Your task is to "extract" α and β rhythms of the provided sample EEG. To do this:

1. Design a BPF using MATLAB "firpm" function (or its modern version) and satisfying the following specifications:
- Passband: 8 Hz to 30 Hz;
- Transition bands: 1 Hz each;
- Passband ripple: 0.01;
- Stopband attenuation: -41 dB.

Report your design steps and ML code, present the proofs that the filter is GLP and meets the specifications. You are NOT allowed to use any ML "filter design" packages or interactive tools.

2. Load the provided EEG to workspace, preprocess it with the common reference spatial filter and additionally remove DC. Report the code and results for an arbitrary channel.
3. Apply the filter you designed in 1 to the preprocessed C_3 EEG channel. Report the code and results.
4. Assuming that 0.5-second long EEG fragments are stationary, evaluate a spectrum of the filtered and unfiltered signal for an arbitrary fragment. You are free to use any spectrum estimation technique but make sure to justify your choice.
5. Write a report.