Lesson Plan - 10/9/20

Course Title: BMED 3600: Physiology of Cellular and Molecular Systems

Estimated # of students in course/attending your lesson: 75

Room Configuration: Online (Bluejeans)

Course Goals:

List course goal in each row.	Does current lesson address this goal?
1. To introduce BME students to the anatomy of mammalian cells: structure, organization and basic function of organelles, gene expression, intracellular signaling cascades, the cytoskeleton, the cell life cycle, and the extracellular matrix.	Yes
2. To introduce students to the relationship between cell and molecular biology and bioengineering.	Yes
3. To introduce concepts of how cells interact with their physical and mechanical environments and function as intricate machines that sense, process, and respond to stimuli.	Yes
4. To introduce students to analytical methods used in cell biology research.	Yes
5. To acquaint students with issues related to biological variability.	Yes

Lesson Topic:

Systems Biology and Neuroinflammation

Lesson Learning Objectives (Where are you going?):

Students should be able to:

1. Analyze the process of neuroinflammation from a systems-level perspective.
    a. Describe the purpose and process of tissue inflammation.
    b. Differentiate between inflammation within the brain and elsewhere in the body.
    c. Illustrate extracellular inflammatory signaling pathways between types of brain cells.
2. Understand various methods used to gather data in systems biology.
    a. Explain the purpose and basic principles of multiplexed enzyme-linked immunosorbent assays.
    b. Explain the purpose and basic principles of protein mass spectrometry.
    c. Explain the purpose and basic principles of RNAseq.
3. Interpret multivariate data analysis of biological systems.
    a. Explain the basic principles of Principal Components Analysis (PCA).
    b. Interpret the results of a PCA scores plot and loadings chart.
    c. Explain the basic principles of Partial Least Squares Regression (PLSR).
    d. Interpret the results of a PLSR scores plot and loadings chart.

Assessment:

Assessment of learning will be in the form of formative homework problems and maybe one to two multiple choice summative quiz questions.

Agenda/lecture outline and procedures:

Topic	Activity	Est. Time
Intro to Inflammation		1100-1105
Neuroinflammation Overview	"Type into the chat" question, end by 11:10	1105-1115
Intro to Systems Biology	"Type into the chat" question, end by 11:20	1115-1122
ELISA and Multiplexed ELISA		1122-1124
Mass Spectrometry	(can be cut for time)	1125-1126
RNAseq		1127-1129
Multivariate Data Analysis: PCA		1130-1135
Multivariate Data Analysis: PLSR	(can be cut for time)	1135-1140
Feedback Forms		1140-1150

Student and Instructor Preparation and Follow-up:

Before the lesson:

-Upload slides to Canvas for student use

After the lesson:

-Collect feedback forms

-Assign homework problems

-Include problems on next quiz

Materials & Supplies (including files and handouts):

Slides

Contingencies:

Should bluejeans shut down, I will record the lecture and share it on Canvas for students to watch asynchronously.

If I get behind on the schedule, I can comfortably cut PLSR and mass spectrometry.