General Instructions for Lab Reports

Generally: Read through the tutorial & follow the experiment instructions. There are two important things to keep in mind when you are writing these reports; every question posed within the lab should be answered (even if the answer to the question is stated within the lab). However, when the answer is written do not just write it word-for-word in your blue book. Both the question and the answer should be paraphrased so that they make sense given the format we want you to use. For simplicity, we have included a list of the question that you must answer to receive full credit. The second thing to keep in mind; these should be written as a lab report/journal article, with one of each of the sections described below. The labs themselves as they appear in NIA2 are split into sections. Sections within your report can be split into sections (see the “Hypothesis” section for an example).

Regarding formatting, you are allowed to write your lab report in pencil or pen. However, if we believe that people are abusing this privilege, future lab reports will have to be written in pen.

Labs will have multiple components:

- **Introduction**: read through the tutorial description and introduce the topic of your “lab experiment”. Take this opportunity to draw connections between the NIA2 text, the reading, and the lectures. (1/2 – 1 page)

- (1-2 page) **Hypothesis**: Each lab will be divided into “Experiments and Observations” sections. Lab 1 (‘The Membrane Potential’), as an example, has the following (4) sections:
  - Experiment with charging a lipid bilayer with a current pulse.
  - Establish a resting potential by adding the Na/K pump.
  - Add “leak” channels.
  - Add HH voltage-sensitive channels

For each of these sections, write a short hypothesis. Describe the manipulation instructed by NIA2 and your models predictions. There will also be random, specific questions dispersed throughout the tutorial, these should be addressed in your hypothesis section as well. You can address these questions under their respective section, but remember to have a distinct hypothesis for each individual question and the section. Your predictions can be written as bulletpoints. **Write these predictions before conducting the experiment and explain the reasoning behind them. Don’t be afraid to be wrong** – this is a valuable learning opportunity (really). (1 page)

- (1/2-1 page) **Methods**: For each of your experimental sections, describe the methods of your experiment. For example: “(1) set total ms to 25, (2) click iClamp & set duration to...”.

For example: Lab 1 has 4 sections, so you should have 4 brief (2-3 sentence/bullet points) sections describing your methods. (1/2 page)
● **Results:** This should be the bulk of your lab report. Each of your four sections will have between 1 and 5 individual manipulations. Each manipulation (described in your methods) should produce a graph (developed by NIA2) – **it is your responsibility to draw and describe these graphs in your lab report.** Previous students have found success with drawing their graphs on graph paper, cutting them out and then gluing them into their blue books. This section should include at least one graph for each section. Make sure that your axes and individual lines are clearly labeled. This section will vary greatly in length depending the lab.

● **Discussion:** Compare your hypotheses to your results. If some of your hypotheses were wrong, explain where the prediction error came from. Depending on your hypotheses, this section could be anywhere from a few sentences reiterating your correct hypotheses to a couple paragraphs explaining where you went wrong.

**Lab 6 The Unmyelinated Axon Sections and Questions:**

1. Record the action potential as a function of time at various locations along the axon
   a. Do the ionic current patterns for this propagating action potential appear similar to those for an action potential in a uniform patch, which you observed in the Na Action Potential tutorial?
   b. How can it be that the currents in a propagating impulse at any given point in the axon have time courses similar to those for a stationary impulse in a patch?
2. Display the impulse as it travels along the axon (voltage as a function of space).
3. Observe the effect of changing the axon diameter on impulse propagation.
   a. When you reduce the diameter, why can you see more of its waveform?
   b. As the axon diameter is decreased, less current is necessary to stimulate it. Why?
   c. In the Voltage-vs-Time graph, notice what happens to the delay of the action potential with respect to the stimulus, and also whether the shape of the action potential is affected when the axon's diameter is changed over two log units. Can you explain your observations?
4. Observe the effect of changes in temperature on the propagation of the impulse.
   a. As you increase the temperature, do you find a point where the action potential fails? Exactly how does it fail, and why?
5. Measure the velocity of propagation of the impulse.