ECE-497-03/BME-491 Applied Biomedical Signal Processing
Winter 2006

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Text: Biomedical Signal Analysis: A Case-Study Approach, by Rangayyan, Wiley, 2002

GRADING POLICY

Each Takehome Exam	15%
Homeworks/Reports	60%
Laptop Days	10%

Notes:

1. You must acceptably complete each homework assignment to pass the class.

2. Many of the homework problems will require you to use Matlab as part of the problem. If you do not do these parts of the problem, do not expect to receive credit for any parts of the problem.

3. You are expected to do your own work. You can certainly talk with each other and help each other, but the work you hand in should be your own. As an example, if two people hand in the same Simulink plot and both came from the same directory, neither will receive any points!

4. Unless specifically told otherwise on a particular problem, you are expected to work out the problem by hand (or use Matlab). *If you write on your assignment that you used Maple and are copying the answer, expect to get no points.* You can use Maple to check your answers. You cannot turn in any Maple code or plot as part of the solution to a problem.

5. Every ***Laptop day*** I will expect you to bring your laptops to work on something. Your performance on these days will be graded.

Tentative Schedule

11/27 heartbeats: p, QRS, and T waves; sinus rhythm
11/28 ventricular tachycardia/fibrillation, normalized autocorrelation
11/30 triggering by normalized autocorrelations, template matching, signal averaging
12/1 ***Laptop day***

12/4 simple z-transforms, difference equations
12/5 simple z-transforms, stability, frequency response
12/7 moving average filters, implementing IIR and FIR filters in Matlab
12/8 ***Laptop day***

12/11 derivative based filters
12/12 Butterworth filters
12/14 notch filters
12/15 ***Laptop Day***

12/18 QRS detection
12/19 carotid pulse signal, detection of the dicrotic notch
12/21 ***Laptop day***
12/22 ***No Class***

1/8 EEG signal source, correlation analysis of EEG channels
1/9 coherence and template analysis of EEG signals
1/11 matched filters
1/12 ***Laptop day***

1/15 template matching for waveform analysis
1/16 triggering for intracardiac electrograms
1/18 ***Laptop day***
1/19 ***Takehome Exam 1 (no class)***

1/22 envelope extraction
1/23 RMS, zero crossing rate
1/25 turns count, form factor
1/26 ***Laptop Day***

1/29 scatter diagram analysis
1/30 review of matrix algebra
2/1 matrix calculus, least squares
2/2 ***Laptop Day***

2/5 singular value decomposition (svd)
2/6 generalized singular value decomposition (gsvd)
2/8 Tikhonov regularization
2/9 **Laptop Day**

2/12 training sets, measurement of diagnostic accuracy
2/13 receiver operating characteristics (ROC curves)
2/15 ***Takehome Exam 2 (no class)***