# ECEN 620

## Homework #4

Due: 11-4-2025, 11:59PM
**Homeworks will not be received after due.**
Instructor: Sam Palermo

1. Let's consider a second-order digital PLL that utilizes the PI filter from Lecture 9.
$F_{ref}$=156.25MHz
N=16
$\Delta_t$=10ps
$(V_{FS}/2^B)K_{VCO}$=2$\pi$*5MHz/LSB

- Follow the Lecture 9 design procedure and find the loop filter parameters $\alpha$ and $\beta$ for $f_u$=5MHz and $\Phi_m$=60°.
- Implement a linear macromodel (MATLAB, etc.) for the closed-loop system.
  - Plot the open-loop gain magnitude and phase and find the phase margin.
  - Plot the output phase transfer function (magnitude only) from 10kHz to 1GHz.