

General information:

- 40 points total.
- You are responsible for all information in chapters 1, 3, and 4 of the lab manual. In addition, you are responsible for techniques and predictions learned in the lab.
- Note that questions similar to the ones on lab write-ups and weekly quizzes could also show up on the exam.
- Be prepared for concepts, definitions, procedures, predictions, broad themes, minor facts, diagrams/graphs/traces, calculations, hands-on with computer or apparatus, etc.
- Be prepared for all types of questions: fill-ins, brief essay, true/false, multiple choice, etc.
- See sample questions at <<http://spot.colorado.edu/~saul/physiology/index.html>>: “Sample Questions for Midterm 1” (Q#6,7,8). *Note:* These were written in an earlier year, when the labs were arranged in a different order.

Study questions

- Below I have given for each lab a list of skills and knowledge areas to think about. Keep in mind that this is not an exhaustive list.

Lab Basics lab

- Know how to log on to the physiology server (note typo in lab manual!).
- Understand the basic purpose of the PowerLab and transducers.
- Know how to find and run Chart, Scope, Excel and SPSS on the lab computers.
- Know how to open the Data Pad, and use it to calculate Max-Min or an average.
- Explain verbally what a p-value means. Be able to interpret significance of a p-value.
- If an experiment is described, state which t-test (paired or unpaired) is appropriate.
- Know how to perform a paired or unpaired t-test in SPSS.
- Given a description of an experimental design, be able to identify problems with it.
- What are the differences between Chart and Scope?
- Know how to calibrate a force transducer.
- Know what kind of graph (e.g. bar, scatter, scatter with regression line) is appropriate for a given set of data.
- Understand the difference between the independent variable (which goes on the x-axis) and the dependent variable (which goes on the y-axis).

Nerve lab

- Know the anatomy of neurons and the mechanism of nerve signaling.
- Understand the basic idea of the experimental setup (stimulus and recording electrodes, where they are placed, what they are measuring, etc.).
- Be able to identify the stimulus artifact and the CAP on a Scope trace, and be able to explain their biological or electrical basis.
- Know how the size of a neuron affects its response to stimulation.
- Understand the difference between an AP (action potential) and a CAP.
- What is the all-or-none law? Does it apply to APs, CAPs, or both?
- As we vary stimulus intensity, what can you say about the sizes of neurons that are producing APs?

- As we vary the interval between two large (“supramaximal”) stimuli, what happens? What does this tell us about absolute and relative refractory periods?
- As we vary the interval between two small (subthreshold) stimuli, what happens? What can you say about the neurons that are firing and those that are not firing?
- Be able to calculate the conduction velocity given sufficient information.

Muscle lab

- Know the anatomy of muscles and the mechanism of muscle contraction.
- As with nerves and neurons, understand the differences and similarities between the whole-muscle response and the muscle fiber’s response.
- Explain the difference between twitch and tetanic contractions. Which is used in normal activity?
- Understand how muscle fiber recruitment works. What is a motor unit?
- Be able to recognize wave summation and tetanus from graphical Chart output. Be able to calculate the tetanus-twitch ratio. Understand the biological basis for these phenomena.
- What muscle length produces maximum tension, and why?
- What is the difference between isometric and isotonic contractions? Give examples.
- Explain the reasoning behind each one of our hypotheses in this lab.