INTRODUCTION TO PUBLIC HEALTH
GRADE 10-12

EWING PUBLIC SCHOOLS
2099 Pennington Road
Ewing, NJ 08618

Board Approval Date: September 19, 2022 Michael Nitti
Produced by: Sean Hammer Superintendent

In accordance with The Ewing Public Schools' Policy 2230, Course Guides, this curriculum has been reviewed and found to be in compliance with all policies and all affirmative action criteria.

Table of Contents

Course Description and Rationale

Introduction to Public Health will provide an overview of the interdisciplinary field of public health. Students will learn about the history of public health and the core public health sciences including behavioral and social sciences, biostatistics, epidemiology, environmental health, and policy. Other topics will include health disparities (both within the US and globally), ethics in public health, community participation in research, public health promotion, and the prevention of chronic and infectious diseases.

Throughout the course, students will use the eight NGSS Science and Engineering Practices to demonstrate understanding of the core ideas:

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

The following seven NGSS cross-cutting concepts support the development of a deeper understanding of the disciplinary core ideas:

- Patterns
- Cause and effect: mechanism and explanation
- Scale, proportion and quantity
- Systems and system models
- Energy and matter: flows, cycles and conservation
- Structure and function
- Stability and change

The course follows a block semester schedule, with students meeting daily for 88 minutes. The course content is arranged into six units of study:

In **Unit 1: The Principles of Public Health**, students will be introduced to the context and scope of public health, including its history, philosophy, literature, essential services, ethics, and applications to current events. Students will understand public health as a cross-cutting, systematic, and interdisciplinary field and will demonstrate their understanding by presenting a health issue from the lens of the public health paradigm.

In **Unit 2: Epidemiology**, students will learn the basic principles of the study of disease etiology and distribution. They will learn to calculate and interpret rates, risk factors, and health status indicators of morbidity and mortality; disease determinants, causation, and types of epidemiological research; and public health surveillance and vital statistics. Several case studies will be used to allow students to learn the steps of investigating a disease outbreak.

In **Unit 3: Population Health Tools**, students will learn to evaluate the quality of health information and data in the mass media. They will also learn to apply social science theories to understand health behaviors and design interventions. Students will also examine the influence of health policies and laws on public health and examine the potential tensions between individual rights and social responsibilities.

In **Unit 4: Preventing Disease and Reducing Morbidity/Mortality**, students will examine three major types of health hazards/risks: environmental health / occupational health and safety; communicable/infectious diseases; and noncommunicable diseases. For each category, students will use case studies to practice characterizing risk, measuring the burden on morbidity, and mortality, and designing evidence-based interventions to mitigate risk/harm.

In **Unit 5: Healthcare and Public Health Systems**, students will learn about the composition of the US healthcare system and compare/contrast our system with those of Canada, the United Kingdom, and other nations. Quality of care, access to care, and healthcare costs will be examined as potential drivers of health disparities both within and across our borders.

In **Unit 6: Global Health, Health Disparities, and Vulnerable Populations**, students will compare/contrast the leading causes of morbidity and mortality around the globe, with a particular emphasis on vulnerable populations. Students will conduct their own research and share their own evidence-based recommendations for how to reduce such health disparities and protect these populations using the tools of public health.

Career Readiness, Life Literacies, and Key Skills

During this course, students will work on developing, to an age appropriate level, the following Career Readiness, Life Literacies, and Key Skills:

Disciplinary Concepts:

- Career Awareness and Planning
    - An individual's strengths, lifestyle goals, choices, and interests affect employment and income.
    - Developing and implementing an action plan is an essential step for achieving one's personal and professional goals.
    - Communication skills and responsible behavior in addition to education, experience, certifications, and skills are all factors that affect employment and income.

- Creativity and Innovation
    - Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.
- Critical Thinking and Problem-solving
    - Multiple solutions exist to solve a problem.
    - An essential aspect of problem solving is being able to self-reflect on why possible solutions for solving problems were or were not successful.
- Digital Citizenship
    - Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work.
    - Digital communities are used by Individuals to share information, organize, and engage around issues and topics of interest.
    - Digital technology and data can be leveraged by communities to address effects of climate change.
- Global and Cultural Awareness
    - Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.
- Information and Media Literacy
    - Increases in the quantity of information available through electronic means have heightened the need to check sources for possible distortion, exaggeration, or misrepresentation.

- Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.
- Sources of information are evaluated for accuracy and relevance when considering the use of information.
- There are ethical and unethical uses of information and media.

- Technology Literacy
  - Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others. • Digital tools allow for remote collaboration and rapid sharing of ideas unrestricted by geographic location or time.

Technology Integration

<u>Computer Science and Design Thinking</u>

During this course, students will work on developing, to an age appropriate level, the following Computer Science and Design Thinking Skills:

Disciplinary Concepts and Core Ideas:

- Data & Analysis
  - People use digital devices and tools to automate the collection, use, and transformation of data.
  - The manner in which data is collected and transformed is influenced by the type of digital device(s) available and the intended use of the data.
  - Data is represented in many formats. Software tools translate the low-level representation of bits into a form understandable by individuals. Data is organized and accessible based on the application used to store it.
  - The purpose of cleaning data is to remove errors and make it easier for computers to process.
  - Computer models can be used to simulate events, examine theories and inferences, or make predictions.
- Engineering Design
  - Engineering design is a systematic, creative and iterative process used to address local and global problems.
  - The process includes generating ideas, choosing the best solution, and making, testing, and redesigning models or prototypes.
  - Engineering design requirements and specifications involve making trade-offs between competing requirements and desired design features.

- Interaction of Technology and Humans
    - Economic, political, social, and cultural aspects of society drive development of new technological products, processes, and systems.
    - Technology interacts with society, sometimes bringing about changes in a society's economy, politics, and culture, and often leading to the creation of new needs and wants.
    - New needs and wants may create strains on local economies and workforces.
    - Improvements in technology are intended to make the completion of tasks easier, safer, and/or more efficient.
- Nature of Technology
    - Technology advances through the processes of innovation and invention which relies upon the imaginative and inventive nature of people.
    - Sometimes a technology developed for one purpose is adapted to serve other purposes.
    - Engineers use a systematic process of creating or modifying technologies that is fueled and constrained by physical laws, cultural norms, and economic resources. Scientists use systematic investigation to understand the natural world.
- Effects of Technology on the Natural World
    - Resources need to be utilized wisely to have positive effects on the environment and society.
- Some technological decisions involve trade-offs between environmental and economic needs, while others have positive effects for both the economy and environment.

ELA Integration:

NJSLS.RST.9-10.8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem
NJSLS.RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
NJSLS.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
NJSLS.RST.11-12.8 Evaluate the hypotheses, data, analysis and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
NJSLS.SL.11-12.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning and well-chosen details; use appropriate eye contact, adequate volume and clear pronunciation.
NJSLS.SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual and interactive elements) in presentations to enhance understanding of findings, reasoning and evidence and to add interest.
NJSLS.WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

NJSLS.WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
NJSLS.WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection and research.
NJSLS.WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Math Integration:

NJSLS.MP.2 Reason abstractly and quantitatively.
NJSLS.MP.4 Model with mathematics.
NJSLS.HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
NJSLS.HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.
NJSLS.HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
NJSLS.HSS-IC.A.1Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
NJSLS.HSS-ID.A.1Represent data with plots on the real number line.

Unit 1: The Principles of Public Health (2 weeks)

Why Is This Unit Important?

In this unit, students will be introduced to the context and scope of public health, including its history, philosophy, literature, essential services, ethics, and applications to current events. Students will understand public health as a cross-cutting, systematic, and interdisciplinary field and will demonstrate their understanding by presenting a health issue from the lens of the public health paradigm

List of Applicable Performance Expectations (PE) Covered in This Unit:

- Identify eras in the historical development of public health and ways that public health affects literature and the arts, current events, and everyone's daily life.
- Illustrate the interdisciplinary, cross-cutting or ecological character of public health and the contributions of a range of disciplines and professions to improving health.
- Explain how public health assesses the options for intervention to improve the health of a population.
- Apply the public health approach- problem, cause, intervention and implementation to a new public health problem.

Enduring Understandings:

- Population health considers the full range of options for intervention to address health problems, from community control of communicable disease and environmental health, to healthcare delivery systems, to public policies such as taxation and laws designed to reduce unhealthy behaviors.
- Demographic changes in populations have specific consequences for public health
- Evidence-based public health consists of defining the problem, establishing the etiology, making evidence-based recommendations, implementing these recommendations in practice, and evaluating the impacts of these interventions.

Essential Questions:

- What is public health?
- How has the approach to public health changed over time?
- What is evidence-based public health?

Acquired Knowledge:

- Identify multiple ways that public health affects daily life
- Define eras of public health from ancient times to the present
- Define the meaning of "population health"
- Illustrate the uses of health care, traditional public health, and social interventions in population health
- Identify a range of determinants of disease
- Identify ways that populations change over time and how this affects health
- Describe the uses of qualitative data that complement quantitative data
- Describe the process of grading evidence-based recommendations
- Explain the role that evaluation plays in establishing effectiveness as part of evidence-based public health

Acquired Skills:

- Explain the steps in the evidence-based public health process
- Describe a public health problem in terms of morbidity and mortality
- Describe the course of a disease in terms of incidence, prevalence, and case-fatality
- Describe how the distribution of disease may be used to generate hypotheses about the cause of a disease
- Describe an approach used in public health to identify a contributory cause of a disease or other conditionUse an approach to identify options for intervention based on "when, who, and how"

Assessments:

Formative Assessments:

- Do Nows
- Homework
- Class discussion

Summative Assessments:

- Unit quiz/test

Benchmarks:

- Public Health Awareness Campaign - Students will create a Google Slides presentation that applies the public health paradigm to a health problem of their choosing

Alternative Assessments:

- Modified project requirements and rubrics

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- What's Going on in this Graph? (NY Times)
  - https://www.nytimes.com/column/whats-going-on-in-this-graph
- Public health careers quiz
- Charty Party

In-Class Activities and Laboratory Experiences:

- Case Studies (CDC Science Ambassadors) -- https://www.cdc.gov/scienceambassador/educational/active-activities.html
    - Public Health Surveillance
        - Drink Up: Lesson in Survey Methodology
    - Careers/Roles
        - What's in the Syringe? A Fungal Meningitis Outbreak Investigation
- Outbreak at Water's Edge
    - http://www.mclph.umn.edu/watersedge/

Closure and Reflection Activities:

- Gallery Walk
- Exit Ticket
- Self-assessment quizzes

Instructional Materials:

- *Public Health 101* (3rd ed.)
- World Health Organization online textbook
    - http://whqlibdoc.who.int/publications/2006/9241547073_eng.pdf

Technology Connections:

- CDC's Morbidity and Mortality Weekly Report
    - http://www.cdc.gov/mmwr

Unit 2: Epidemiology (3 weeks)

Why Is This Unit Important?
In this unit, students will learn the basic principles of the study of disease etiology and distribution. They will learn to calculate and interpret rates, risk factors, and health status indicators of morbidity and mortality; disease determinants, causation, and types of epidemiological research; and public health surveillance and vital statistics. Several case studies will be used to allow students to learn the steps of investigating a disease outbreak.

List of Applicable Performance Expectations (PE) Covered in This Unit:

- Explain the basic principles of epidemiology, including rates, risk factors, disease determinants, causation and public health surveillance.
- Describe key features and applications of descriptive and analytic epidemiology.
- Describe the processes, uses, and evaluation of public health surveillance.
- Describe the steps of an outbreak investigation.
- Calculate and interpret ratios, proportions, incidence rates, mortality rates, prevalence, and years of potential life lost.
- Calculate and interpret mean, median, mode, ranges, variance, standard deviation, and confidence interval.
- Prepare and apply tables, graphs, and charts such as arithmetic-scale line, scatter diagram, pie chart, and box plot.

Enduring Understandings:

- Epidemiology is the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems
- Epidemiology is a quantitative discipline that relies on a working knowledge of probability, statistics, and sound research methods
- Epidemiological tools are essential for identifying, measuring, and investigating public health problems.

Essential Questions:

- What is epidemiology?
- How do we summarize and communicate public health data?
- How do we quantify risk?
- How do we detect, identify, and investigate potential outbreaks of infectious disease?

Acquired Knowledge:

- Define epidemiology
- Summarize the historical evolution of epidemiology
- Name some of the key uses of epidemiology
- Identify the core epidemiologic functions
- Describe primary applications of epidemiology in public health practice
- Specify the elements of a case definition and state the effect of changing the value of any of the elements
- List the key features and uses of descriptive epidemiology
- List the key features and uses of analytic epidemiology

- List the three components of the epidemiologic triad
- Describe the different modes of transmission of communicable disease in a population
- State the value and proper use of population pyramids, cumulative frequency graphs, survival curves, scatter diagrams, box plots, dot plots, forest plots, and tree plots
- Identify when to use each type of table and graph
- Define public health surveillance
- List the essential activities of surveillance
- List the desirable characteristics of well-conducted surveillance activities
- Describe sources of data and data systems commonly used for public health surveillance
- Describe the principal methods of analyzing and presenting surveillance data
- Describe selected examples of surveillance in the United States
- List the reasons that health agencies investigate reported outbreaks
- List the steps in the investigation of an outbreak
- Define cluster, outbreak, and epidemic

Acquired Skills:

- Construct a frequency distribution
- Calculate and interpret four measures of central location: mode, median, arithmetic
- mean, and geometric mean
- Apply the most appropriate measure of central location for a frequency distribution
- Apply and interpret four measures of spread: range, interquartile range, standard
- deviation, and confidence interval (for mean)
- Calculate and interpret the following epidemiologic measures:
    - Ratio
    - Proportion
    - Incidence proportion (attack rate)
    - Incidence rate
    - Prevalence
    - Mortality rate
- Choose and apply the appropriate measures of association and measures of public health impact
- Given a scenario and a specific health problem, design a plan for conducting surveillance of the problem
- Given the initial information of a possible disease outbreak, describe how to determine whether an epidemic exists
- Given information about a community outbreak of disease, list the initial steps of an investigation
- Given the appropriate information from the initial steps of an outbreak investigation, develop biologically plausible hypotheses
- Draw and interpret an epidemic curve
- Given data in a two-by-two table, calculate the appropriate measure of association

Assessments:

Formative Assessments:

- Do Nows
- Homework
- Class discussion

Summative Assessments:

- Unit quiz/test

Benchmarks:

- Epidemiology Capstone Project -- students will complete an epidemiological outbreak investigation in small groups

Alternative Assessments:

- Modified project requirements and rubrics

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- What's Going on in this Graph? (NY Times)
  - https://www.nytimes.com/column/whats-going-on-in-this-graph
- Pandemic board game
- Charty Party

In-Class Activities and Laboratory Experiences:

- Disease Detective Starter Pack
  - https://store.soinc.org/us/Disease-Detectives-Starter-Pack/p/170473
- Disease Outbreak simulation kits
  - https://www.carolina.com/dna-gel-electrophoresis/outbreak-fingerprinting-virus-dna-kit/FAM_211206.pr
  - https://www.flinnsci.com/outbreak-a-study-in-epidemiology---super-value-laboratory-kit/fb1794/#variantDetails
- Koch's postulates kit
  - https://www.wardsci.com/store/product/8878647/ward-s-koch-s-postulates-demonstration-lab-activity
- Solve the Outbreak
  - https://www.cdc.gov/digital-social-media-tools/mobile/applications/sto/web-app.html

Closure and Reflection Activities:

- Gallery Walk
- Exit Ticket
- Self-assessment quizzes

Instructional Materials:

- *Public Health 101* (3rd ed.)
- World Health Organization online textbook
    - http://whqlibdoc.who.int/publications/2006/9241547073_eng.pdf
- *Principles of Epidemiology 3rd Edition* (CDC Online textbook)
    - https://www.cdc.gov/csels/dsepd/ss1978/SS1978.pdf
- CDC Epidemiologic Case Studies
    - https://www.cdc.gov/training/epicasestudies/computerbased.html
    - https://www.cdc.gov/training/epicasestudies/classroom.html
- CDC Disease Detectives Practice Materials
    - https://www.cdc.gov/careerpaths/diseasedetectives/practice.html
- Young Epidemiology Scholars Instructional Units
    - http://yes-competition.org/yes/teaching-units/discipline.html

Technology Connections:

- CDC's Morbidity and Mortality Weekly Report
    - http://www.cdc.gov/mmwr
- Epiville (Columbia University)
    - https://epiville.ccnmtl.columbia.edu/

Unit 3: Population Health Tools (3 weeks)

Why Is This Unit Important?
In this unit, students will learn to evaluate the quality of health information and data in the mass media. They will also learn to apply social science theories to understand health behaviors and design interventions. Students will also examine the influence of health policies and laws on public health and examine the potential tensions between individual rights and social responsibilities.

List of Applicable Performance Expectations (PE) Covered in This Unit:

- Explain how public health can utilize health information and health communications to improve the health of populations.
- Apply principles of health communications and informatics to evaluate the quality of health information on the Internet and in the mass media.
- Explain how public health can utilize social and behavioral interventions to improve the health of populations.
- Analyze the advantages and disadvantages of potential interventions.
- Explain how public health can utilize health policy and law to improve the health of populations.

Enduring Understandings:

- Effective health communication starts with understanding how information is perceived.
- Even in countries with modest levels of income disparities, a socioeconomic gradient of health status exists such that individuals with higher socioeconomic status tend to have better health outcomes than those with lower socioeconomic status.
- Theories and models of health behavior provide a useful framework to study health problems, develop appropriate interventions, and evaluate the impact of the interventions.
- Health laws and health policies can have significant impacts on population health.

Essential Questions:

- What factors affect how we perceive public health information?
- How do theoretical models help us to understand and shift health-related behavior?
- How do laws and policies affect behavior?
- When can governments infringe on individual freedoms for the sake of public health?

Acquired Knowledge:

- Identify the six basic types of public health data
- Explain the meaning, use, and limitations of the infant mortality rate and life expectancy measurements
- Explain the meanings and uses of HALEs and DALYs
- Identify criteria for evaluating the quality of information presented on a website
- Explain ways that perceptions affect how people interpret information
- Explain how attitudes, such as risk-taking attitudes, may affect decision-making
- Identify three different approaches to clinical decision making and their advantages and disadvantages
- Explain relationships between the social and behavioral sciences and public health

- Explain the principles of social marketing
- Identify the steps of the PRECEDE-PROCEED planning framework
- Explain the scope of health law, policy, and ethics
- Identify key legal principles that form the basis for public health law
- Discuss key principles that underlie the ethics of human research
- Identify principles of public health ethics
- Discuss policies aimed at preparing for and responding to pandemic disease

Acquired Skills:

- Illustrate how socioeconomic status affects health
- Illustrate how culture and religion affect health
- Describe the relationship between income and socioeconomic status and health
- Describe key categories of social determinants of health
- Describe the role of theory in changing health behavior
- Identify three levels of influence in which theories and models are categorized and provide examples of theories and models corresponding to these three levels
- Illustrate the potential tensions between individual rights and the needs of society using public health examples

Assessments:

Formative Assessments:

- Do Nows
- Homework
- Class discussion

Summative Assessments:

- Unit quiz/test

Benchmarks:

- Design a Public Health Intervention Project - Students will use health behavior theory to design an intervention to address a chosen public health problem.

Alternative Assessments:

- Modified project requirements and rubrics

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- What's Going on in this Graph? (NY Times)
  - https://www.nytimes.com/column/whats-going-on-in-this-graph
- Charty Party

In-Class Activities and Laboratory Experiences:

- Case Studies (CDC Science Ambassadors) -- https://www.cdc.gov/scienceambassador/educational/active-activities.html
    - Ethics
        - RAGE Outbreak: Making Grueling Public Health Decisions
    - Communication
        - Spreading Sickness in Middle School

Closure and Reflection Activities:

- Gallery Walk
- Exit Ticket
- Self-assessment quizzes

Instructional Materials:

- *Public Health 101* (3rd ed.)
- World Health Organization online textbook
    - http://whqlibdoc.who.int/publications/2006/9241547073_eng.pdf

Technology Connections:

- CDC's Morbidity and Mortality Weekly Report
    - http://www.cdc.gov/mmwr

Unit 4: Preventing Disease and Reducing Morbidity/Mortality (3 weeks)

Why Is This Unit Important?

In this unit, students will examine three major types of health hazards/risks: environmental health / occupational health and safety; communicable/infectious diseases; and noncommunicable diseases. For each category, students will use case studies to practice characterizing risk, measuring the burden on morbidity, and mortality, and designing evidence-based interventions to mitigate risk/harm.

List of Applicable Performance Expectations (PE) Covered in This Unit:

- Explain the impact of the environment and communicable diseases on the health of populations.
- Explain the burden of chronic diseases on morbidity and mortality and approaches to prevention and early detection.
- Analyze the determinants of morbidity and mortality in a new situation.

Enduring Understandings:

- Public health tools for addressing the burden of noncommunicable diseases include screening, multiple risk factor interventions, cost-effective treatment, genetic counseling, and research.
- Public health tools for addressing the burden of communicable diseases include barrier protections, immunizations, screening, and treatment.
- Environmental and occupational health hazards can be addressed using risk assessment, public health assessments, ecological assessments, and interaction analyses.

Essential Questions:

- How do natural and built environments pose threats to public health?
- How can we reduce the burden of communicable and noncommunicable diseases?

Acquired Knowledge:

- Describe the burden of noncommunicable diseases on mortality and morbidity in the United States
- Describe the ideal criteria for a screening program
- Explain why two or more tests are nearly always required to screen for asymptomatic disease
- Explain the multiple risk factor intervention approach to control a noncommunicable disease
- Describe the meaning of "cost-effectiveness"
- Describe the burden of disease caused by communicable diseases
- Describe the criteria that are used to establish that an organism is a contributory cause of a disease
- Identify factors that affect the transmissibility of a disease and the meaning of R_0
- Identify the roles that barrier protections play in preventing communicable diseases
- Identify the roles that vaccinations can play in preventing communicable diseases
- Identify the roles that screening, case finding, and contact treatment can play in preventing communicable diseases

- Identify the conditions that make eradication of a disease feasible
- Describe the scope of morbidity and mortality caused by the physical environment including the unaltered environment, the altered environment, and the built environment
- Distinguish between a risk assessment, a public health assessment, and an ecological assessment
- Discuss the meaning of interactions and how they may impact the size of risks
- Describe how intentional and unintentional injuries can be addressed to prevent their occurrence and diminish their consequences
- Identify successes of outbreak investigations

Acquired Skills:

- Describe several ways that genetic interventions can affect the burden of noncommunicable diseases
- Describe approaches to reducing the adverse impacts of treatments including overdoses of prescription drugs
- Describe ways that population interventions can be combined with individual interventions to more effectively reduce the burden of noncommunicable diseases.
- Describe a range of options for controlling a given epidemic
- Identify the components of environmental risk assessment, and apply them to an environmental hazard, such as lead

Assessments:

Formative Assessments:

- Do Nows
- Homework
- Class discussion

Summative Assessments:

- Unit quiz/test

Benchmarks:

- Communicable Disease Project -- Students will research a communicable disease, describe its burden on morbidity/mortality, and identify potential interventions
- Noncommunicable Disease Project -- Students will research a noncommunicable disease and describe its burden on morbidity/mortality, and identify potential multiple risk factor interventions
- Environmental / Occupational Health Case Study - Students will research an environmental / occupational health hazard, perform a risk assessment, and relate their findings/recommendations for risk mitigation

Alternative Assessments:

- Modified project requirements and rubrics

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- What's Going on in this Graph? (NY Times)
  - https://www.nytimes.com/column/whats-going-on-in-this-graph
- Air Quality Index
  - http://www.airnow.gov/
- Flint Water Crisis
- Charty Party

In-Class Activities and Laboratory Experiences:

- Gizmos (http://gizmos.explorelearning.com)
  - Drug Dosage
- Environmental Public Health (PBS)
  - https://whyy.pbslearningmedia.org/collection/enh/
- Case Studies (CDC Science Ambassadors) -- https://www.cdc.gov/scienceambassador/educational/active-activities.html
  - Infectious Disease
    - I Have a Gut Feeling
    - No Cure for the Summertime Blues
    - Have You "Herd"? Modeling Influenza's Spread
    - Brain-eating Ameba
    - Don't Let *Salmonella* Ruffle Your Feathers
    - Something Wicked This Way Comes (2014 Ebola)
  - Noncommunicable diseases
    - Food for Thought: Making Health Food and Physical Activity Choices
    - Spatial Analysis of Obesity: GIS and descriptive epidemiology
  - Environmental health
    - Lurking Radon and Lung Cancer
    - Lung Cancer at Peachstate Community Center

Closure and Reflection Activities:

- Gallery Walk
- Exit Ticket
- Self-assessment quizzes

Instructional Materials:

- *Public Health 101* (3rd ed.)
- World Health Organization online textbook
  - http://whqlibdoc.who.int/publications/2006/9241547073_eng.pdf

Technology Connections:

- CDC's Morbidity and Mortality Weekly Report
  - http://www.cdc.gov/mmwr

Unit 5: Healthcare and Public Health Systems (3 weeks)

Why Is This Unit Important?
In this unit, students will learn about the composition of the US healthcare system and compare/contrast our system with those of Canada, the United Kingdom, and other nations. Quality of care, access to care, and healthcare costs will be examined as potential drivers of health disparities both within and across our borders.

List of Applicable Performance Expectations (PE) Covered in This Unit:

- Describe the basic organization of healthcare and public health systems and the contributions of health professionals.
- Identify the basic payment mechanisms for providing health services and the basic insurance mechanisms for paying for health services.
- Identify criteria for evaluating health systems including issues of access, quality, and cost.
- Apply principles for evaluating the quality of an existing health delivery system to that of a different health delivery system.
- Analyze the degree of success in implementing essential public health services in a new situation.

Enduring Understandings:

- The United States has a complicated and evolving healthcare delivery system that is closely tied to the way that healthcare is financed and services are paid for.
- Quality of care, access to care, and cost of care all have significant impacts on public health

Essential Question:

- Is the US healthcare system broken?

Acquired Knowledge:

- Describe the roles of physicians, nurses, and public health professionals in the delivery of healthcare
- Explain the concept of primary care and differentiate it from secondary and tertiary care
- Describe the range of inpatient and outpatient healthcare facilities that exist in the United States
- Identify ways that healthcare systems are attempting to improve the quality of care
- Describe similarities and differences among governmental and employee-based health insurance systems in the United States
- Describe other options for obtaining health insurance and the consequences of uninsurance
- Describe the basic structure of the healthcare systems in Canada and the United Kingdom, and compare them to those of the United States
- Identify and describe sources of extra costs in the US healthcare system
- Describe the foundational public health services
- Identify global public health organizations and agencies, and describe their basic roles

Acquired Skills:

- Describe approaches being used to define and measure the quality of healthcare
- Identify strategies for reducing the costs of healthcare in the United States.
- Explain the impact of recent laws on the US healthcare system
- Illustrate the need for collaboration by governmental public health agencies with other governmental and nongovernmental organizations
- Describe approaches to connecting public health and the healthcare system

Assessments:

Formative Assessments:

- Do Nows
- Homework
- Class discussion

Summative Assessments:

- Unit quiz/test

Benchmarks:

- Fix the US Healthcare System Project - Students will research and present their ideas for improving the US healthcare system

Alternative Assessments:

- Modified project requirements and rubrics

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- What's Going on in this Graph? (NY Times)
  - https://www.nytimes.com/column/whats-going-on-in-this-graph
- *Frontline - The Healthcare Divide* (PBS documentary)
- Charty Party

In-Class Activities and Laboratory Experiences:

- Case Studies (CDC Science Ambassadors) -- https://www.cdc.gov/scienceambassador/educational/active-activities.html
  - Costs
    - Seasonal Flu Costs How Much?!

Closure and Reflection Activities:

- Gallery Walk
- Exit Ticket
- Self-assessment quizzes

Instructional Materials:

- *Public Health 101* (3rd ed.)
- World Health Organization online textbook
    - http://whqlibdoc.who.int/publications/2006/9241547073_eng.pdf

Technology Connections:

- CDC's Morbidity and Mortality Weekly Report
    - http://www.cdc.gov/mmwr

Unit 6: Global Health, Health Disparities, and Vulnerable Populations (3 weeks)

Why Is This Unit Important?
There has been enormous progress in improving health status over the last 50 years in many countries. The progress in health status, however, has been very uneven. Hundreds of millions of people, especially poorer people in low- and middle-income countries, continue to get sick, be disabled by, or die from preventable causes of disease. In many countries, nutritional status and health status of lower-income people have improved only slowly and may decline as illustrated by the HIV/AIDS epidemic. Enormous disparities in health status and access to health services exist both within and across countries. Wealthier people often have better health status and better access to health services than poorer people. In general, urban dwellers and ethnic majorities enjoy better health status than rural people and disadvantaged ethnic minorities. Women, children, persons with disabilities, and members of the LGBTQ+ community also face a number of unique challenges to their health.

List of Applicable Performance Expectations (PE) Covered in This Unit:

- Identify the roles of public health in addressing the needs of vulnerable populations and health disparities.
- Synthesize the principles and tools of public health as applied to a new public health problem.

Enduring Understandings:

- The burden of disease varies greatly by country, income group, region, age, and sex
- Some of the health conditions faced by vulnerable populations are biologically determined, but many are socially determined.
- Public health interventions targeting vulnerable populations can effectively reduce disparities in health outcomes

Essential Questions:

- Why is the global burden of disease unequal?
- How can we protect the most vulnerable populations in a society?

Acquired Knowledge:

- Describe the status of health globally and how it varies by country, income group, region, and age group.
- Describe the leading risk factors for morbidity and mortality by region, country, income group, age, and ex
- Describe the connections among health, education, productivity, and earnings
- Describe the burden of nutrition problems globally
- Describe the most important causes of illness and death among young children globally

Acquired Skills:

- Describe critical challenges in improving women's health in low- and middle-income countries
- Describe some of the constraints to further enhancing the health of young children in low- and middle-income countries and what might be done to address them

Assessments:

Formative Assessments:

- Do Nows
- Homework
- Class discussion

Summative Assessments:

- Unit quiz/test

Benchmarks:

- Global health / health disparities research project - Students will identify a global health issue OR health disparities issue (within the US), research the burden on morbidity/mortality, explain the biological and social determinants of the issue, and make evidence-based recommendations for interventions

Alternative Assessments:

- Modified project requirements and rubrics

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- What's Going on in this Graph? (NY Times)
  - https://www.nytimes.com/column/whats-going-on-in-this-graph
- Unnatural Causes: Is Inequality Making us Sick?
  - https://unnaturalcauses.org/
- Charty Party

In-Class Activities and Laboratory Experiences:

- Career Exploration: Director of the CDC
- Famous Public Health Professionals Research Report
- Case Studies (CDC Science Ambassadors) -- https://www.cdc.gov/scienceambassador/educational/active-activities.html
  - Global Health
    - Global HIV/AIDS Testing & Surveillance
    - Masters of Disaster
    - Making Room: The Public Health Response to Unaccompanied Minors Crossing the US Borders

Closure and Reflection Activities:

- Gallery Walk
- Exit Ticket
- Self-assessment quizzes

Instructional Materials:

- *Global Public Health 101* (4th ed.)
- World Health Organization online textbook
    - http://whqlibdoc.who.int/publications/2006/9241547073_eng.pdf

Technology Connections:

- CDC's Morbidity and Mortality Weekly Report
    - http://www.cdc.gov/mmwr

Sample Standards Integration

Career Readiness, Life Literacies, and Key Skills

9.4.12.CI.1:

An example of the application of this standard is found in unit 5 with the "Fix the US Healthcare System" project.

9.4.12.CT.2:

For example, in Unit 9 where students collaborate to analyze and determine magnetic fields

9.4.8.IML.3:

An example of the application of this standard is found in unit 6 with the global health disparities project.

8.1 Computer Science and Design Thinking
All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

For example in Unit 1, students will access, manage, evaluate, and synthesize information to present a complex real-world issue from the perspective of the public health paradigm (e.g., gun violence as a public health issue).

For example in Units 3 & 4, students develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment when they evaluate a solution to a complex real-world public health problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability and aesthetics as well as possible social, cultural and environmental impacts.

LGBT and Disabilities Law:

In Unit 6 the Famous Public Health Professionals Research Project has students explore the contributions of famous public health officials from varying minorities including those who are LGBTQ and have disabilities

Career Exploration:

- In Unit 6 there is a Career Exploration: Director of the CDC

ELA Integration

NJSLS.RST.9-10.8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

NJSLS.RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

NJSLS.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

NJSLS.RST.11-12.8 Evaluate the hypotheses, data, analysis and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

NJSLS.SL.11-12.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning and well-chosen details; use appropriate eye contact, adequate volume and clear pronunciation.

NJSLS.SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual and interactive elements) in presentations to enhance understanding of findings, reasoning and evidence and to add interest.

NJSLS.WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

NJSLS.WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

NJSLS.WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection and research.

NJSLS.WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

These standards are met through the completion of activities throughout the course. For example in:

- Unit 1 with the benchmark assessment -- Public Health Awareness Campaign.
- Unit 4 with the environmental / occupational health case study.

Math Integration:

NJSLS.MP.2 Reason abstractly and quantitatively.

NJSLS.MP.4 Model with mathematics.

NJSLS.HSN-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

NJSLS.HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.

NJSLS.HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

NJSLS.HSS-IC.A.1Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

NJSLS.HSS-ID.A.1Represent data with plots on the real number line.

These standards are met through the completion of activities throughout the course. For example in:

- Unit 2 with the CDC epidemiological case studies.
- Unit 2 with the epidemiology capstone project.