

EE1101 Signals and Systems JAN—MAY 2019
SYLLABUS

Modules:

- Signals (continuous-time): Signal classification (analog - digital, energy - power, even - odd, periodic - aperiodic, deterministic - random etc.), standard signals (unit step, unit impulse, ramp, exponential, sinusoids), transformations of the independent variable. (4 classes)
- Systems (continuous-time): System classification (memory, causal, stable, linear, time-invariant, invertible etc.). (2 classes)
- Impulse response of an LTI system, convolution integral, graphical convolution, system properties from impulse response, interconnection of LTI systems, step response. (4 classes)
- Discrete time signals and systems: Emphasize similarities and differences with continuous - time counterpart, transformations of signals, discrete - time convolution. (3 classes)
- Continuous - time Fourier series: Periodic signals and their properties, complex exponential as eigen function of LTI systems, exponential and trigonometric FS representation of periodic signals, convergence, FS of standard periodic signals, salient properties of Fourier series, FS and LTI systems, some applications of FS (eg. filtering). (6 classes)
- Continuous - time Fourier transform: Development of Fourier representation of aperiodic signals, convergence, FT of standard signals, FT of periodic signals, properties of FT, some applications of FT (eg. modulation). (6 classes)
- Laplace transform: Bilateral laplace transform, ROC, properties of Laplace transform, standard Laplace transform pairs, transfer function of LTI system, characterizing LTI system properties from transfer functions, algebra of transfer functions and block diagram representations, Unilateral Laplace Transform, Brief introduction to initial value problems and applications. (8 classes)
- Sampling (Bridge continuous and discrete): Sampling theorem and signal reconstruction, notion of aliasing with examples, sampling in frequency domain. (5 classes)

Books:

- *Text book:* Signals and Systems: Oppenheim, Willsky and Nawab (2nd Edn).
- *Reference book:* Principles of Linear Systems and Signals: B.P. Lathi (2nd Edn).