

EE513
Audio Signals and Systems

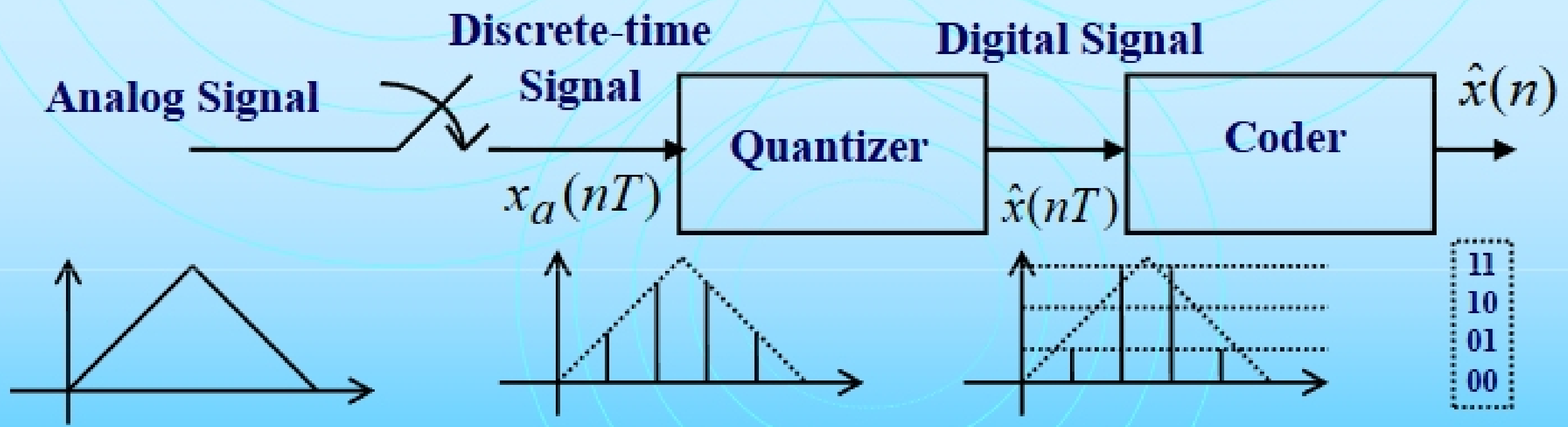
Noise

Kevin D. Donohue

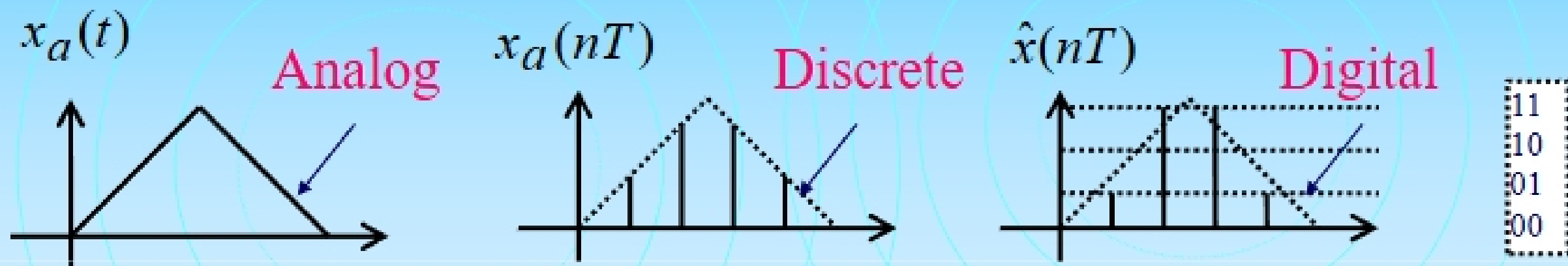
Electrical and Computer Engineering
University of Kentucky

Quantization Noise

Signal amplitudes take on a continuum of values. A discrete signal must be digitized (mapped to a finite set of values) to be stored and processed on a computer/DSP



Quantization Error and Noise



- Quantization has the same effects as adding noise to the signal:

$$\varepsilon_q(nT) = x_a(nT) - \hat{x}(nT) \quad x_a(nT) - \varepsilon_q(nT) = \hat{x}(nT)$$

- Intervals between quantization levels are proportional to the resulting quantization noise since they limit the maximum rounding or truncation error.
- For uniform quantization, the interval between signal levels is the maximum signal amplitude value divided by the number of quantization intervals.