Lesson Plan - 11/9/20

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.	No
5. To acquaint students with issues related to biological variability.	No

Lesson Topic:

Stem Cells

Lesson Learning Objectives (Where are you going?):

Students should be able to:

1. Understand cell division and differentiation.
    a. Explain why cells divide.
    b. Explain the differences between stem cells and differentiated cells.
    c. Explain the relationship between cell differentiation and plasticity.
2. Describe the role of stem cells in the human body.
    a. State the unique properties of stem cells: self-renewal and differentiation.
    b. Differentiate between the different levels of cell potency.
    c. Diagram the cell types of the intestinal epithelium and explain the role of intestinal stem cells.
    d. Diagram the differentiation pattern of hematopoietic stem cells.
3. Describe stem cell applications.
    a. Explain an example application of stem cells in regenerative medicine.
    b. Explain the challenges associated with the application of stem cells in medicine.
    c. Describe the creation and function of induced pluripotent stem cells.
    d. Propose novel applications of stem cells.

Assessment:

Assessment of learning will be in the form of formative homework problems and summative quiz questions.

Agenda/lecture outline and procedures:

Topic	Activity	Hit Time
Introduction		
Explain why cells divide	"Why do cells divide?" open question	
Explain stem cells vs differentiated cells Explain the levels of cell differentiation and relationship to plasticity	"How many types of cells?" multiple choice (MC)	11:12
Unique properties of stem cells	"What are the unique properties" open question	
Different levels of cell potency	"What level potency is a zygote?" MC	11:21
Example: Intestinal epithelial stem cells	"Where are the stem cells?" MC "What level potency?" MC	
Example: Hematopoietic stem cells		11:29
Stem cell applications	"What applications can you think of"	
Challenges for use of stem cells		
Induced pluripotent stem cells		
Example application: iPSCs to repair spinal cord damage, slide		
Student survey and announcements, slide	Survey	Start NLT 11:45

Student and Instructor Preparation and Follow-up:

Before the lesson:

-Upload slides to Canvas for student use at least 24hr prior

After the lesson:

-Collect feedback forms

-Assign homework problems or practice quiz

-Create problems for next quiz

Materials & Supplies (including files and handouts):

Slides

TurningPoint app

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 hematopoietic stem cells and shorten discussion on iPSCs