Lab Submission Worksheet

Laboratory 1 | Electrocardiography

Lab Group: _____ Date: _____

Student 1	Student 2
Name: _____	Name: _____
Student number: _____	Student number: _____

Instructions

Step 1

Complete the Lab and take screenshots requested. They will be used to answer the questions.

Step 2

Print and attach the following labeled plots:

1. Frequency spectrum of the ECG data
2. Raw ECG data
3. ECG data with 20 Hz lowpass filter
4. ECG data with 5 Hz lowpass filter
5. For the exercise recording (section 4), plot the first 5 heart beats and the last 5 heart beats of lead I in separate figures, with Matlab.

Step 3

Write your answer to all questions in the provided boxes.

Step 4

Submit to the drop box for 'sysc4203" outside ME4460 before 2:30pm one week after the lab.

2.0 ECG Signal (Time and Frequency Analysis)

a. Discuss how the time domain signal changes as the cut off value is lowered? How about in the frequency domain?

b. Using your ECG plots, label the P, Q, R, S and T segments of one beat. Select the best lead to show your signal. What is the amplitude of your QRS complexes? Are the durations of the segments of the individual heart beat signals consistent within a single subject?

c. What is the source of the 60Hz noise? Identify and label the 60Hz noise in the frequency plot.

d. *(Max. 100 words)* Discuss the time and frequency signals of the different low pass filter cut off values. On the attached plots, indicate differences. What happens to the time signal with the cut off value decreases? What happens to the frequency signal? Is there an optimal cut off value? What happens when the cut off value is too high? Too low?

3.0 – Signal Artefact

a. Look at each lead. Does the ECG Data look different? Why? Does the Spectral Analysis look different? Why or why not?

b. *(Max. 100 words)* Did you notice motion artefact on all leads? Why did each lead have motion artefact (or not)?

4.0 – Recovery after Exercise

c. *(Max. 100 words)* Plot the first 5 heart beats and the last 5 heart beats of lead I in separate figures, with Matlab. Measure the average R-R distance and calculate the heart rate for both figures. Is there a difference between your two heart rate values? Why?

d. *(Max. 100 words)* Compare the PQRST shape in the first and last 5 seconds. Are the shapes compressed? Is the firing rate increased? Explain why.

3.0 – Signal Artefact

a. *(Max. 100 words)* What are the sources of noise in this lab? Are they low or high frequency? How can you remove/reduce them? You may support your answer by showing some of the graphs recorded during the lab.

b. *(Max. 50 words)* Does your signal ECG have a DC component? What is the source of the DC component? How can you remove it?