

# ECE 732

## Homework 7

Experiment with the Periodogram spectral estimator in Matlab. You can generate a sample of stationary Gaussian process using the lines of code below.

```
% length of observation
N = 10000;

% generate LTI filter
a = 0.95;
M = 100;
k = 0:M;
h = a.^k;

% generate GWN input
L = 10*M+N;
x = randn(L,1);

% generate output
y = filter(h,1,x);

% remove initial portion
% of output to eliminate
% non-stationary "start-up" effect
y = y(L-N+1:L);
```

Study the bias and variance of the periodogram as a function of  $N$ . Experiment with different spectra (*i.e.*, change the filter  $h$ ).

Also, try to find a real-world time series (*e.g.*, Dow-Jones Index or ECG signal) and compute its periodogram.