Curriculum Units and Learning Outcomes

Content Area: Biology	**Grade Level: 10**
Unit Title: Cell Division	
Unit Summary: This unit focuses on the way in which cell reproduction results in the growth, repair and replacement of cells of an organism, as well as the development of new organisms. It starts out by introducing the cell life cycle and its phases and then focuses on cell division. The simplest form of cell division seen in bacteria, binary fission is covered first. Then the unit moves on to discuss a more complex process seen in eukaryotes, mitosis. Finally, the unit covers meiosis, a process that produces sex cells necessary for reproduction. Similarities and differences between mitosis and meiosis are examined. In the lab, students will again use microscopes to compare cells in various stages of mitosis, and use statistical analysis to determine time spent in each phase.	
Massachusetts Standards: ● HS-LS1-4. Construct an explanation using evidence for why the cell cycle is necessary for the growth, maintenance, and repair of multicellular organisms. Model the major events of the cell cycle, including (a) cell growth and DNA replication, (b) separation of chromosomes (mitosis), and (c) separation of cell contents. ● HS-LS3-1. Develop and use a model to show how DNA in the form of chromosomes is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction.	
Enduring Understandings: Students will understand that: ● Growth, maintenance and repair of organisms are made possible due to the cell cycle. ● Meiosis results in the production of unique gametes that are combined to create new combinations of traits in the offspring.	

Essential Questions:

- How does the cell cycle make growth, maintenance and repair of organisms possible?
- How do meiosis and sexual reproduction result in new combinations of traits in offspring?

Students will demonstrate KNOWLEDGE of:	**Students will be SKILLED at**:
● the structure of a chromosome ● the major events of the cell cycle ● the major events of the phases of mitosis and meiosis ● the difference between haploid and diploid cells ● the difference between asexual and sexual reproduction ● cell parts and organelles that are involved in cell division ● the process of binary fission ● karyotypes and why they are done ● cancer cells and how they cause cells to divide uncontrollably	● **Identifying** phases of mitosis and describe the organization of the chromosomes during each phase. ● **Constructing** a model or diagram to demonstrate the events of mitosis and meiosis. ● **Comparing and contrasting** the process of mitosis in plant and animal cells. ● **Analyzing** data sets to determine the relative length of phases of the cell cycle; making a claim and providing evidence and scientific reasoning. ● **Explaining** how meiosis results in cells that contain unique genetic material. ● **Explaining** how genetic mutations result in the growth of tumors/ cancer. ● **Explaining** how mitosis maintains chromosome number and produces identical cells. ● **Comparing and contrasting** the processes of mitosis and meiosis.

Estimated Duration: 14-16 days