

### Signal Processing/ Hilbert spaces and Wavelets



Hourly volume 69h

## Introducing

### Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

-Hilbert Spaces: definition, Hilbertian basis, projection on a convex set, Fourier analysis

-Wavelets: Haar wavelets, connection coefficients/regularity

-Approximation of functions in Hilbert Spaces

At the end of this module, the student should be able to:

-Provide examples of Hilbert spaces

- -Give examples of Hilbertian basis
- -Fourier analysis of a 1d and 2d signal
- -Use and analyze the results of Fast Fourier Transform
- -Use and analyse the results of Wavelet transform

-Understand the decomposition of a function in a basis of wavelets.

#### Necessary prerequisites

Python: numpy, scipy, matplotlib Fourier Analysis: Fourier Series, Fourier Transform, L<sup>2</sup> space.

# Practical info

## Location(s)

**Q** Toulouse

