MicroBiology

Syllabus

INSTRUCTOR INFORMATION

Please go to your course and access the 'Course Home' for detailed instructor information.

CONTACT INFORMATION

Please feel free to contact me if you have any questions regarding your assignments or course content. Course facilitators respond to emails within 24 hours on weekdays and 48 hours on weekends. If you don't receive a response in that time, please reach out again just in case I did not get your message.

Project-based learning

"Students engaged in school are more likely to earn high grades and test scores, and have lower dropout rates. In contrast, students with low levels of engagement are at risk for a variety of long-term adverse consequences, including disruptive behavior in class, absenteeism, and dropping out of school." From "Relationships Matter: Linking Teacher Support to Student Engagement and Achievement" by Adena M. Klem and James P. Connell, 2004. This proposal lays out a plan to embrace a simple idea; more engagement equals more learning. "Regardless of definition, research links higher levels of engagement in school with improved performance" (Klem and Connell, 2004). Increased engagement and achievement is always a part of an educator's year-long plan. One method that is supported by research is Project Based Learning (PBL).

There are several goals when a teacher uses PBL. "Project-based learning involves completing complex tasks that typically result in a realistic product, event, or presentation to an audience" (Barron and Darlin-Hammond 2008). Students complete tasks that will create a product. The educator acts as a facilitator in assigning and assisting with each task. As the students participate, they will build toward finalizing a product (usually of their choice).

The tasks used have been designed with care. Each project is central to the curriculum and designed using the NGSS science standards. They also embrace inquiry to drive learner questioning. Learners are at the center of the tasks, using questioning to complete each part. In addition, the tasks are authentic and relate to the real world (Barron and Darlin-Hammond 2008). Finally, to complete the projects, learners research and design a product. This product can be anything they wish (podcast, video, commercial, presentation, letter to congress,experiment, etc.) Using PBL creates a unique environment that will increase student engagement, motivation, and acquisition of critical 21st century skills. Increasing these metrics will lead to increased student achievement.

COURSE REQUIREMENTS

All learners must have computer and internet access. Participants in online classes must be comfortable with the basic functions of word-processing software, including GOOGLE DOCS.

This is an online course. In each unit, students will be expected to participate in discussions, and proceed through the Weekly Agenda that may include videos, PowerPoints, virtual labs, research, data gathering and analysis, assignments, quizzes, and tests. Online simulations will be included in this exploration and may require tech support. Learners will be encouraged to show understanding in creative projects.

COURSE GOALS

- Gain a comprehensive understanding of core microbiology concepts like cellular structure, metabolism, and microbial diversity.
- Explore the complex interactions between microbes and their environments, including the human body.
- Develop critical thinking skills by designing and conducting your own microbiology experiments, analyzing data, and drawing scientific conclusions.
- Effectively communicate scientific findings through written reports, presentations, and discussions.
- Embrace teamwork and collaboration while working with peers on project-based learning activities.
- Appreciate the potential of microbiology to address challenges in human health, environmental sustainability, and technological advancements.

By the end of this course, you'll not only have a deeper understanding of the microbial world but also gain valuable skills in scientific research, communication, and collaboration, preparing you for future success in science-related fields and beyond.

COURSE DESCRIPTION

Are you curious about the unseen world teeming with life? This exciting project-based learning (PBL) course takes a deep dive into the fascinating subject of microbiology. We'll explore the microscopic universe of bacteria, archaea, protists, and fungi, investigating their diverse roles in health, disease, and the environment.

Through a series of hands-on projects and collaborative investigations, you'll:

- Master fundamental microbiology concepts like cell structure, growth, and reproduction.
- Investigate the beneficial and harmful effects of microbes on human health, food spoilage, and bioremediation.
- Develop critical thinking and problem-solving skills by designing and conducting your own microbiology experiments.
- Hone communication skills by collaborating with peers, presenting findings, and defending your research.
- Explore the cutting-edge applications of microbiology in biotechnology, medicine, and environmental sustainability.

This course is ideal for students who:

- Enjoy hands-on learning and tackling real-world challenges.
- Are curious about the invisible world and its impact on our lives.
- Thrive in collaborative and project-based learning environments.
- Want to develop critical thinking, problem-solving, and communication skills.

REQUIRED TEXTS

All reading materials are available online, but will also be provided as links through the course website.

METHODS OF INSTRUCTION

This is an online course, and while there is flexibility in how and when you do assignments, it is best to log in and complete work each day according to the posted pacing schedule. It is highly recommended that learners follow the pacing schedule posted, but work may be submitted late for full credit. If you are struggling to complete your work or you need some assistance with an alternate schedule or workload, please contact me as soon as possible. I am more than happy to help support your success in the class!

LEARNER EXPECTATIONS

The learner is expected to participate in the course via e-mail, discussion boards (or other communication) with the facilitator, by reading the assigned readings, submitting assignments and completing and submitting original work.

Learners are expected to check their course and email account every day and complete work on time as assigned with designated dates and time.

GRADING

Each assignment is given a specific number of points. Some assignments will be graded based on completion and others will be assessed on understanding. The number of points earned by the student is determined and a percentage is calculated. The raw score is recorded in the grade book.

NON-HARASSMENT

Learners are expected to treat fellow students, and their facilitators, with respect. No form of a "hostile environment" or "harassment" will be tolerated by any learner or facilitator.
For more information on good netiquette, please review THIS RESOURCE

HONESTY AND PLAGIARISM

Plagiarism of any sort is prohibited.

According to the Merriam-Webster online dictionary, to "plagiarize" means:

- to steal and pass off (the ideas or words of another) as one's own

- to use (another's production) without crediting the source
- to commit literary theft
- to present as new and original an idea or product derived from an existing source

Please review THIS RESOURCE for more information on plagiarism.
Any plagiarized work will be given a zero and referred to your EF/COACH/GUIDE for review.

PRIVACY POLICY
All work submitted is the property of the author and is not available to anyone not in the class. If work is to be submitted or viewed outside of this website, I will obtain permission from the author. FERPA Info

Course Goals:

- Develop a strong understanding of core microbiology concepts including microorganisms, their structure, function, classification, and interactions with the environment and human health.
- Gain proficiency in scientific communication by creating educational resources, research reports, and public health campaigns for various audiences.
- Apply scientific inquiry skills through research projects, analyzing data, and proposing solutions to real-world problems related to microbiology.

Block Goals: High School Microbiology

Semester A

Block 1: Intro to Microbiology

- Goal: Understand the concept of microorganisms and their impact on human health. (Discussions, Infographic, Lab)

Block 2: Microbial Cell Anatomy

- Goal: Explain the structure and function of different microbial cells. (Discussions, Poster, Lab)

Block 3: Microbial Classification

- Goal: Analyze the principles of microbial classification and their applications. (Discussions, Infographic, Lab)

Block 4: Chapter Reflection & Project 1 (Podcast/eBook Chapter)

- Goal: Reflect on learning and develop initial ideas for the educational resource project.

Block 5: Chemistry of Microbiology

- Goal: Explore the chemical composition of microbial cells and their interactions. (Discussions, Poster, Lab)

Block 6: Cell Structure and Function

- Goal: Analyze the relationship between microbial cell structure and function. (Discussions, Infographic)

Block 7: Chemical Composition of Microbial Cells

- Goal: Explain the importance of the chemical composition of microbial cells. (Discussions, Presentation)

Block 8: Chapter Reflection & Project 2 (Podcast/eBook Chapter)

- Goal: Refine project based on feedback and understanding of microbial chemistry.

Block 9: Infectious Diseases and Epidemiology

- Goal: Analyze the spread of infectious diseases and the role of epidemiology. (Discussions, Research, Lab)

Block 10: Epidemiological Concepts

- Goal: Explain key concepts in epidemiology and analyze disease outbreaks. (Discussions, Research)

Block 11: Infectious Diseases

- Goal: Explore various infectious diseases and their spread. (Discussions, Poster)

Block 12: Chapter Reflection & Project 3 (Podcast/eBook Chapter)

- Goal: Refine project based on understanding of infectious diseases and epidemiology.

Block 13: Immunology

- Goal: Explain the components and functions of the human immune system. (Discussions, Pamphlet)

Block 14: Autoimmune Disorders

- Goal: Analyze how the immune system can malfunction and cause diseases. (Discussions, Poster)

Block 15: History and Function of Vaccines

- Goal: Explain the history and importance of vaccines in preventing diseases. (Discussions, Infographic)

Block 16: Chapter Reflection & Project 4 (Podcast/eBook Chapter)

- Goal: Refine project based on understanding of immunology and vaccines.

Semester B

Block 1: Intro to Microbial Metabolism

- Goal: Understand the concept of microbial metabolism and its impact on growth. (Discussions, Poster, Lab)

Block 2: Microbial Metabolism Case Studies

- Goal: Analyze the applications and ethical considerations of microbial metabolism. (Discussions, Infographic, Lab)

Block 3: Microbial Growth Control

- Goal: Explain methods for controlling microbial growth and their applications. (Discussions, Social Media Post)

Block 4: Microbial Metabolism Case Studies

- Goal: Explore the diversity of microbes and their metabolic processes. (Discussions, Poster, Lab)

Block 5: Impact of Microbial Metabolism on Antibiotic Resistance

- Goal: Analyze the development and spread of antibiotic resistance. (Discussions, Poster)

Block 6: Research Report

- Goal: Conduct research on a topic related to microbial metabolism and effectively communicate findings. (Project)

Block 7: Understanding Viral Agents and Their Impact

- Goal: Explain the structure, function, and societal implications of viruses. (Discussions, Assessment, Lab)

Block 8: Community Health Assessment

- Goal: Analyze risk factors and health concerns within a community. (Discussions, Assessment, Lab)

Block 9: Developing Community-Based Prevention Strategies

- Goal: Design public health campaigns to prevent the spread of viruses. (Discussions, PSA)

Block 10: Research Report

- Goal: Refine research report based on understanding of viral agents and public health. (Project)

Block 11: Preventing the Spread: Public Health Campaign

- Goal: Develop and present a public health campaign to address a viral threat. (Project)

Block 12: Understanding Antimicrobial Drugs and Mechanisms of Action

- Goal: Explain the mechanisms of action of antimicrobial drugs and ethical considerations. (Discussions, Analysis, Lab)

Block 13: Selecting Antimicrobial Drug and Target Audience

- Goal: Analyze factors for selecting appropriate antimicrobial drugs and define target audiences for public health campaigns. (Discussions, Poster)

Block 14: Creative Development and Advertisement Drafting

- Goal: Apply scientific knowledge to develop a creative and informative advertisement about antimicrobial drugs. (Discussions, Storyboarding, Lab)

Block 15: Peer Feedback and Advertisement Refinement

- Goal: Utilize peer-review to improve the clarity, accuracy, and effectiveness of the public health advertisement. (Discussions, Revisions)

Block 16: Distribution of Advertisements

- Goal: Reflect on project challenges and celebrate the completion of the public health campaign through advertisement distribution. (Discussions, Project)

COURSE OUTLINE:
Semester A

Unit 1: Intro to Microbiology
Project: Podcast episodes or ebook chapters that serve as tangible resources to educate K-5 learners about microbiology. These episodes will be shared with a wider audience to promote scientific understanding.

- Block 1: Microorganisms
    - Discussion: Microorganisms and Human Health
    - Task 1 - Microorganism Infographic
    - Lab: Cell Types
- Block 2: Microbial Cell Anatomy
    - Discussion: Interesting Microbiology
    - Task 2: Comparative Analysis of Microbial Cell Anatomy and Function Poster

- Block 3: Microbial Classification
    - Discussion: Storytelling Techniques
    - Task 3: Creating an Infographic on Microbial Classification Principles
    - Lab: Paramecium Homeostasis Lab

- Block 4: Chapter 1
    - Discussion: Reflection and looking forward
    - Project: Podcast Episode/eBook Chapter

Standards:

- HS-PS1 Matter and Its Properties:
    - HS-PS1-2. (Content Limit) Analyze data to identify patterns in the properties of elements. (Covered to a limited extent in Block 3: Microbial Classification, if element composition of different microbial groups is discussed)
- HS-ETS1 Engineering Design:
    - HS-ETS1-1. Analyze a specific real-world problem or a technology to identify a way to improve it. (Covered in Project: Podcast Episode/eBook Chapter, through considering how to best communicate science to a younger audience)
    - HS-ETS1-2. Design a solution to a specific real-world problem by considering criteria and constraints. (Covered in Project: Podcast Episode/eBook Chapter, through designing the educational content)
    - HS-ETS1-3. Evaluate a solution designed to solve a specific real-world problem. (Covered in Project: Podcast Episode/eBook Chapter, through self-evaluation and peer review)
- HS-LS1 From Molecules to Organisms:
    - HS-LS1-C. Organization for Matter and Energy Flow within Systems (Covered in a limited way throughout the unit, depending on the specific content covered in discussions and labs)

Unit 2: Cell Structure and Function

Project: Podcast episodes or ebook chapters that serve as tangible resources to educate K-5 learners about microbiology. These episodes will be shared with a wider audience to promote scientific understanding.

- Block 5: Chemistry of Microbiology
    - Discussion: Microorganism Interactions
    - Task 5: Research and Create a Microbiology Poster
- Block 6: Cell Structure and Function
    - Discussion: Microorganism Structure
    - Task 6: Exploring Microbial Cell Structure and Function Infographic

- Block 7: Chemical Composition of Microbial Cells
    - Discussion: How is microbiology used?
    - Task 7: Exploring the Chemical Composition of Microbial Cells Presentation

- Block 8: Chapter 2
    - Discussion: Enhancing the Value of Your Project
    - Project: Podcast Episode/eBook Chapter

<u>Standards:</u>

- HS-LS1 From Molecules to Organisms:
    - HS-LS1-1. Conduct an investigation to determine the relationship between photosynthesis and cellular respiration in plant cells. (Covered in Block 7: Chemical Composition of Microbial Cells)
    - HS-LS1-2. (Content Limit) Develop and use a model to illustrate the roles of nucleic acids and proteins in the process of translation. (Covered in Block 6: Cell Structure and Function, but content limited to protein function)
- HS-LS3 Inheritance and Variation of Traits:
    - HS-LS3-1. Ask questions to recognize the role of human activity in biodiversity loss and ecosystem disruption. (Covered in Block 5: Chemistry of Microbiology, through discussions of microorganism interactions and potential applications in bioremediation)
- HS-ETS1 Engineering Design:

    - HS-ETS1-1. Analyze a specific real-world problem or a technology to identify a way to improve it. (Covered in Project: Podcast Episode/eBook Chapter, through project selection and improvement)
    - HS-ETS1-2. Design a solution to a specific real-world problem by considering criteria and constraints. (Covered in Project: Podcast Episode/eBook Chapter)
    - HS-ETS1-3. Evaluate a solution designed to solve a specific real-world problem. (Covered in Project: Podcast Episode/eBook Chapter, through self-evaluation and peer review)
    - HS-ETS1-4. (Content Limit) Use a computer simulation to model the impact of proposed solutions to environmental and societal problems. (Not directly covered, but can be incorporated into Project: Podcast Episode/eBook Chapter depending on the chosen topic)

<u>Unit 3: Infectious Disease and Epidemiology</u>

Project: Podcast episodes or ebook chapters that serve as tangible resources to educate K-5 learners about microbiology. These episodes will be shared with a wider audience to promote scientific understanding.

- Block 9: Infectious Diseases and Epidemiology
    - Discussion: Microbiology and Sustainability
    - Task 9: Research and Summarize Common Infectious Diseases
    - Lab: Disease Spread Lab
- Block 10: Epidemiological Concepts
    - Discussion: Infectious Diseases
    - Task 10: Research Epidemiological Concepts and Analyze Disease Outbreaks
- Block 11: Infectious Diseases
    - Discussion: infectious Disease Spread
    - Task 11: Brainstorming Public Health Campaign Topics Poster

- Block 12: Chapter 3
    - Discussion: Project Reflection
    - Project: Podcast Episode/eBook Chapter

<u>Standards:</u>

- HS-LS1 From Molecules to Organisms:
    - HS-LS1-7. (Content Limit) Use a model to illustrate the role of cellular respiration in providing cellular energy. (Covered to a limited extent if the unit discusses the energy needs of microbes causing infectious diseases)
- HS-LS3 Inheritance and Variation of Traits:
    - HS-LS3-1. Ask questions to recognize the role of human activity in the emergence and spread of infectious diseases. (Covered in Block 9: Microbiology and Sustainability discussions)
    - HS-LS3-2. (Content Limit) Develop and use a model to illustrate the process of natural selection and its evolutionary consequences. (Covered to a limited extent if the unit discusses antibiotic resistance and evolution of pathogens)
- HS-LS4 Biological Evolution: Unity and Diversity:
    - HS-LS4-6. (Content Limit) Use mathematical representations to support explanations of how natural selection leads to adaptation. (Covered to a limited extent if the unit discusses antibiotic resistance and evolution of pathogens)
- HS-ETSP Public Health:
    - HS-ETSP1-2. Develop a public health campaign addressing a specific health issue. (Covered in Block 11: Brainstorming Public Health Campaign Topics Poster and potentially the Project)
    - HS-ETSP1-3. Design a solution to a specific public health problem considering public health practices, social, ethical, and economic factors. (Covered to a limited extent in the Project, depending on the chosen topic)

<u>Unit 4: Immunology</u>

Project: Podcast episodes or ebook chapters that serve as tangible resources to educate K-5 learners about microbiology. These episodes will be shared with a wider audience to promote scientific understanding.

- Block 13: Immunology
    - Discussion: Common Infectious Diseases
    - Task 13: Immune System Components and Functions Pamphlet
- Block 14: Autoimmune Disorders
    - Discussion: Epidemiologists Investigation

    - Task 14: Understanding Immune-Related Disorders Awareness Poster
- Block 15: History and Function of Vaccines
    - Discussion: Public Health
    - Task 15: Exploring the History and Function of Vaccines - Infographic
- Block 16: Chapter 4
    - Discussion: Project Reflection
    - Project: Podcast Episode/eBook Chapter

Standards:

- HS-LS1 From Molecules to Organisms:
    - HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis in living organisms, at the cellular and whole-organism levels, by examining disruptions to the system. (Covered to a limited extent in Block 13 discussions if the concept of homeostasis in the immune system is addressed)
- HS-LS3 Inheritance and Variation of Traits:
    - HS-LS3-1. Ask questions to recognize the role of the immune system in maintaining organism health. (Covered throughout the unit)
- HS-LS4 Biological Evolution: Unity and Diversity:
    - HS-LS4-6. (Content Limit) Use mathematical representations to support explanations of how natural selection leads to adaptation. (Covered to a limited extent if the unit discusses the evolution of the immune system or the development of antibiotic resistance)

Semester B

Unit 5: Microbial Metabolism, Genetics, and Growth

Project:

This project invites you on a scientific expedition to explore the hidden engine of life - microbial metabolism! We'll delve into research to uncover how microbes in soil, water, and even our own bodies transform nutrients into energy, shaping entire ecosystems and impacting human health.

Unveiling the Microscopic Marvels:

Your mission is to become a science communicator, crafting a comprehensive report and a visually captivating infographic. Through research and analysis, you'll distill complex scientific discoveries about microbial metabolism. Your report will provide a clear roadmap through the research, while your infographic will translate those findings into a visually stunning story, engaging anyone curious about the invisible world that shapes our planet.

- Block 1: Intro to Microbial Metabolism
    - Discussion: Microbial Metabolism
    - Task 1: Microbial Metabolism and Growth Poster
    - Lab: Yeast Home Lab
- Block 2: Microbial Metabolism Case Studies
    - Discussion: Ethical Considerations
    - Task 2: Microbial Metabolism Case Study Infographic
    - Lab: Enzyme Case Study
- Block 3: Microbial Growth Control
    - Discussion: Challenges Associated with Microbial Growth Control
    - Task 3: Controlling MIcrobial growth Social Media Post
- Block 4: Microbial Metabolism Case Studies
    - Discussion: Microbial Biotechnology Applications
    - Task 4: Genetic Diversity of Microbes Information Poster
    - Lab: Meowsis STEM Case
- Block 5: Impact of Microbial Metabolism on Antibiotic Resistance
    - Discussion: Manipulating Microbial Metabolism
    - Task 5: Microbial Metabolism and Antibiotic Resistance Poster
- Block 6: Research Report on the Impacts of Microbial Metabolism
    - Discussion: Effective Communication
    - Project: Research Report

<u>Standards:</u>

- HS-LS1 From Molecules to Organisms:
    - HS-LS1-2. (Content Limit) Develop and use a model to illustrate the roles of nucleic acids and proteins in the process of translation. (Covered to a

limited extent in Block 1 discussions if the concept of enzymes as proteins is introduced)
    - HS-LS1-7. (Content Limit) Use a model to illustrate the role of cellular respiration in providing cellular energy. (Covered throughout the unit, as microbial metabolism is the foundation for cellular energy production)
- HS-LS2 Ecosystems: Interactions, Energy, and Dynamics:
    - HS-LS2-1. Use mathematical representations to describe the cycling of important nutrients and energy in terrestrial and aquatic ecosystems. (Covered in Block 2 and 4 discussions if the unit explores the role of microbes in biogeochemical cycles)
    - HS-LS2-7. Design, evaluate, and refine a solution to a biodiversity problem or impact on human welfare. (Covered to a limited extent in Block 3 discussions on microbial growth control, but could be expanded upon)
- HS-ETS1 Engineering Design:
    - HS-ETS1-1. Analyze a specific real-world problem or a technology to identify a way to improve it. (Covered in Block 3 discussions on challenges of microbial growth control and Block 4 discussions on microbial biotechnology applications)
    - HS-ETS1-2. Design a solution to a specific real-world problem by considering criteria and constraints. (Covered in Block 3 discussions on controlling microbial growth)
- HS-ETS1-3. Evaluate a solution designed to solve a specific real-world problem. (Not directly covered, but could be incorporated into discussions on the effectiveness of different microbial growth control methods)
- HS-LS3 Inheritance and Variation of Traits: (Potentially covered in Block 5 discussions on antibiotic resistance, depending on how the unit explores the topic)

<u>Unit 6: Viruses and Other Agents</u>

Project:

Imagine a future where communities are empowered to protect themselves from viral threats. This project allows you to design a comprehensive public health campaign, becoming a champion for community resilience.

From Awareness to Action:
Your mission is to craft a powerful public health campaign that educates, inspires, and mobilizes your target audience. By analyzing the needs of your community and leveraging creative materials, you'll develop a multifaceted campaign that promotes preventive behaviors and fosters a culture of preparedness. This project equips you with the skills to translate public health knowledge into actionable steps, building a shield against viral threats for your community.

- Block 7: Understanding Viral Agents and Their Impact
    - Discussion: Social Implications
    - Task 7: Community Health Assessment
    - Lab: Virus Cycle
- Block 8: Community Health Assessment and Risk Identification
    - Discussion: Primary Health Concerns
    - Task 8: Community Health Assessment
    - Lab: Virus Spread
- Block 9: Developing Community-Based Prevention Strategies
    - Discussion: Cultural Beliefs
    - Task 9: Community-Based Prevention Strategies PSA
- Block 10: Research Report on the Impacts of Microbial Metabolism
    - Discussion: Crisis Response Plan
    - Task 10: Microbial Metabolism Research Report
    - Lab: Protein Synthesis
- Block 11: Preventing the Spread: Public Health Campaign
    - Discussion: Inclusivity in Public health Campaigns
    - Project: Viral threats Public Health Campaign

<u>Standards:</u>

- HS-LS1 From Molecules to Organisms:
    - HS-LS1-7. (Content Limit) Use a model to illustrate the role of cellular respiration in providing cellular energy. (Not directly covered, but could be introduced if the unit discusses how some viruses disrupt host cell functions)
- HS-LS3 Inheritance and Variation of Traits:

    - HS-LS3-1. Ask questions to recognize the role of viruses in causing infectious diseases. (Covered throughout the unit)
    - HS-LS4 Biological Evolution: Unity and Diversity:
    - HS-LS4-6. (Content Limit) Use mathematical representations to support explanations of how natural selection leads to adaptation. (Covered to a limited extent if the unit discusses viral mutations and emergence of new strains)
- HS-ETS1 Engineering Design:
    - HS-ETS1-2. Design a solution to a specific real-world problem by considering criteria and constraints. (Covered in Block 9: Developing Community-Based Prevention Strategies, through designing a Public Service Announcement (PSA))
- HS-ETS1-1. Analyze a specific real-world problem or a technology to identify a way to improve it. (Covered throughout the unit discussions on viral threats and prevention strategies)
- HS-ETS1-3. Evaluate a solution designed to solve a specific real-world problem. (Not directly covered, but could be incorporated into discussions about the effectiveness of different prevention strategies)

<u>Unit 3: Anitmicrobial Drugs</u>

Project:

The culmination of your hard work is here! This project marks the final stage of launching your public awareness campaign for antimicrobial drugs. You'll polish your advertisement, strategically distribute it to reach the target audience, and then reflect on the entire journey.

Reflect, Learn, Grow

This project is more than just creating an ad; it's about personal growth. After sharing your campaign, you'll delve into a reflective process. This self-exploration will help you identify challenges overcome, new knowledge gained, and how collaboration contributed to your success. By documenting your learnings, you'll solidify valuable insights and pave the way for future impactful communication projects.

- Block 12: Understanding Antimicrobial Drugs and Mechanisms of Action

    - Discussion: Ethical Considerations of Public Healthcare Products
    - Task 12: Advertisement Analysis
    - Lab: Antimicrobial Susceptibility
- Block 13: Selecting Antimicrobial Drug and Target Audience
    - Discussion: Defining target Audiences
    - Task 13: Antimicrobial Drugs Poster
- Block 14: Creative Development and Advertisement Drafting
    - Discussion: Explaining Complex Scientific Phenomena
    - Task 14: Advertisement Storyboarding
    - Lab: Genetic Engineering
- Block 15: Peer Feedback and Advertisement Refinement
    - Discussion: Peer-review
    - Task 15: Advertisement Revisions
- Block 16: Distribution of Advertisements
    - Discussion: Project Challenges
    - Project: Antimicrobial Drug Advertisement

<u>Standards:</u>

- HS-LS1 From Molecules to Organisms:
    - HS-LS1-7. (Content Limit) Use a model to illustrate the role of cellular respiration in providing cellular energy. (Covered to a limited extent in Block 12 discussions if the unit explores how some antibiotics disrupt microbial energy production)
    - HS-LS3 Inheritance and Variation of Traits:
    - HS-LS3-1. Ask questions to recognize the role of antimicrobial resistance in the spread of infectious diseases. (Covered throughout the unit, especially in Block 12 and 13)
- HS-ETS1 Engineering Design:
    - HS-ETS1-1. Analyze a specific real-world problem or a technology to identify a way to improve it. (Covered in Project: Antimicrobial Drug Advertisement, through considering responsible advertisement strategies)
    - HS-ETS1-2. Design a solution to a specific real-world problem by considering criteria and constraints. (Covered in Project: Antimicrobial Drug Advertisement, through designing the advertisement itself)

- **HS-PS1 Matter and Its Properties:**
    - **HS-PS1-2. (Content Limit) Analyze data to identify patterns in the properties of elements. (Covered to a limited extent in Block 12 discussions if the unit explores the mechanisms of action of different antibiotic classes)**

- **HS-ETS1-3. Evaluate a solution designed to solve a specific real-world problem. (Not directly covered, but could be incorporated into Project reflection discussions)**
- **Science Communication: Throughout the unit, students develop skills in advertisement creation and explaining complex scientific concepts to a target audience. This aligns with the NGSS emphasis on scientific practices and communication.**

California CTE Standards (Health Science Research - HSR):

- **Standard 1.0:** Apply basic research principles to a microbiology topic. (Blocks 5, 9, 10 - Semester B) - Research projects on topics like infectious diseases or antibiotic resistance.
- **Standard 2.0:** Distinguish between quantitative and qualitative research methods. (Not directly covered, but could be introduced in Block 1 - Semester B)
- **Standard 3.0:** Conduct a basic research project related to microbiology. (Project throughout the course)
- **Standard 4.0:** Communicate scientific research findings effectively. (Projects, presentations, infographics, posters throughout the course)
-