

# TS302 : Multi-rate systems

## ECTS credits :

1.00

## Evaluation :

S1: ET(1h30,E,sd,sc) x2 + CC(CR TP) x1; S2: ET(20m,O,sd,sc) x2 + Rep(CC) x1

## Number of hours :

Combined lecture and tutorial classes : 4.00

Tutorial classes : 5.33

## Teacher(s) :

MEGRET Rémi

## Title :

Multi-rate systems

## Abstract :

This class deals with multi-rate systems. Such systems consider signals at several sampling frequencies (multi-resolution). They can be seen nowadays in various application, such as the now well known JPEG2000 norm, which is based on wavelet decomposition. The gaussian pyramid is another exemple of a multi-rate approach that improves the robustness of image analysis systems. Those approaches share the common base of the digital signal theory and linear filtering.

## Plan :

- \* Sampling
  - Temporal and frequential point of view
  - Up- and downsampling
- \* Image pyramids
  - Gaussian and laplacian pyramids
  - Reconstruction
  - Application to image enhancement and fusion
- \* Filter-banks
  - Perfect reconstruction
  - QMF filters
- \* Wavelets
  - Time/frequency analysis
  - Orthogonal wavelets
  - Analysis and synthesis multiresolution frameworks
  - Application to image compression, JPEG2000

## Prerequisite :

- \* Traitement numerique du signal
- \* Programmation Matlab