# Subject Matter "D" Evidence: Unit 2, Taking Action in Your Community—Health Equity

## Contents

# Executive Summary

Sponsored by Genentech, Futurelab+ brought together a coalition of partners to develop an innovative, modular, 2-year biotechnology curriculum, along with instructional materials, to expose students and educators to the breadth of education and career pathways across biotechnology. To increase adoption and access to such curricula in California and beyond, the modular curriculum was designed to align with the California Career Technical Education Model Curriculum Standards for Biotechnology, meet at least 1 year of the University of California (UC) science (D) subject requirement, and incorporate some of the three-dimensional learning innovations of the Next Generation Science Standards (NGSS). The 2-year biotechnology curriculum has four core units per year; each core unit has nine lessons and a lab that each take approximately 1 week to complete (9–10 weeks for the full unit). In total, the biotechnology curriculum has 72 lessons and eight labs that span 2 full instructional years. Because the Futurelab+ biotechnology curriculum is modular, teachers can select specific units and materials to design biotechnology courses that are relevant and appropriate for their students and teaching environments.

Because teachers and schools can choose which portions of the curriculum to include in their final course designs, this report series provides evidence of where each unit meets specific criteria for the UC science (D) subject requirement and, when incorporated into a full year-long course, where the curriculum could meet at least 1 year of the UC science (D) subject requirement, contingent upon review and approval by UC. Subsequently, the evidence provided herein can be used by teachers for submitting Futurelab+ course materials for UC science (D) subject approval.

**The purpose of this report is to provide evidence for alignment of Unit 2 of the Futurelab+ Biotechnology Curriculum with the UC science (D) subject requirement**. To help educators submit their final courses for UC science (D) subject review, the American Institutes for Research (AIR) also wrote sample unit and lab summaries, which follow the guidelines for writing a UC science (D) course (March 17, 2021), to provide language to teachers as they write their full course descriptions.

Specifically, AIR reviewed each unit for evidence of the extent to which the unit meets the eight Course Content Guidelines for the UC science (D) subject requirement. This report provides specific examples to demonstrate where and how materials satisfy these criteria. Based on our review, we believe there is a strong body of evidence that will likely translate to Unit 2 meeting the UC science (D) subject matter requirement. **This review was completed on materials received October 18, 2021 and has not been updated to reflect any revisions made to materials since then.**

# University of California A–G Course Requirements

To be eligible for admission into the California State University or the University of California (UC) systems, high school students must successfully complete (with a grade of C or better) the UC A through G (A–G) course requirements. The A–G course requirements encompass 15 year-long courses, including (A) 2 years of history/social science, (B) 4 years of English composition and literature, (C) 3 years of mathematics, **(D) 2 years of science**, (E) 2 years of language other than English, (F) 1 year of visual and performing arts, and (G) 1 year of a college preparatory elective. Teachers, parents, and students want high school courses to meet A–G requirements. To increase adoption of the Futurelab+ biotechnology curriculum, the modular curriculum was designed to meet at least 1 year of the UC science (D) subject requirement.

# Futurelab+ and UC Science (D) Subject Requirement

The 2-year Futurelab+ biotechnology curriculum was designed to be modular. Teachers can select specific units and materials to design biotechnology courses that are relevant and appropriate for their students and teaching environments. For example, a biotechnology teacher can create a course that consists of four Futurelab+ units—two units from Year 1 of the curriculum and two units from Year 2 of the curriculum. Or, a school can create a course that consists of two Futurelab+ units in conjunction with other materials. Each course would have unique course descriptions because the materials are different.

*The modular, 2-year Futurelab+ biotechnology curriculum consists of four core units each year. Each unit has nine lessons and a lab. A lesson consists of more than one class period of learning to allow students the opportunity to develop their knowledge and understanding more fully. Lessons and labs take approximately five 45-minute instructional periods to complete. In its entirety, the biotechnology curriculum has 72 lessons and eight labs.*

Given the modular nature of the curriculum and because teachers and schools can choose which units to include in their final course designs, this report series provides evidence of where singular units meet specific criteria for the UC science (D) subject requirement and, when incorporated into a full year-long course, where the curriculum could meet at least 1 year of the UC science (D) subject requirement, contingent upon review and approval by UC. Subsequently, the evidence provided herein can be used by teachers for submitting Futurelab+ course materials for UC science (D) subject approval.

To assist educators in writing and submitting to UC their unique course descriptions that incorporate Futurelab+ materials, each unit report includes a sample unit overview, assignment overview, and laboratory activity summary, as required for A–G course submissions and following the sample provided in the UC Policy Guide. **Appendix A** includes the example UC science (D) subject course description provided by UC. **Appendix B** includes a sample unit overview, assignment overview, and laboratory activity for educators to adapt to their needs.

This summary report provides evidence on how **Unit 2: Taking Action in Your Community: Health Equity** of the Futurelab+ curriculum meets the UC science (D) subject requirement.

# Methodology

There is strong overlap between the UC science course content guidelines and the NGSS Lesson Screener criteria (see Exhibit 1). As such, the American Institutes for Research (AIR) staff first conducted an NGSS Lesson Screener review on a randomly sampled lesson from Unit 2.

### Exhibit 1. Course Content Guidelines and NGSS Lesson Screener Criteria

There is strong overlap between the UC science (D) subject requirement and the NGSS Lesson Screener criteria. Specific course content guidelines of the A–G Policy Resource Guide are briefly summarized here, with notations about which Lesson Screener criteria include the same or similar requirements.

- Explicitly integrate the eight NGSS Science and Engineering Practices **(Lesson Screener Criteria B and C); this requirement is mentioned multiple times**.
- Draw content generally from the NGSS **(Lesson Screener Criteria B and C)** and Common Core State Standards for Literacy in History/Social Studies, Science, and Technical Subjects.
- Provide opportunities for students to participate in all phases of the scientific process and require students to discuss ideas with other students **(Lesson Screener Criteria B, C, D, and E)**.
- Be explicit about formative and summative assessment practices **(Lesson Screener Criteria B, C, and E)**.
- Include real-world problems that engage all students in science learning **(Lesson Screener Criteria A, D, and E)**.
- Specify minimum mathematics course requirements.
- Reserve at least 20% of class time for teacher-supervised, hands-on laboratory activities.
- Incorporate technology (to the extent possible) to increase access and computer-based skills for students.

Upon completion of the NGSS Lesson Screener deep dive, AIR staff reviewed the remaining Unit 2 materials for further evidence. Specifically, AIR reviewed each unit for evidence of the extent to which the unit meets the following UC science (D) subject matter course criteria, outlined in the Course Content Guidelines:

Criterion 1 Integrate the eight NGSS practices of science and engineering

Criterion 2 Consist of content pulled largely from the California NGSS and the Common Core State Standards for literacy in history/social studies, science, and technical subjects

Criterion 3 Provide opportunities for students to participate in all phases of the scientific process

Criterion 4 Employ quantitative reasoning and methods where appropriate

Criterion 5 Hold at least 20% of class time for teacher-supervised, hands-on laboratory activities

Criterion 6 Include explicit formative and summative assessment practices

Criterion 7 Provide real-world problems and applications

Criterion 8 Include the use of technology if possible

# Summary of UC Science (D) Course Content Guidelines

## Criterion 1: Integrate the Eight Science and Engineering Practices

Subject "D" Course Criterion 1 requires students to engage with the eight science and engineering practices outlined in the California NGSS throughout a year-long science course. **The following**

**bulleted list shows examples of students engaging with these eight practices throughout Unit 2 of the Futurelab+ curriculum**. This list is not exhaustive.

### Practice 1: Asking questions and defining problems

Students engage in elements of *Practice 1, Asking questions and defining problems*, in the following instructional activity:

- **Define a design problem that can be solved through the development of an object, tool, process, or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions**. In the Social Awareness Campaign Project, students engage in social engineering to create a social awareness campaign that influences the behaviors of target populations disproportionately impacted by an infectious disease of their choosing. As the first step in this process, teams must identify the population being impacted. (Mock Wearable Tech Innovation Project Design Journal: pp. 5–28, Steps 1–4).

### Practice 2: Developing and using models

Students engage in elements of *Practice 2, Developing and using models*, in the following instructional activity:

- **Compare models to identify common features and differences**. In the New Production Materials lesson, students create physical representations of both DNA and RNA to compare and contrast them and examine the role mRNA plays in medicine (New Production Methods, Teacher Section, p. 8; Student Section, p. 6).

### Practice 3: Planning and carrying out investigations

Students engage in elements of *Practice 3: Planning and carrying out investigations*, in the following instructional activity:

- **Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions**. In the Using ELISA in Vaccine Trials Laboratory Investigation, students determine the concentration of antibodies in 6 mock clinical trial participants (Unit 2 Lab: Using ELISA in Vaccine Trials, Student Section, p. 64).

### Practice 4: Analyzing and interpreting data

Students engage in elements of *Practice 4, Analyzing and interpreting data*, in the following instructional activity:

- **Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible**. In the Using ELISA in Vaccine Trials Laboratory Investigation, students conduct a linear regression in Google Sheets to determine the coefficient of determination ($R^2$) within the data they collected. This calculation is used to support their claim about whether the vaccine was effective (Unit 2 Lab: Using ELISA in Vaccine Trials, Student Section, p. 64).

### Practice 5: Using mathematics and computational thinking

Students engage in elements of *Practice 5, Using mathematics and computational thinking*, in the following instructional activities:

- **Apply mathematical concepts and/or processes to scientific and engineering questions and problems**. Unit 2 has several opportunities for students to utilize quantitative reasoning, particularly during Lesson 2, in which students calculate and interpret several common measures of epidemiology, including ratio, proportion, incidence proportion or attack rate, incidence rate, prevalence, and mortality rate (Lesson 2: Epidemiology, Student Section, pp. 15–17).
- **Apply techniques of algebra and functions to represent and solve scientific and engineering problems**. The Using ELISA in Vaccine Trials Laboratory Investigation involves students solving linear equations and creating graphs to determine the effectiveness of a vaccine and the concentration of IgG antibodies where "immunity" occurs (Unit 2 Lab: Using ELISA in Vaccine Trials, Teacher Section, p. 1).

### Practice 6: Constructing explanations and designing solutions

Students engage in elements of *Practice 6, Constructing explanations and designing solutions*, in the following instructional activity:

- **Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion**. During the Using ELISA in Vaccine Trials Laboratory Investigation, students write a "complete Claim, Evidence, Reasoning paragraph that answers the Driving Question: Did the vaccine trigger production of IgG antibodies to the SARS-CoV-2 spike protein and can you conclude if a particular concentration of IgG antibodies confers immunity to COVID-19?" As the final part of this task, students use scientific principles to explain how their claim is supported by the data they collected (Unit 2 Lab: Using ELISA in Vaccine Trials, Student Section, p. 76).

### Practice 7: Engaging in argument from evidence

Students engage in elements of *Practice 7, Engaging in argument from evidence*, multiple times throughout Unit 2, including in the following instructional activities:

- **Construct and/or support an argument with evidence, data, and/or a model**. During the Using ELISA in Vaccine Trials Laboratory Investigation, students write a "complete Claim, Evidence, Reasoning paragraph that answers the Driving Question: Did the vaccine trigger production of IgG antibodies to the SARS-CoV-2 spike protein and can you conclude if a particular concentration of IgG antibodies confers immunity to COVID-19?" To complete the task, students first must make a claim about whether the vaccine they tested worked and then support that claim with evidence and data from the investigation they completed (Unit 2 Lab: Using ELISA in Vaccine Trials, Student Section, p. 76).

### Practice 8: Obtaining, evaluating, and communicating information

Students engage in the following elements of *Practice 8, Obtaining, evaluating, and communicating information*, in several instructional activities, some of which are highlighted below:

- **Communicate scientific and/or technical information or ideas in writing and/or through oral presentation**. In the Day 2 small-group activity of the Current Infectious Diseases lesson, students work in small groups to research information, using a variety of web sources, about an infectious disease, including a description of and details about the disease, the pathogen that causes it (if applicable), risk factors and causes, genetic or hereditary information if applicable, treatment(s) sociocultural details, physical environment, complications, symptoms, morbidity, mortality, possible preventive measures, and the actions and responsibilities of an infectious disease specialist when treating individual patients as well as outbreaks. Students then present their findings to their peers for feedback (Lesson 1: Current Infectious Diseases, Teacher Section, p. 7; Student Section pp. 6–7).

- **Communicate scientific and/or technical information or ideas in multiple formats.** For their final project, student groups design a social awareness campaign to share information with a chosen community through several components, including (1) an informational website, (2) choice of an informative ad or infographic, (3) a public service announcement video, and (4) a social media outreach plan (Social Awareness Campaign Project Design Journal, p. 3).

## Criterion 2: Content Largely From the California NGSS

As previously noted, the Futurelab+ curriculum was designed to be aligned to the California Career Technical Education Model Curriculum Standards for Biotechnology. These standards, adopted in 2013, include an Academic Alignment Matrix (p. 32) that explicitly indicates content overlap with the NGSS and the Common Core State Standards for Literacy in History/Social Studies, Science, and Technical Subjects. For feedback about incorporation of specific three-dimensional learning and instructional shifts, see the accompanying **Unit 2 Lesson 1 NGSS Lesson Screener** report.

## Criterion 3: All Phases of the Scientific Process

Throughout Unit 2, students complete learning activities to develop the content knowledge and skills needed for the unit's final project, which is to design a social awareness campaign to share information with a chosen community through several components, including (1) an informational website, (2) choice of an informative ad or infographic, (3) public service announcement video, and (4) social media outreach plan. (Social Awareness Campaign Project Design Journal, p. 3). Learning activities that work toward addressing this final project include the following:

- Identifying a problem through research that justifies the need for a targeted social awareness campaign about the impact of an infectious disease on a selected community disproportionately impacted by that disease
- Researching the disease description and details, the pathogen that causes the disease if applicable, risk factors and causes, genetic or hereditary information if applicable, treatment(s), sociocultural details, physical environment, complications, symptoms, morbidity, mortality, possible preventive measures, and the actions and responsibilities of an infectious disease specialist when treating individual patients as well as outbreaks
- Communicating the problem and proposed solution by creating a Social Awareness Campaign with several components, including (1) an informational website, (2) choice of an informative ad or infographic, (3) public service announcement video, and (4) social media outreach plan (Social Awareness Campaign Project, pp. 2–4)
- Student groups are guided through a 12-step engineering design process during the final project, as identified throughout the Social Awareness Campaign Project Design Journal (pp. 5–36).

## Criterion 4: Employ Quantitative Reasoning and Methods Where Appropriate

Unit 2 has several opportunities for students to use quantitative reasoning, particularly during Lesson 2, in which students calculate and interpret several common measures of epidemiology, including ratio, proportion, incidence proportion or attack rate, incidence rate, prevalence, and mortality rate (Lesson 2: Epidemiology, Student Section, pp. 15–17). Additionally, the Using ELISA in Vaccine Trials lab indicates that micropipetting, calculating serial dilutions, solving linear equations, and creating graphs are skills students use within the lesson (Unit 2 Lab: Using ELISA in Vaccine Trials, Teacher Section, p. 1).

## Criterion 5: At Least 20% Class Time for Teacher-Supervised, Hands-On Laboratory Activities

This criterion specifically recommends that at least one scientific investigation be a student-designed project involving a tested hypothesis and that "teacher supervision may be synchronous or asynchronous, depending on whether the learning environment is classroom-based, fully online, or a hybrid."

Names of specific lab activities are noted in the Unit 2 Flow Chart and are listed, along with their timings, below:

- LAB: Using ELISA in Vaccine Trials—5 Days
- Lesson 1: Current Infectious Diseases: *Multiplying Microbes and Disease Transmission Lab*—2 Days
- Lesson 2: Epidemiology: *Measures of Disease Frequency Capture Sheet*—1 Day
- Lesson 5, Day 3: *What Can Go Wrong* and *Revised Vaccine Manufacturing Process*—1 Day

Unit 2 includes 9 days, or roughly 22.5% of unit time, of hands-on, teacher-supervised lab activities throughout 40 days of instruction. As a result, AIR determined that at least 20% of class time will include teacher-supervised, hands-on laboratory activities that are directly related to and support the other class work and that involve inquiry, observation, analysis, and write-up of investigations consistent with the practices of the scientific field.

## Criterion 6: Explicit Formative and Summative Assessment Practices

AIR found evidence of several opportunities for teachers to gauge student learning, with both formative and summative assessment practices, and students are often provided the opportunity to demonstrate their learning of a specific topic in multiple ways.

The Protocols for Culturally Responsive Learning and Increased Student Engagement include multiple protocols for gathering *formative* assessment information, in a culturally responsive way, about student prior knowledge. Specific protocols and their purposes are often identified within the teaching section, with notes to teachers about what to look for in student responses. An example can be found in Lesson 6, Vaccine Production and Safety Testing, where teachers can use the *snowball fight* strategy to summarize key information as a formative assessment of student understanding (Teacher Section, p. 5).

The Unit 2 Flow Chart provides an overview for teachers about specific instructional activities and resulting student artifacts generated to demonstrate student learning, including student-created posters, presentations, videos, concept maps, activities, videos and letters. Each lesson includes several graphic organizers and worksheets for students as well.

Finally, the overall summative assessment is a unit-long, project-based learning opportunity in which students apply what they have learned throughout the unit to solving a real-world problem by designing a social awareness campaign to share information with a chosen community through several components, including (1) an informational website, (2) choice of an informative ad or infographic, (3) public service announcement video, and (4) social media outreach plan

## Criterion 7: Real-World Problems and Applications

Unit 2 of the Futurelab+ biotechnology curriculum excels at providing real-world problem and application connections for students, particularly through the lens of equity and access to healthcare information.

As noted in several prior criteria, the Unit 2 final activity is a project-based learning opportunity in which students are tasked with creating a social awareness campaign to inform and influence a community that struggles with equity in health care.

Additionally, lessons within the unit are explicitly tied to real-world problems and scenarios. Some examples of real-world problem and application activities in Unit 2 lessons include the following:

- *Current Infectious Diseases*, in which students explore different infectious diseases, the rates at which they multiple, how they can be spread, and their impact on different communities.
- *Treating Bacterial and Viral Diseases,* in which students review journal abstracts and visually depict disparities in treatment of diseases, as well as brainstorm how to address those disparities

## Criterion 8: Include the Use of Technology

The Futurelab+ curriculum was designed to be flexible for teachers who may have to alternate between in-person learning, virtual learning, or a hybrid environment. As such, the curriculum includes multiple opportunities for students to use a variety of programs that are open source and provides students with opportunities to manipulate data; run simulations; record videos and commercials; and, in Unit 2, design a social awareness campaign with several components, including (1) an informational website, (2) choice of an informative ad or infographic, (3) public service announcement video, and (4) social media outreach plan to communicate information to a specific community of their choosing

# Resources


Achieve & National Science Teachers Association. (2016). *NGSS lesson screener*. https://www.nextgenscience.org/screener

California Department of Education. (2007). *Career technical education framework for California public schools: Grades seven through twelve*. https://www.cde.ca.gov/ci/ct/sf/documents/cteframework.pdf

California Department of Education. (2017). *California career technical education model curriculum standards*. https://www.cde.ca.gov/ci/ct/sf/documents/healthmedical.pdf

Sacramento City Unified School District. (n.d.). *Protocols for culturally responsive learning and increased student engagement*. Retrieved October 11, 2021, from https://www.scusd.edu/sites/main/files/file-attachments/protocols_0.pdf?1445031253.

University of California. (n.d.). *Writing A–G Courses* [UC A–G Course Management Portal]. https://hs-articulation.ucop.edu/guide/update-your-a-g-list/writing-a-g-courses/

# Appendix A. Example Science (D) Subject Course Description

The following sample course description was shared by the University of California to "give course authors a model for how to construct course overviews, unit overviews, and sample assignments" (University of California, "Sample course descriptions."). The course description below can be found here.

## Subject Area "D" Sample

*Included in this sample is a single course overview, unit, and assignment; this is not a sample of a complete course, nor are all disciplines/courses represented in this sample. The purpose of these pieces is to give course authors a basic sample of how to construct strong course overviews, units, and assignments. Often, when a course is not approved by the UC High School Articulation Team, it is because the UC A-G Subject Area Specific Criteria is not explicitly written into a course submission. We encourage all course authors to consistently review the criteria specific to the subject/discipline under which they are submitting their courses.*

**Course Title:** Biology / **Subject:** Laboratory Science / **Discipline:** Biology

**Sample Course Overview:**

In this course, students develop an in-depth understanding of the living world by studying structure, function and processes. Students recognize and understand the interactions of chemistry, physics, and earth sciences in the study of biology. Laboratory investigations incorporate procedures and develop the ability to analyze complex information. The main content areas of focus are cell biology, ecology, genetics, evolution, and physiology. Students will continue to develop their skills of reading, writing, discussion, technology, and analysis through lab reports, essays, and individual and group research projects. The ultimate course goal is to demonstrate scientific knowledge and skills as students work toward the school-wide goals of becoming self-directed learners who can identify a task and complete it, complex thinkers who can determine solutions to problems, and community contributors who can work collaboratively.

**This course overview demonstrates the following strengths:**

- Uses concise language which gives a global view of the course without sacrificing meaning
- Includes a balance of skills and content (merely listing standards to be covered is not sufficient)
- Previews how the course will integrate the following UC laboratory science "D" subject area requirements:
  - All courses approved in the laboratory science subject area should be designed with the explicit intention of developing and encouraging scientific habits of mind important for university-level studies and aligned with the eight practices of science and engineering identified by the National Research Council Framework and detailed within the Next Generation Science Standards

**Sample Unit: *Cells***

This unit builds upon key lessons introduced in the previous unit, the scientific process, data analysis, investigation and experimentation, by unifying the themes of biology. This unit covers chemical concepts, the differences between carbon-based molecules and proteins, the differences between aerobic and anaerobic respiration, and cell theories related to all living things and how they function. Students begin by understanding basic cellular functions and then move on to compare and contrast different cell types to develop mastery of the processes essential to homeostasis and the proper function of all living cells. Explanation of the properties of water will be applied to diffusion and osmosis across cell membranes. The concepts of chemical energy production and usage, photosynthesis and cellular respiration, will build a foundation for understanding the processes of cell growth and regulation. Enzymatic activity will be connected to the essential cellular processes as they apply to all living organisms. In total, this unit provides students with an inquiry-based approach to applying their knowledge of energy dynamics within cellular organelles while utilizing investigation and experimentation skills mastered in a previous unit.

**Sample Unit Assignment: *Cells***

Supervised by course teacher, each student will explore how the sugar content of a banana changes as it ripens. Students will formulate a hypothesis as to the amount of sugar and starch content that are contained in samples of green, ripe and overripe bananas. After determining the sugar and starch concentrations of various samples, students will demonstrate their understanding of the process of fruit ripening by comparing their predictions to the data generated. Students will use the data collected from the lab to confirm whether their hypothesis was valid or disproved. Their conclusions regarding the relationship between sugar content, starch content, and the ripening process will be based on these comparisons. After predicting concentrations of sugar and starch in various banana samples, students will perform a test with Benedict's reagent to determine the presence of sugar and a test for the presence of starch using an iodine solution. Students will then use their predictions and collected quantitative data to demonstrate an understanding of the fruit ripening process. Students will be writing a 2 to 3 page lab report that includes that clearly states the hypothesis, experimental methods, collected data, analysis of the data, and conclusion of their findings.

While these single unit and assignment samples do not, nor are designed to, demonstrate all of the UC subject area "d" course criteria, they clearly and concisely exhibit the components of the criteria listed below, are well-written, and ultimately answer the question: ***How do this single unit and assignment meet the UC criteria for a college-preparatory laboratory science course?***

**This sample course unit and assignment demonstrate the following strengths & course criteria:**

- provides rigorous, in-depth treatments of the conceptual foundations of the scientific subject studied based on the appropriate underlying biological, chemical and physical principles
- affords students opportunities to participate in all phases of the scientific process, including formulation of well-posed scientific questions and hypotheses, design of experiments and/or data collection strategies, analysis of data, and drawing of conclusions; they will also require students to discuss scientific ideas with other students, differentiate observations from interpretations, engage in critical thinking and write clearly and coherently on scientific topics
- employs quantitative reasoning and methods wherever appropriate
- includes a teacher-supervised, hands-on laboratory activities that are directly related to, and support, the other class work, and that involve inquiry, observation, analysis and write-up

# Appendix B. Sample Unit Overview, Assignment Overview, and Lab Activity

## Example Unit Overview: *Taking Action in Your Community: Health Equity*

In *Taking Action in Your Community: Health Equity*, students discover how pandemics are mitigated and determine ways to address inequities in access to health care. Students begin by comparing several infectious diseases and the risks humans face from pathogens and then work as an epidemiologist to identify populations vulnerable to inequities in health care. Students examine how cells and viruses reproduce and then engage in an exploration of vaccine development, through which they study how vaccines are manufactured and safety tested, as well as the role of government involvement in the process. Finally, students engage in a social engineering process to design a social awareness campaign to inform and influence a community that is impacted by inequitable access in health care.

## Example Unit Assignment: *Social Awareness Campaign Project*

Supervised by the course teacher, students engage in a social engineering process to design a social awareness campaign to inform and influence a community that is impacted by inequities in health care. Students begin by defining the problem—the disease disproportionately affecting a community of the students' choosing—and the initial goals and constraints. Then students work to brainstorm a concept map or organizer that shows connections between the disease and issues of healthcare inequities. Students then conduct background research, partly through various lesson activities and partly on their own, to answer questions about epidemiology and treating bacterial and viral diseases and to explore how vaccines work and are produced, manufactured, and tested and the involvement of public health agencies in vaccine development. Students then design a social awareness campaign to share information with a chosen community through several components, including (1) an informational website, (2) choice of an informative ad or infographic, (3) public service announcement video, and (4) social media outreach plan to educate members of the affected community.

## Lab Activity: *Using ELISA in Vaccine Trials*

In this teacher-supervised lab, students conduct research on an approved COVID-19 vaccine to identify the level of antibodies needed for immunity by using a mock ELISA test to measure the concentration of antibodies in several samples. Students analyze the data obtained and make claims about the effectiveness of the vaccine, based on the analysis of their data.

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