





<b>SIGNAL_S5A</b> <b>Fall Semester</b> <b>Undergraduate/Junior</b>	<b>Mathematics &amp; Signal I 1A</b>	<b>6 credits</b> <b>Lab: 20%</b> <b>Tutorials: 20%</b> <b>Final exam: 60% (2x2h)</b>
<p>This course aims at providing the mathematical basic notions used in signal processing and linear systems. At the outcome, the student will be able to</p> <ul style="list-style-type: none"> <li>- Understand the role of Hilbert spaces in signal representation</li> <li>- Decompose a discrete time signal in a basis suitable to shift-invariant linear filter (DFT)</li> <li>- Compute the Z-transform of a discrete-time signal and apply it to random processes.</li> </ul>		
<b>Prerequisite:</b> None		

<b>DST_1201</b>	<b>Fourier analysis I 1A</b>	<b>Language</b> 
<b>Lecture: 12</b>	<b>Tutorials: 10</b>	<b>Tutorials (BYOD): 2</b>
<p>Time and frequency characterization of signals and discrete-time filters</p> <ul style="list-style-type: none"> <li>- Hilbert space, duality</li> <li>- Shift-invariant linear operators characterization</li> <li>- Convolution product, impulse response</li> <li>- Convolution operator diagonalization, DFT</li> <li>- Projection, approximation, compression</li> <li>- Signal representation, power and energy concepts</li> </ul>		

<b>DST_1202</b>	<b>Complex analysis</b>	<b>Language</b> 
<b>Lecture: 10</b>	<b>Tutorials: 6</b>	<b>Tutorials (BYOD): 4</b>
<ul style="list-style-type: none"> <li>- Holomorphic functions, Harmonic functions, Cauchy formula</li> <li>- Cauchy integrals, residue theorem</li> <li>- Applications: generating function, Discrete-time Fourier Transform, Z-transform</li> </ul>		

<b>DST_1203</b>	<b>Probability</b>	<b>Language</b> 
<b>Lecture: 12</b>	<b>Tutorials: 10</b>	<b>Tutorials (BYOD): 2</b>
<p>Experiment modelisation, classical distributions and random processes.</p> <ul style="list-style-type: none"> <li>- Bayesian probability</li> <li>- Random vector</li> <li>- Discrete-time random process</li> <li>- Markov chain</li> </ul>		

<b>DST_1204</b>	<b>Mathematics Lab</b>	<b>Language</b> 
		<b>Lab work: 16</b>
This lab work will illustrate the different notions seen in this entire module.		