

CHAPTER 34

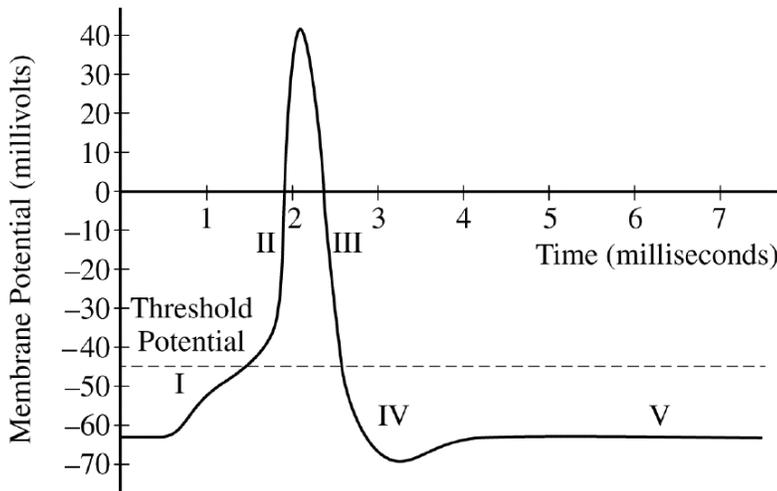
*Approximately 75% of this assignment is due in class on Monday, April 9, 2018
The completed assignment, in its entirety, is due Tuesday, April 10, 2018*

Read Hillis Chapter 34. Answer the following concept questions in complete sentences:
Concept 34.1 (questions 1 & 2); Concept 34.2 (questions 2 & 4); Concept 34.3 (questions 1, 2, & 4);
Concept 34.4 (question 1)

ESSAY 4

Due Thursday, April 12, 2018

Answers must be written out in paragraph form. Outline form is not acceptable. Labeled diagrams may be used to supplement discussion, but a diagram without a written explanation will not receive credit. You must cite the source of all information you mention. Include the page number of information from the textbook or the web address of information found online.



Ion	Concentration (mM)	
	Cytoplasm	Seawater
Na ⁺	50	460
K ⁺	400	20
Ca ²⁺	.5	10
Cl ⁻	50	560

Figure 2. Ion concentration in axon’s cytoplasm and seawater bath outside the cell during stage V

Figure 1. Membrane potential during an action potential

The giant squid is a model system for studying neural communication because the axon and nerve endings are so large that they are relatively easy to manipulate and study. The graph in Figure 1 represents the changes in membrane potential during an action potential. The data in Figure 2 were recorded from the large axon of a giant squid motor neuron and show the concentrations of three ions both inside the axon’s cytoplasm and outside the cell, in a seawater bath, during stage V of Figure 1.

- (a) **Describe** how the plasma membrane of a motor neuron regulates its permeability to Na⁺ and K⁺ during an action potential.
- (b) **Predict** the changes in the Na⁺ and K⁺ concentrations during stages II and III of the action potential shown in Figure 1. **Justify** your predictions.
- (c) **Describe** how the signal is transmitted across the synapse from the terminal branches of the motor neuron and how the signal is received by an effector muscle.
- (d) Animals of the Phylum Chordata possess a hollow dorsal nerve cord, which allow for the possibility of a reflex arc in emergency situations. **Describe** TWO ways that a reflex arc differs from a typical stimulus-response pathway and **provide reasoning** to support the claim that reflex arcs provide an evolutionary advantage in emergency situations.

CHAPTERS 37–40 *Approximately 75% of this assignment is due in class on Monday, April 16, 2018
The completed assignment, in its entirety, is due Tuesday, April 17, 2018*

Thoroughly skim Hillis Concept 36.1 and Chapters 37–40, with an emphasis on the terms in the leftmost column of the table below. You can supplement the reading by looking up information online on the terms in the table.

For each component in the table below, **describe** the structure of the component and **explain** how the structure relates to the function of the component.

Component	System	Hillis Reference
Alveolus	Respiratory	Concept 37.3
Capillary	Circulatory	Concept 38.5
Nephron	Excretory	Concepts 40.3–4
Sarcomere	Muscular	Concept 36.1
Villus	Digestive	Concept 39.3

PRACTICE EXAM *Due Monday, April 23, 2018*

Complete all sections of the practice exam assigned in class. It is strongly recommended that you do this in one timed 3-hour sitting (90 minutes for multiple choice and grid-in, followed by a 10-minute break, then immediately after 10 minutes to read the essay questions and 80 minutes to complete the free response section).

BOOK RETURN *Due Tuesday, May 15, 2018*

Bring your Hillis textbook to class. Please be sure to have the exact copy of the book that will match your book receipt.