

# BLG 354E Signals and Systems for Computer Engineering

## Homework-4

ITU Computer and Informatics Faculty

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- You are asked to upload .py files and .pdf file (report that includes comparison plots). Give a brief explanation for your results in the report file.
  - Write comments in your code, whenever you feel necessary.
  - Put your name and number at the top of your code and report.
  - The code you typed must WORK (as the manner of syntax). Otherwise, you will get zero points for the homework. Your code will not be fixed or debugged to work.
  - In Case of Cheating and Plagiarism Strong disciplinary action will be taken.
  - No late submissions will be accepted.

### Problem 1

In this homework, you will be using one of the two 16-bit sampled (@44100Hz) mono audio records (music) that were provided for homework 3.

- a) Write a Python implementation of Radix-2 Decimation in Frequency (DIF) type Fast Fourier Transform.
- b) Run 256-point Radix 2 DIF-FFT code on one of the audio records at three different spots of the song (e.g. at 10th, 20th, and 30th second of the record). Apply this procedure before and after the application of Low Pass Filter (homework 3 “b”) with and without 5dB amplification. Visualize and compare the spectrograms (3x3x2 plots) using logarithmic scale for frequency and the amplitude axes.