Lab Submission Worksheet

Laboratory 2 — Electromyography

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. Data from `bicep_isometric` file and identify when weights are being added.
2. RMS envelope of `bicep_isometric` calculated with the 1s analysis window.
3. Data from `bicep_isotonic` file and identify when weights are being added.
4. RMS envelope of `bicep_isotonic` calculated with the 1s analysis window.

Step 3

Write your answer to all questions in the provided boxes.

Step 4

Submit to the drop box for "sysc4203" outside ME4460 before **2:00pm** one week after the lab.

2.0 - Isometric Contractions

a. *(Max. 100 words)* How do you expect the EMG signal to change as more force is applied to an isometric contraction?

b. Plot the signal of the `bicep_isometric` file and identify when weights are being added (as in figure above). Print, label, annotate and attach this plot to the report.

Attach and label plot.

c. Calculate the RMS envelope of the signal using a sliding 1s analysis window.
nb. sliding 1s analysis = moving average using 1s of data to calculate each value. Plot the RMS envelope calculated with the 1s analysis window.

Attach and label plot.

d. For each 15s interval of lifting 1, then 2... books, what is the average RMS value of your signal? Plot it as a function of the number of books (x axis).

# of books	Average RMS (μV)
1	
2	
3	
4	

Attach and label plot.

e. *(Max. 100 words)* What happens to the number of activated motor units and their firing rates when the weight is increased?

3.0 - Isotonic Contractions

a. Plot the signal of the `bicep_isotonic` file and identify the time instances when the muscle length is varied. Plot the RMS envelope calculated with the 1s analysis window.

Attach and label plot.

Attach and label plot.

b. What is the average RMS value of your signal for each position (ignoring time when the arm is moving from one position to another)? Plot the value (y axis) as a function of the angle (x axis).

Arm angle (degrees)	Average RMS (μV)
120	
90	
60	
30	

Attach and label plot.

c. *(Max. 100 words)* What changes occur in your muscle to create the shape of the plot in question 3b? Draw the sliding filament model diagram of a muscle fibre and use this model to support your answer.

Draw the sliding filament model diagram: