SIGNAL_S6A **Spring Semester** **Undergraduate/Junior**	**Mathematics & Signal 1A II**	**6 credits** **Lab: 33,3%** **Final exam: 66,7% (2x2h)**
Signal processing first consists in extract relevant data on levels, shapes and spectral content from the signal (signal characterization). Then, it formalizes the signals transformation from one physical shape to another; for instance, time-continuous electrical quantities to discrete-time quantified quantities which can be processed by digital systems. This course has the double objective to insist on sampling effect on signals and on the characterization of signals and filters in time and frequency domains. At the outcome, the student will be able to: - Know the influence of sampling frequency, width and shape of the observing window, DFT order, zero-passing… - Extract the spectral characteristics of a signal - Extract the relevant characteristics of a filter for a given application (order, delay, stability, linear phase, finite or infinite impulse response) - Envisage the use of a digital filter in a time-continuous signal processing chain - Define an optimal template and synthetize a filter responding to a given need, depending on the signal characteristics, the application and its environment - Implement this filter in a vector/matrix-programming language and verify its influence from time& frequency representations of the output for a given input.		
Prerequisite: Mathematics & Signal I 1A		

DST_1211	**Fourier analysis II 1A**	**Language**
Lecture: 14	**Tutorials: 14**	**Tutorials (BYOD): 2**
Analysis of time and frequency characteristics of a time-continuous signal and filter. Distribution space is introduced as a general study frame, covering continuous and discrete problems. One objective is to show its flexibility and the scope of the formalism. Continuous-time Fourier transform is considered in its generality. - Distributions - Fourier transform of a function - Fourier transform of a distribution - Dirac comb and Poisson's sum formula - Fourier transform of periodical functions		

DST_1212	**Digital Signal Processing I**	**Language**
Lecture: 12	**Tutorials: 12**	**Tutorials (BYOD): 2**
This lecture requires the continuous-time filtering basis introduced in the Fall Semester in order to bring answers to the following questions: - How to act on a signal? - How to analyze a signal spectrum? - What are the characteristics of a filter? - How to design a digital filter? - How to implement a digital filter to process time-continuous signals?		

DST_1213	**Signal lab**	**Language**
		Lab work: 24
This Lab work has a double objective. First, it allows the students to implement the notions and tools seen in lectures to solve concrete problems linked to signal processing. Then, it allows the learning of the given software, which is not only useful but also really appreciated in companies.		