

What is this course about?

Read the title. . . and do not be confused. Although the word wavelets appears in the first place in the official (=unchangeable) name of the course it is yet another tool, an important one, for signal processing. This course is primarily about signals. And what is a signal? And what is the need for processing?

We consider a signal as a function carrying some kind of information. This is too general and any fanatic mathematician could complain saying that any function carries information, the one about itself. There is not a more concrete mathematical definition because the term signal comes from applications outside Mathematics, it is closer to engineering. If you prefer something in the middle (Physics?) you can stick to the following definition grabbed from [MK11]: “*For our purposes a signal is defined as any physical quantity that varies as a function of time, space, or any other variable or variables. Signals convey information in their patterns of variation*”.

To add something on my own, in many instances a signal is a function that it is used to transmit something informative from a place into another, for instance the amplitude of the human voice in terms of time or the frames of a video. Signal processing concerns the manipulation of the information carried by the signal. In general this is not a devious manipulation, we look for improving quality or gaining storage efficiency. Think for instance in a CD, usually it contains (contained?) up to 80 minutes of audio. The signal giving the sound, a longitudinal wave of pressure transmitted through air has to be treated to fit in 700 megas (technically MiB), it means around $5.87 \cdot 10^9$ bits, zeros and ones, represented by tiny pits in a plastic layer. Something must be done to convert the complicated wave sound in the individually simple zeros and ones.

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