Wavelet Transform
2. Wavelet zoom, a local characterization of functions
3. The 2D Continuous Wavelet Transform

4. The 1D and 2D Discrete Wavelet Transform
 5. Linear and nonlinear approximations in wavelet bases
 6. The graph Fourier and wavelets transforms
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Course parts

Lectures	Lectures (CM)	36h
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Useful info

Contacts

Program director

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Campus

➤ [Grenoble - University campus](#)