EEMB 157: Disciplinary Knowledge

Writing Task

EEMB 157 - DISCIPLINARY KNOWLEDGE
Upper division
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This assignment will help you to develop your understanding of how membrane potentials are harnessed by diverse cells to do different types of work. Mastering this topic can often be tricky, but is *fundamental* for learning how to think like a cell physiologist. You'll also see questions related to these topics, on your next midterm!
This assignment has *three parts*:
PART 1: Complete the writing prompt below by Monday, 11/5 at 11:45 pm.
PART 2: Provide feedback to course colleagues on their draft of the prompt by Monday, 11/12 at 11:45 pm. You will find a link in GauchoSpace that will take you to the drafts you'll review. (You'll receive additional instructions about the review.)
PART 3: REVIEW feedback provided *to you, on your draft*, through the same process that you will use to provide feedback to others. Following consideration of comments from class peers, REVISE your draft and re-upload by Sunday, 11/18 at 11:45pm.
To receive credit for this assignment, you must complete *all three parts*. That is, you must:

1. Write a draft;
2. Provide feedback to peers; and
3. Review feedback provided to you, revise based on that feedback, and resubmit your revised draft.

You will not receive credit if any of these parts are not completed.
Writing Prompt:
Membrane potentials are established by diverse transport mechanisms and used to power many different, important cellular processes across all three domains of life. For this assignment, you'll choose a case study from the list below and analyze your case in two parts.
Your explanation should be understandable for an audience who has a basic understanding of membrane transport and membrane potentials, but is excited to understand more about specific cases where these processes matter.
Your responses for parts 1 and 2 should be clearly separated in your written response. Your thoughts should be detailed and well developed in 250-300 words per section. Write in complete sentences and paragraph format (no bullet points) . Your first draft should probably take about 120 minutes to write.
STEP ONE:
Choose a specific case study from the list below. You must write **which case study you have chosen at the top of your written response.**
CASE STUDY ONE: Axons and action potentials

CASE STUDY TWO: *Haloarchaea* and bacteriorhodopsin
CASE STUDY THREE: Gut epithelial cells and glucose acquisition
CASE STUDY FOUR: Neuromuscular junctions and acetylcholine
CASE STUDY FIVE: *Escherichia coli* and ATP synthesis

STEP TWO: Write your response in the two parts below.

PART ONE:

Describe mechanistically how membrane transport and membrane potential work in the case study you have selected. Refer to both your class notes and textbook to:

- Identify and describe the type of energy used to power the membrane transport that establishes the membrane potential important for your case study;
- Name which ions are transported to establish the membrane potential, identify their transporters, and describe their relative concentrations on either side of the cell membrane;
- Describe a function that depends on the discharge of this membrane potential and why it's important for the cell and for your organism.
- Identify the signal (if any) that triggers membrane potential discharge;
- Describe the relevant membrane transport processes that occur during the discharge of the membrane potential

PART TWO

Describe an example where an important function in your case study is disrupted and discuss its implications for the organism. This could be an environmental condition (for example, changes in environmental pH or perturbations in the body's sodium levels), toxin, or drug. Here, you will likely need to do some independent research and reading beyond what we discuss in class or what is covered in your textbook. Your response should:

- Identify and name a perturbation (condition, toxin, or drug) that produces a significant disruption
- Describe in mechanistic detail what it disrupts, and
- Explain the physiological consequences for the organism

Remember to clearly separate your responses for parts 1 and 2. Your complete responses to each section, again, should be 250-300 words per section.