



Department of Electrical Engineering  
School of Science and Engineering

## EE310 Signals and Systems

### TUTORIAL 5

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#### Tutorial 5-1

Determine the discrete-time periodic signal  $x[n]$  of period 8 whose Fourier series coefficients  $a_k$  are given by

$$a_k \begin{cases} \cos(\frac{k\pi}{3}), & 0 \leq k \leq 6, \\ 0, & k = 7. \end{cases}$$

#### Tutorial 5-2

Consider the following two discrete time periodic signals, each with fundamental period 6:

$$x[n] = \cos(\frac{2\pi}{6}n + \pi/2), \quad y[n] = 1 - \sin(\frac{2\pi}{6}n).$$

Determine the Fourier series coefficients of the signal  $z[n] = x[n]y[n]$ .

#### Tutorial 5-3

Consider a continuous-time LTI system with impulse response

$$h(t) = e^{-2|t|}$$

and input signal (continuous-time and periodic)

$$x(t) = \sum_{n=-\infty}^{\infty} (-1)^n \delta(t - n).$$

Determine the Fourier series coefficients of the output of LTI system.

#### Tutorial 5-4

(Analogous to previous question) Consider a discrete-time LTI system with impulse response

$$h[n] = \frac{1}{2}^n$$

and input signal (continuous-time and periodic)

$$x[n] = \begin{cases} 1, & |n| \leq 1, \\ 0, & 2 \leq |n| \leq 3. \end{cases}$$

Determine the Fourier series coefficients of the output of LTI system.