| **Unit Title:** Diseases | **Content Area:** Biology | **Grade Level:** 9-12 |
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**Summary:** This unit begins with the topic of mitosis and cell division. It uses this content as a transition between the cellular biology unit and this unit on diseases. From here students will investigate the stages of the cell cycle and learn how it is regulated and the problems that arise when the regulations in place do not work. Students will then learn about how cancer form and how cancer is treated. Students will then explore bacteria and learn science skills as they design and implement a lab investigation that aims to identify how bacteria grows in a lab and where within the school bacteria is most dominant. They will then conclude their understandings of bacteria by summarizing the differences between good and bad bacteria and how bacterial infections are treated. Students will then explore virus structure, replication and infection. Finally, the unit will conclude with the students reviewing several case studies (bacterial infections, viral infections and cancer) and identify the disease, treatment (if any) and prevention methods.

Science Practices Addressed: Asking questions (for science) and defining problems (for engineering). Developing and using models, Planning, and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing, explanations (for science) and designing solutions (for engineering), Engaging in argument from evidence, Obtaining, evaluating, and communicating information

Cross-Cutting Concepts Addressed: Patterns, Cause and Effect, Stability and Change and Structure and Function.

| **Unit Essential Questions:** | **Unit Enduring Understandings:** |
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| • What is the level of organization from atom to ecosystem?<br>• How does a cell regulate its growth and why?<br>• What is cancer?<br>• How are some bacteria helpful and other harmful?<br>• In what ways can you prevent viral infection? | • Cells divide through the process of mitosis resulting in daughter cells that have the same genetic composition as the original cells. This process, if unregulated can result in cancer (Specifically: Mitosis, Cell Growth Regulation, and Cancer).<br>• Bacteria are prokaryotic organisms that can be both helpful and harmful (Specifically: Diseases, Symbiotic Relationships, and Role in the Environment).<br>• There are different preventions, treatments and cures for different diseases but not all diseases can be prevented or cured (Specifically: Vaccines, Antibiotics, Chemotherapy). |

**NJCCCS:** 5.3.12.A.4, 5.3.12.A.6

**NGSS Performance Expectations:** *Students who demonstrate understanding can…*

- HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

| **Primary CCSS ELA/Literacy Connections:** CCSS.ELA-Literacy.RI.11-12.2, CCSS.ELA-Literacy.RI.11-12.4, CCSS.ELA-Literacy.W.11-12.1, CCSS.ELA-Literacy.W.11-12.4, CCSS.ELA-Literacy.W.11-12.7, CCSS.ELA-Literacy.SL.11-12.1, CCSS.ELA-Literacy.SL.11-12.4 | **Primary CCSS Mathematics Connections:** CCSS.Math.Content.HSS.ID.A.1, CCSS.Math.Content.HSS.ID.B.5, CCSS.Math.Content.HSS.ID.C.7 |
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## Lesson Pace & Sequence

| **Lesson Title/Number: Diversity of Cellular Life, Lesson 1** | **Learning Objective(s): Explore the diversity of cellular life and apply their understanding by creating analogies for the levels of organization.** | **Lesson Duration: 120 min** |
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| ***Learning Cycle***<br><br>***What lesson elements will support students' progress towards mastery of the learning objectives(s)?***<br><br>****Elements do not have to be in conducted in sequence.*** | ***Learning Activities***<br><br>***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?*** | ***Resources/Materials***<br><br>***What curricular resources/materials are available to facilitate the implementation of the learning activities?*** | ***Science and Engineering Practices***<br><br>***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?*** | ***Disciplinary Core Ideas***<br><br>***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?*** | ***Crosscutting Concepts***<br><br>***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?*** |
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| ***Elicit: How will you access students' prior knowledge?*** | Do Now: Have students read the caption and study the unicellular organisms on page 190. Ask Which of these cells is prokaryotic and which are eukaryotic? How do you know? | | Constructing explanations (for science) and designing solutions (for engineering) | LS.1.A. | Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. |
| ***Engage: How will you capture students' interest and get students' minds focused on the concept/topic?*** | Place the following words on the board: cell, atom, population, tissue, ecosystem, organ system, molecule, organ, and human. Ask student to write the words in order from smallest to largest. Share class results. Inform students you will return to this order at the end of class. | | Developing and using models | | |
| ***Explore: What hands-on/minds-on common experience(s) will you provide for students?*** | Microscope Experience: Explore slides of various types of tissue (blood, plant, muscle, etc.) Have students compare and contrast the different types of tissue. Ask, can a muscle tissue be replaced with skin tissue? Why not? | • Histology Slides: http://www2.yvcc.edu/histologyzoomer/HistologyTutorials/histology_tutorials.htm | Obtaining, evaluating, and communicating information | | |
| ***Explain: How will you help students connect their exploration to the concept/topic under investigation?*** | Discussion/PPT Ch. 7-4 on the diversity of cellular life. Write discussion questions after each subsection to ask the class. | • Levels of Organization Video: https://www.youtube.com/watch?v=jp6L5emD8rw | Asking questions (for science) and defining problems (for engineering) | | |
| ***Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?*** | Using Analogies: Using an organized area in your life- such as school, sports or extracurricular activities- to construct an analogy to explain how the levels of organization in that chosen area can be compared with those of living organisms. | • Ch. 7-4, pg. 193 | Obtaining, evaluating, and communicating information | | |
| ***Evaluate: How will students demonstrate their mastery of the learning objective(s)?*** | Exit Ticket: Place the following words in order from smallest to largest, cell, atom, population, tissue, ecosystem, organ | | Developing and using models | | |

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| | system, molecule, organ, and human. | | | | |
| ***Extend: How will students deepen their conceptual understanding through use in new context?*** | Read, "Stem Cells: Promises and Problem" Write a brief report on how this technology will impact the future of medicine. | • pg. 253 | Constructing explanations (for science) and designing solutions (for engineering) | | Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts |
| **Lesson Title/Number: Cell Growth, Lesson 2** | | **Learning Objective(s): Explain why cells must regulate their growth through an inquiry activity and quick lab investigation.** | | **Lesson Duration: 120 min** | |
| ***Learning Cycle***<br><br>***What lesson elements will support students' progress towards mastery of the learning objectives(s)?***<br><br>****Elements do not have to be in conducted in sequence.*** | ***Learning Activities***<br><br>***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?*** | ***Resources/Materials***<br><br>***What curricular resources/materials are available to facilitate the implementation of the learning activities?*** | ***Science and Engineering Practices***<br><br>***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?*** | ***Disciplinary Core Ideas***<br><br>***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?*** | ***Crosscutting Concepts***<br><br>***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?*** |
| ***Elicit: How will you access students' prior knowledge?*** | Do Now: How would you describe the process by which a multicellular organism increases its size? Why do cells stay small? | | | LS1.B. | Structure and function. The way in which an object or living thing is Shaped and its substructure determine many of its properties and functions. |
| ***Explore: What hands-on/minds-on common experience(s) will you provide for students?*** | Inquiry Activity: How do organisms grow? Students will be able to observe that the sizes of cells are about the same in small organisms as in large organisms. | • Ch. 10-1, pg. 240 | Planning and carrying out investigations | | Structure and function. The way in which an object or living thing is Shaped and its substructure determine many of its properties and functions. |
| ***Explain: How will you help students connect their exploration to the concept/topic under*** | Class Discussions/PPT: How cells grow. Have students say one sentence summarizing the information for each slide | • Ch. 10-1 | Obtaining, evaluating, and communicating information | | |

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| ***investigation?*** | before moving to the next slide. | | | | |
| ***Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?*** | Quick Lab: What limits the sizes of cells? Students will be able to use a model (hard boiled eggs), to explain why a cell cannot continue to grow exponentially. | • Ch. 10-1, pg. 242 | Planning and carrying out investigations | | |
| ***Evaluate: How will students demonstrate their mastery of the learning objective(s)?*** | Writing: Write a paragraph that explains why a cell in the human body never grows as large as a fist. | | Obtaining, evaluating, and communicating information.<br><br>Constructing explanations (for science) and designing solutions (for engineering) | | |
| ***Extend: How will students deepen their conceptual understanding through use in new context?*** | Connecting Concepts: Stability and Equilibrium- Select two cell organelles and describe how their functions might be impaired if the cell were to become too large. Students may require a quick review of Ch.7. | • Ch. 10 | Constructing explanations (for science) and designing solutions (for engineering) | | Stability and change. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study. |
| **Lesson Title/Number: Mitosis, Lesson 3** | | **Learning Objective(s): Predict the stages of the cell cycle by ordering descriptive images then assess and revise their order after class discussion.** | | **Lesson Duration: 120 min.** | |
| ***Learning Cycle***<br><br>***What lesson elements will support students' progress towards mastery of the learning objectives(s)?***<br><br>****Elements do not have to be in conducted in sequence.*** | ***Learning Activities***<br><br>***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?*** | ***Resources/Materials***<br><br>***What curricular resources/materials are available to facilitate the implementation of the learning activities?*** | ***Science and Engineering Practices***<br><br>***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?*** | ***Disciplinary Core Ideas***<br><br>***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?*** | ***Crosscutting Concepts***<br><br>***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?*** |
| ***Elicit: How will you access students' prior knowledge?*** | Do Now: How many cells do you think your body has? | | Asking questions (for science) and defining problems (for engineering) | LS1.B. | Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. |

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| ***Engage: How will you capture students' interest and get students' minds focused on the concept/topic?*** | Display an outline of the human body with lines draw separating different parts of the body. Ask: Suppose that your hand or your arm or your foot was made of only one cell, what would happen if that cell stopped working or died? How many cells are really in our bodies? (There are approximately 100 trillion) What happens if just one cell dies in my hand, arm or foot? Do all the cells in my hand or foot die? Does my foot fall off? What does the body do to replace cells that die, whether they are in our hand or foot or elsewhere in our bodies? What is this process called? | | Constructing explanations (for science) and designing solutions (for engineering) | | |

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| ***Explore: What hands-on/minds-on common experience(s) will you provide for students?*** | Organize steps: Provide students with cut out images and short descriptions of the different stages of the cell cycle (interphase through cytokinesis). Instead of labeling these images by their name, assign them a letter or number (randomly).<br>Ask students in groups to put the images in what they believe to be the order of the stages/phases and write down the letters/numbers of each image in the order they agree upon. Have students switch groups so that no student is at a group with any of the same members from their initial group. At their new groups, students should share their concluded order form their last group.<br>Assuming students will have some discrepancies in the order, have them negotiate and come to a consensus i their new group. Have students return to their original seats and write each group's suggested order of images/descriptions | | Obtaining, evaluating, and communicating information | | |

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| ***Explain: How will you help students connect their exploration to the concept/topic under investigation?*** | PPT and Class Discussion: Chapter 10-2. Once the teacher explains a stage/phase, ask students what corresponding image/description goes with what was just explained. As you go through the stages ask students to paste/glue/tape the images they used into their notebooks and add additional notes alongside the images/descriptions. | | | | |
| ***Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?*** | Using Models: Divide the class into eight groups, making a mix of students of varying abilities and assign each group to a stage/phase. Explain that together, the groups will make a wall-length cartoon strip that shows the events in the cell cycle. Give each group of students four frames (pieces of paper) that they will get to model their designated stage/phase. Have students present their material to the class as one large cartoon. | | Developing and using models | | |
| ***Evaluate: How will students demonstrate their mastery of the learning objective(s)?*** | Ch. 10-2 Section Assessment | • Pg. 249 | Constructing explanations (for science) and designing solutions (for engineering) | | |
| ***Extend: How will students deepen their conceptual understanding through use in new context?*** | Analyzing Data: Life spans of human cell. Students will analyze the life span of various human cells. They will then infer, compare and contrast, and formulate hypotheses. | • Ch. 10-2, pg. 249 | Analyzing and interpreting data.<br><br>Using mathematics and computational thinking. | | |
| **Lesson Title/Number: Cancer, Lesson 4** | | **Learning Objective(s): Create a pamphlet explaining cancer and cell growth regulation.** | | **Lesson Duration: 80 min.** | |

| ***Learning Cycle***<br><br>***What lesson elements will support students' progress towards mastery of the learning objectives(s)?***<br><br>****Elements do not have to be in conducted in sequence.*** | ***Learning Activities***<br><br>***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?*** | ***Resources/Materials***<br><br>***What curricular resources/materials are available to facilitate the implementation of the learning activities?*** | ***Science and Engineering Practices***<br><br>***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?*** | ***Disciplinary Core Ideas***<br><br>***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?*** | ***Crosscutting Concepts***<br><br>***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?*** |
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| ***Elicit: How will you access students' prior knowledge?*** | Do Now: What is cancer? | | | LS1.B. | |
| ***Engage: How will you capture students' interest and get students' minds focused on the concept/topic?*** | Using visuals: Look at figure 10-7, what happened to the cells between the first petri dish and the second petri dish? What caused the difference shown between the third and the fifth petri dishes? Why didn't the cells keep dividing until they spilled over the edge of the petri dish? | • Ch. 10-3, pg. 250 | Developing and using models<br><br>Obtaining, evaluating, and communicating information | | Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts. |
| ***Explain: How will you help students connect their exploration to the concept/topic under investigation?*** | Class Discussion/PPT: Regulating the cell cycle and cancer | • Ch. 10-3 | Obtaining, evaluating, and communicating information | | |
| **Explore: What hands-on/minds-on common experience(s) will you provide for students?** | Quick Lab Design: Ask students to design a hypothetical investigation to test the following hypothesis, "Substance C regulates when a cell begins each phase of the cell cycle." | • TE: pg. 251 | Planning and carrying out investigations | | |

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| ***Evaluate: How will students demonstrate their mastery of the learning objective(s)?*** | Create a pamphlet: Have students create a pamphlet for the public that explains the regulation of cell division and how cancer cells have lost the growth control that normal body cells have. | | Obtaining, evaluating, and communicating information | | |
| ***Extend: How will students deepen their conceptual understanding through use in new context?*** | Designing an Anticancer Drug: Imagine you are developing a drug that will inhibit the growth of cancer cells. Use your knowledge of the cell cycle to describe how the drug would target and prevent the multiplication of cancer cells. Use the internet to compare your anticancer drug with those currently in use. | • Alternative Assessment, Ch. 10-3, pg. 252 | | | |
| **Lesson Title/Number: Intro to Bacteria, Lesson 5** | | **Learning Objective(s): Apply their understanding of bacteria and bacterial growth by designing a lab investigation that aims to answer the lab question, "What areas of the school have the most bacterial growth?"** | | **Lesson Duration: 80 min.** | |
| ***Learning Cycle***<br><br>***What lesson elements will support students' progress towards mastery of the learning objectives(s)?***<br><br>****Elements do not have to be in conducted in sequence.*** | ***Learning Activities***<br><br>***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?*** | ***Resources/Materials***<br><br>***What curricular resources/materials are available to facilitate the implementation of the learning activities?*** | ***Science and Engineering Practices***<br><br>***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?*** | ***Disciplinary Core Ideas***<br><br>***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?*** | ***Crosscutting Concepts***<br><br>***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?*** |
| ***Elicit: How will you access students' prior knowledge?*** | Do Now: Brainstorm the pros and cons of bacteria. | | | LS.1.A. | |
| ***Engage: How will you capture students' interest and get students' minds focused on the concept/topic?*** | Watch the Ameba sister's video titled, "Bacteria, the good the bad and the kinda gross." Prior to showing the video ask students to write questions they have about bacteria. | • Bacterial – The Good, the Bad, and the Kinda Gross: https://www.youtube.com/watch?v=kxM_9DL2GYw | Asking questions (for science) and defining problems (for engineering) | | Structure and function. The way in which an object or living thing is Shaped and its substructure determine many of its properties and functions. |

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| ***Explore: What hands-on/minds-on common experience(s) will you provide for students?*** | Display images of bacteria and viruses. Ask students in groups to classify the photos into either bacteria of viruses. Students can then present their classifications and discuss what criteria they used to classify. | • Biology Images: http://www.sciencekids.co.nz/pictures/biology.html | Obtaining, evaluating, and communicating information | | |
| ***Explain: How will you help students connect their exploration to the concept/topic under investigation?*** | Discussion/PPT: Bacteria. Students will write down key words and characteristics of bacteria. Provide students with the lists of common prefixes and suffixes to help break down key vocabulary (auto=self, chemo=chemical, etc.). Include in the discussion how bacteria can be good and bad. Also, discuss the use of antibiotics. | • Ch. 19-1 | | | Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them |
| ***Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?*** | Design a lab, "What areas in the school have the most bacteria growth?" In addition to information about bacteria, students should include how to grow bacteria using petri dishes and using the clamshell method in their background information. Students should then write their hypothesis that states what areas they will test and which have the most growth. Variable and control must also be completed. | • Agar Dish Techniques: http://www.hccfl.edu/media/568160/6-exercise%20iii.pdf | Asking questions (for science) and defining problems (for engineering) | | |

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| ***Evaluate: How will students demonstrate their mastery of the learning objective(s)?*** | Pre Lab questions: What type of cells are bacteria and what are some key characteristics? What is agar used for? Why is using the clam shell method important when collecting bacteria samples? What area of the school does your group predict to have the most growth? Explain your rationale. Over how long of a period (days) will you be collecting data? Why is the use of incubator important? How will you know if the bacteria are multiplying? | | | | |
| ***Extend: How will students deepen their conceptual understanding through use in new context?*** | Write investigation procedures, determine list of materials, and create data collection table. | • How to Design a Lab: http://sciencestuffbyamy.blogspot.com/2013/08/how-to-teach-your-students-to-design.html | Planning and carrying out investigations | | Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. |
| **Lesson Title/Number: Bacteria Lab, Lesson 6** | | **Learning Objective(s): Continue to plan and implement their lab design that investigates bacterial growth.** | | **Lesson Duration: 80 min.** | |
| ***Learning Cycle***<br><br>***What lesson elements will support students' progress towards mastery of the learning objectives(s)?***<br><br>****Elements do not have to be in conducted in sequence.*** | ***Learning Activities***<br><br>***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?*** | ***Resources/Materials***<br><br>***What curricular resources/materials are available to facilitate the implementation of the learning activities?*** | ***Science and Engineering Practices***<br><br>***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?*** | ***Disciplinary Core Ideas***<br><br>***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?*** | ***Crosscutting Concepts***<br><br>***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?*** |
| ***Elicit: How will you access students' prior knowledge?*** | Do Now: What did your group hypothesize for today's investigation? | | Asking questions (for science) and defining problems (for engineering) | LS.1.A. | Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. |

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| ***Engage: How will you capture students' interest and get students' minds focused on the concept/topic?*** | Recap: In their groups, students continue to design their lab investigation. Determine procedures, variables, control, and data collection methods. | | Planning and carrying out investigations | | |
| ***Explore: What hands-on/minds-on common experience(s) will you provide for students?*** | Complete bacteria investigation by going to their corresponding locations within the school and swabbing. Students should be reminded of the techniques used when working with agar dishes. | | | | |
| ***Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?*** | Analyze Data: Over the designated time period (determined by each group but should be limited to under 1 week), students should analyze their data by counting colony growth of bacteria. Students should report their final outcome to the whole class to determine class results. | | Analyzing and interpreting data | | Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them. |
| ***Evaluate: How will students demonstrate their mastery of the learning objective(s)?*** | Post lab questions: Which plate of yours had more colonies? Of the class data, which plate had the most colonies? Where did the bacteria on your plates come from? Did you control have growth? If so, what does that say? If you were teaching an AP biology class, how would you make this lab more challenging? | | | | |

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| ***Extend: How will students deepen their conceptual understanding through use in new context?*** | Refer to the class data. Which area(s) are you most surprised to see bacterial growth? Write a letter to the principle explaining the experiment you've conducted and its results. Be sure to state what you would like done and cite specific evidence from your experiment in your argument. | | Obtaining, evaluating, and communicating information.<br><br>Constructing explanations (for science) and designing solutions (for engineering) | | |
| **Lesson Title/Number: Viruses, Lesson 7** | | **Learning Objective(s): Differentiate between different types of viruses, how they reproduce and how they can be prevented through class discussion and a quick lab.** | | **Lesson Duration: 120 min.** | |
| ***Learning Cycle***<br><br>***What lesson elements will support students' progress towards mastery of the learning objectives(s)?***<br><br>****Elements do not have to be in conducted in sequence.*** | ***Learning Activities***<br><br>***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?*** | ***Resources/Materials***<br><br>***What curricular resources/materials are available to facilitate the implementation of the learning activities?*** | ***Science and Engineering Practices***<br><br>***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?*** | ***Disciplinary Core Ideas***<br><br>***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?*** | ***Crosscutting Concepts***<br><br>***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?*** |
| ***Elicit: How will you access students' prior knowledge?*** | Do Now: How are viruses transmitted? | | Asking questions (for science) and<br>defining problems (for engineering) | LS.1.A. | |
| ***Explore: What hands-on/minds-on common experience(s) will you provide for students?*** | Using Models- Give students an unshelled sunflower seed. Ask, "In what ways is the structure of a virus like the structure of a<br>sunflower seed? What does the shell of a sunflower seed represent in a virus?<br>What does the kernel of a sunflower seed represent?<br>What is the function of the virus core? | | Developing and using models | | Structure and function. The way in which an object or living thing is Shaped and its substructure determine many of its properties and functions. |
| ***Explain: How will you help students connect their exploration to the concept/topic under investigation?*** | Discussion/PPT- Viruses (Ch. 19-2). Ask students to write a summary paragraph after the PPT. | • Ch. 19-2 | Obtaining, evaluating, and communicating information | | |

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| ***Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?*** | Quick Lab: How do viruses differ in structure? Students will make models of two different viruses and conclude that viruses differ in structure. | • Ch. 19-2, pg. 482 | Planning and carrying out investigations | | |
| ***Evaluate: How will students demonstrate their mastery of the learning objective(s)?*** | Venn Diagram- Compare viruses and eukaryotic cells | | Obtaining, evaluating, and communicating information | | |
| ***Extend: How will students deepen their conceptual understanding through use in new context?*** | Issues in Biology: Read, Should Mass Vaccinations be Required? Analyze viewpoints, form opinions and role play. | • Ch. 19-2, pg. 484 | Engaging in argument from evidence | | |
| **Lesson Title/Number: Prevention, Diagnosis and Treatment of diseases, Lesson 8** | | **Learning Objective(s): Apply their knowledge of cancer, bacterial and viral diseases by developing a diagnosis, prevention and treatment of various case studies.** | | **Lesson Duration: 80 minutes** | |
| ***Learning Cycle***<br><br>***What lesson elements will support students' progress towards mastery of the learning objectives(s)?***<br><br>****Elements do not have to be in conducted in sequence.*** | ***Learning Activities***<br><br>***What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?*** | ***Resources/Materials***<br><br>***What curricular resources/materials are available to facilitate the implementation of the learning activities?*** | ***Science and Engineering Practices***<br><br>***What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?*** | ***Disciplinary Core Ideas***<br><br>***What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?*** | ***Crosscutting Concepts***<br><br>***What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?*** |
| ***Elicit: How will you access students' prior knowledge?*** | Do Now: Why do you go to the doctor to get shots? | | | LS.1.A. | |
| ***Engage: How will you capture students' interest and get students' minds focused on the concept/topic?*** | Provide students with an article on the Ebola virus. Have students read and develop questions regarding what they want to know more about the disease. | • Ebola Virus Information: http://www.who.int/mediacentre/factsheets/fs103/en/ | Asking questions (for science) and defining problems (for engineering) | | Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts |

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| ***Explore: What hands-on/minds-on common experience(s) will you provide for students?*** | Provide students with various case studies that explain the symptoms different patients are experiencing. Using their understandings of the different diseases have students determine the type of disease (viral, bacterial, cancer), what the treatment (if any) is, and how the patient could have prevented getting the disease. Also give a space for students to create questions they would ask the patient. | | Asking questions (for science) and defining problems (for engineering)<br><br>Analyzing and interpreting data | | |
| ***Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?*** | Students will then get into small groups and share what they think each case study disease is. They will be asked to use evidence from the case studies to support their claim. | | Engaging in argument from evidence | | Patterns.<br>Observed patterns of forms and events guide organization and classification,<br>and they prompt questions about relationships and the factors that influence<br>them.<br>Cause and effect: Mechanism and explanation. Events have causes,<br>sometimes simple, sometimes multifaceted. A major activity of science is<br>investigating and explaining causal relationships and the mechanisms by<br>which they are mediated. Such mechanisms can then be tested across<br>given contexts and used to predict and explain events in new contexts |
| ***Evaluate: How will students demonstrate their mastery of the learning objective(s)?*** | The accuracy in their diagnosis, prevention methods and treatment. | | | | |

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| ***Extend: How will students deepen their conceptual understanding through use in new context?*** | Develop a concept map (or flow chart) that models how each disease is treated and prevented. | | Developing and using models | | Patterns.<br>Observed patterns of forms and events guide organization and classification,<br>and they prompt questions about relationships and the factors that influence<br>them.<br>Cause and effect: Mechanism and explanation. Events have causes,<br>sometimes simple, sometimes multifaceted. A major activity of science is<br>investigating and explaining causal relationships and the mechanisms by<br>which they are mediated. Such mechanisms can then be tested across<br>given contexts and used to predict and explain events in new contexts |