Engineering Systems Analysis: Signals

Developed Course Materials' Topics

Here is a complete listing of the 20 discrete-time (DT) topics covered by my developed course materials for the Signals course, any of which are available on request.

Materials for the continuous-time Fourier Transform, its properties, frequency response, sampling and aliasing were developed by Prof. Siddhartan Govindasamy (now Professor of Engineering at Boston College).

1. Elementary DT signals – the building blocks for more complicated signals
2. Difference equations for recursive and non-recursive realizations of DT LTI systems
3. DT periodicity: are all DT sinusoids periodic?
4. Impulse response – why is it important?
5. From a system's difference equation to its impulse response h[k]
6. How to represent any signal as a sum of scaled and shifted unit samples?
7. Introducing DT convolution – why is it useful?
8. Convolution examples
9. Convolution with Matlab
10. The discrete-time convolution theorem – prove it!
11. Setting the stage for the DTFT
12. Define the DTFT and examine its properties
13. Discrete-time filters and DT frequency response
14. Magnitude and phase response, Hermitian (conjugate) symmetry
15. CTFT and DTFT connections: s-plane transforms (CTFT and Laplace) cf. z-plane transforms (DTFT and z-transform)
16. Introducing the z-transform and the R.O.C.!
17. DT system function, H(z): connect to difference equations
18. Poles/zeros and stability
19. How the s-plane maps to the z-plane
20. Review: Key Concepts and Terms