

# Project

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Course: *Stochastic Processes* – Professor: *Dr. Ahmed Abu Taleb*  
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## Objectives

- Wiener filter design.
- Signal estimation.
- Using signal models in signal prediction.
- Documentation with either Latex or Word.

## Notes

- This is an individual project. Every student must submit his own solution to problems of this project.
- you have to submit your project online. No discussion for this project.
- Solution must be on your own. Be creative and avoid plagiarism and cheating.
- You can implement your project using either Python or Matlab.

## Project Signals Data

- This is the data [link](#).
- Data contain two ECG signals one distorted and the other original.
- Use the distorted ECG signal only to implement your project.
- Use the original ECG signal to validate your result.

## Project to implement

Given a distorted ECG signal. We have modelled the distortion as follow:

$$y(n) = c_0x(n) + c_1x(n-1) + c_2x(n-2) + \varepsilon(n) \quad (1)$$

Where  $y(n)$  is the distorted signal.  $x(n)$  is the source signal, and  $\varepsilon(n)$  is WGN  $\varepsilon(n) \sim N(0, \sigma_\varepsilon^2)$ .  $c_0 = -3$ ,  $c_1 = -2$ ,  $c_2 = -1$ , and  $\sigma_\varepsilon^2 = 0.02$ .

- Using provided model, build a fourth order Wiener filter.
- Apply this filter on the signal and show the output.
- Calculate the mean square error of the filtered signal (Source signal is provided for that)