



LESSON PLAN



Summer Camp: Bacteri-art

ZONE: Investigation Zone **AGE GROUP:** 11-14

EQUIPMENT: DNA Playground, **Amino kit**, Gloves, Ethanol, Microwave, Lab coats, tissues.

DESCRIPTION:

Participants will explore biotechnology with a focus on genetic engineering, learning about DNA, proteins, and corals. By the end of the three-day program, participants will understand the steps to genetically engineer E. coli bacteria to produce a color pigment derived from coral to create a Petri Art piece and explore the microorganism world using a microscope.

ENGINEERING DESIGN CHALLENGE:

The challenge is to change the color of bacteria using a pigment derived from corals. Additionally, participants will be inspired by the corals at the National Museum of Qatar (NMoQ) and will learn about Qatar's coral ecosystem.

LEARNING OBJECTIVES:

After attending this session, participants will be able to:

1. Understand the fundamental principles of genetic engineering.
2. Acquire hands-on knowledge and safety skills for use in a biolab.
3. Explore Qatar's marine life, particularly corals, and understand the role of pigments.

LESSON PLAN

Time / Duration

Activity Day 1

Materials/requirements

5 min

- Ice-breaking activity: Have participants share their experiences or curiosities about genetic engineering and corals.
- Explain today's agenda and objectives.

Computer, internet access, screen

30 min

Presentation :

- Introduction to Summer Camp and the experiment we will perform. Learn the basics of genetic engineering and visit the coral section of the museum.

DNA Playground, Amino kit, Gloves, Ethanol, Microwave, Lab coats, tissues.

1h 30 min

Activity:

- Each participant will get a computer to simulate the creation of an agar plate.
- Participants will learn about safety rules in a biolab. They will wear their lab coats and gloves, and sanitize their stations.
- Hands-on exploration: Each participant will receive 1 pre-prepared agar plate. They will first label the plates and then streak cells following the specific draw provided by Amino Labs.
- At the end of day one, we will place the streaked petri dishes in the incubator at 37° and wait 24 hours to see the results.

LESSON PLAN

Time / Duration

Activity Day 2

Materials/requirements

10 min

Introduction to the agenda for day 2.

Computer, internet access, screen

1h 20min

Activity:

- a. Put on lab coats and gloves, and sanitize their stations.
- b. Check the petri dishes from day 1.
- c. Make competent cells by following the below steps:
 - Collect the blank cells, and turn on the Cold station at 4° in the incubator
 - Turn the loop for 30 seconds in the buffer
 - Take another loop and collect the DNA
 - Place the loop in the buffer tube Turn the loop for 10 seconds in the Cold station, then leave the buffer tube in the Cold Station for 6 minutes
 - Now move the buffer tube in the hot station at 42° to create the heat shock
 - Place the tube back in the Cold Station and let it rest for 2 minutes
 - Pour the recovery medium in the tube, and turn gently for 10 times
 - Last, place the tube in the incubator at 37°
- d. Introduction to the next day's activities (without the participants).

30 min

Draw with bacteria!

Participants will use already transformed samples to draw on a new petri dish following illustrations of corals. The drawing will also be placed in the incubator to develop overnight.

DNA Playground, Amino kit, Gloves, Ethanol, Microwave, Lab coats, tissues.

LESSON PLAN

Time / Duration

Activity Day 3

10 min

Introduction to the agenda for day 3.

1h 30 min

Activity:

- a. Put on lab coats and gloves, and sanitize their stations.
- b. Check the results from day 2.
- c. Observe and analyze the results using microscopes.
- d. To better understand the scale of bacteria compared to other microorganism, participants will also be provided with different plant and animals samples to compare and get more familiar with the microscope.

20 min

Presentation

- a. Closing presentation about corals.
- b. Closing remarks about the activity.

Materials/requirements

Computer, internet access, screen

DNA Playground, Amino kit, Gloves, Ethanol, Microwave, Lab coats, tissues.



**THANK
YOU**

