



## Time Series Analytics

110-1 Homework #09

**Due at 23h59, January 5, 2022; files uploaded to NTU-COOL**

1. (20%) Simulate three random variables with length 1024, following standard Normal,  $t$ -distribution ( $df = 10$ ), and exponential distribution (rate = 1.6), respectively.
  - (a) Perform FFT (Fast Fourier Transform) over the three random variables and plot the amplitudes.
  - (b) Perform STFT (Short-Time Fourier Transform) over the three random variables and plot the time-frequency contours.
  - (c) What do you observe in (a) and (b)?
2. (20%) Simulate a seasonal time series following the model  $SARIMA(2, 1, 0) \times (0, 1, 1)_{12}$ .
  - (a) Perform FFT (Fast Fourier Transform) over the time series and plot the amplitudes.
  - (b) Perform STFT (Short-Time Fourier Transform) over the time series and plot the time-frequency contours.
  - (c) What do you observe in (a) and (b)?