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# Welcome to DSP One!

Welcome, and thank you for your interest in our DSP course! This is the new, refurbished version of the original DSP class that we have been offering on Coursera since 2013. For this new edition, we split the material into four independent courses:

- DSP1: Digital signals and Fourier transforms
- DSP2: Linear filters and adaptive processing
- DSP3: Sampling and interpolation
- DSP4: Digital communications and real-time DSP

The new structure will allow you to progress incrementally if you are new to the world of digital signal processing or, if you would like a simple refresher course, you will be able to choose the one that best fits your needs. All four courses follow the same principles of the original set of lectures: the material is based on a freely-available textbook and each module includes automatically graded exercises that will be used for your final grade. There are no programming assignments but every module is complemented by Jupyter notebooks in Python that implement most of the algorithms discussed in the lectures.

In this course, **DSP1**, you will learn about the basics of digital signal processing starting from first principles. Our personal approach is to describe signal processing using the language of vector space and linear algebra; while perhaps a bit perplexing initially (especially if you're a hands-on practitioner), this approach has the advantage to let us describe very naturally the dual nature of signals in the time and in the frequency domains. In particular, the Fourier transform will emerge as a simple change of basis (that is, a literal change of viewpoint) in the space of digital signals.

This class contains four modules. In the first two we will describe the basics about discrete-time signals starting from first principles. In the third module we will discuss the basics of Fourier analysis and in the last module we will address more advanced topics that will perfect your grasp of how signals "exist" in the frequency domain. You are strongly encouraged to experiment with the Python notebooks, which represent an essential practical counterpart to the theory explained in the videos.

This class corresponds to Chapters 1 to 4 in the reference textbook but we will skip some of the technicalities. Also remember that everything we do in this class you can implement in your numerical package of choice and apply it to your favorite signals!