A NIGHT AT THE LABORATORY



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TABLE OF CONTENTS

01 Safety and Security Objectives

02 Prepare Responsibly

03 Facilitation Principles

04 Activity Flow

06 Closing and Follow-up

07 Contribution to Safety and Security

PRACTICAL FIELD GUIDE - Patras Medicine iGEM 2026

A NIGHT AT THE LABORATORY

An interactive junior-high-school activity linking synthetic biology, biosafety, biosecurity and responsible research

AUDIENCE	Young people between the ages of 13 and 15 (e.g. second- and third-year junior high school students).
FORMAT	Short presentation, hidden-role game and guided project debrief.
DURATION	60 – 90 minutes, adaptable to group size and available time.
CORE PRINCIPLE	Every game incident becomes a discussion about prevention, protection and responsibility inside and outside the laboratory.

Guide purpose: This guide supports teams delivering a short role-playing activity for second- and third-grade junior high school students. It combines a concise scientific introduction with a hidden-role game so that students can distinguish biosafety from biosecurity and discuss prevention, protection, access control and scientific responsibility.

1. Safety and Security Objectives

- Introduce synthetic biology through clear, age-appropriate examples.
- Distinguish accidental laboratory risks from deliberate misuse or unauthorised access.
- Connect laboratory rules with prevention, protection, oversight and responsibility.
- Use fictional incidents to practise risk assessment and evidence-based decision-making.
- Create a respectful game environment in which participation and discussion remain safe.

2. Prepare Responsibly

Coordinate with the host school, organisation or community group

- Confirm the group size, available time, room layout and facilitator support.
- Arrange chairs in a circle, number the seats and test the presentation equipment.
- Select the number of Scientists, Biohackers and Biosafety Officers before the session.
- Offer an observer or incident-recorder role to students who prefer not to take a hidden role.

Materials

PRESENTATION	Synthetic biology, biosafety, laboratory rules, biosecurity and bioethics
ROLE CARDS	Scientist, Biohacker and Biosafety Officer

PROJECT CARDS	Numbers 1 - 6, normally two matching cards per project
FACILITATOR TOOLS	Seat map, timer, pen and a record of night choices
EVALUATION	One anonymous questionnaire and pen per student

Role cards created for this activity

The following role cards were designed and created by our team specifically for this activity. Print the required number of each card with identical, opaque backs. In this version of the game, the "BIOSECURITY" card represents the Biosafety Officer.



SCIENTIST



BIOHACKER



BIOSAFETY OFFICER

3. Facilitation Principles

- **Clear rules:** Explain the roles, night and day phases, voting, ties and victory conditions before distributing cards.
- **Respectful discussion:** Arguments must concern actions and evidence within the game, never a student's personality, identity or real abilities.
- **Safe language:** Use "targeted", "affected" and "leaves the game", avoid death-based language and remind students that every incident is fictional.
- **Scientific accuracy:** Keep the difference explicit: biosafety addresses accidental exposure or release, while biosecurity addresses unauthorised access and intentional misuse.
- **Inclusive participation:** Give instructions verbally and in writing, allow time to process information and keep eliminated players involved as observers.

4. Activity Flow

Part A: The Scientific Introduction

Briefly introduce synthetic biology and its real-world applications. Explain biosafety, basic laboratory rules, biosecurity and bioethics. Ask students for one example of an accidental risk and one example of deliberate misuse before moving to the game. Keep the introduction conceptual, do not use biological materials or provide experimental instructions.

Part B: Night falls in the Laboratory

How "Night falls in Palermo" works: Players secretly receive one of the main roles: Citizen, Mafia member or Detective. At night, the Mafia targets one player and protective roles may intervene. During the day, everyone discusses and votes to remove a suspect.

How "Night falls in the Laboratory" works: Our adaptation keeps this cycle: Mafia becomes Biohackers, Citizens become Scientists, Detectives become Biosafety Officers, and the town becomes a laboratory with projects to protect. Secretly distribute Scientist, Biohacker and Biosafety Officer cards. Scientists also receive a project number. During the first night, matching Scientists recognise their project team. Each following night, Biohackers silently target one player and Biosafety Officers protect one player. During the day, announce whether the incident was prevented, connect it to the affected project, discuss possible safeguards, and then hold a vote. Scientists and Officers win when all Biohackers are identified, while Biohackers win when no Scientists remain.

Scenario Guide: When a Scientist is affected by Biohackers, link the incident to that student's project. Keep each discussion to two or three minutes and focus on the project's purpose, the possible failure and the safeguards that could prevent or limit harm.

Scenario 1: Insulin Production

Project Purpose: modified microorganisms produce insulin for people with diabetes. If the project is affected, explain that a production or quality-control failure could create an ineffective or unsafe medicine. Discuss containment of the microorganism, checks at every production stage, purity testing and independent oversight. Ask: Why must a useful medicine still be tested? Who should verify that it is safe before patients receive it?

Scenario 2: Environmental Clean-up

Project Purpose: a designed microorganism helps remove oil or other pollutants from water or soil. The central risk is that it may spread beyond the intended site or affect non-target organisms and ecosystems. Discuss contained trials, environmental risk assessment, monitoring and mechanisms that limit survival or activity. Ask: What could happen if the organism reached the wrong place? Who should authorise its release into nature?

Scenario 3: Disease Diagnosis

Project Purpose: a cell or biosensor detects early signs of disease. The main failure is an inaccurate result: a false positive may cause unnecessary worry or treatment, while a false negative may delay care. Discuss repeated validation, comparison with trusted methods, quality control and clinical oversight. Ask: What are the consequences of a wrong result? How many times should a test be checked before it is trusted?

Scenario 4: Genetically Modified Plant

Project Purpose: a plant is modified to resist disease, drought or difficult conditions. The risk is uncontrolled spread of the new trait or unexpected effects on other plants, animals and ecosystem balance. Discuss restricted field trials, environmental assessment, monitoring and clear limits on where the plant may be grown. Ask: Is it enough for the plant to work? What long-term effects must be considered before wider use?

Scenario 5: Antibiotic Production

Project Purpose: microorganisms are used to produce an antibiotic against bacterial infections. Risks include contamination, poor-quality production and inappropriate use that contribute to antimicrobial resistance. Discuss manufacturing controls, purity and effectiveness testing, medical guidance and responsible prescribing. Ask: What happens when antibiotics are used without need? Why must production and use both be controlled?

Special Scenario: A Biosafety Officer Is Targeted

If an unprotected Biosafety Officer is targeted, explain that the Biohackers attacked the laboratory's protective system rather than a single project. The Officer leaves the game and the laboratory loses one layer of defense. Discuss why safety must not depend on one person and how layered protection combines procedures, training, access control, equipment and supervision. Ask: What happens when those who monitor safety are removed? Which backup safeguards should remain active?

Part C: Project Debrief

After each incident, ask: What went wrong? Was this a biosafety or biosecurity issue? Which preventive, protective or monitoring measure could have helped? End by asking which project was hardest to protect and why responsible innovation requires both useful science and effective safeguards.

6. Closing and Follow-up

Thank the participants, restate the difference between biosafety and biosecurity and allow time for the anonymous questionnaire. Record answers systematically and report missing or unclear responses rather than inferring them. Use the results to adjust the presentation, role balance and discussion time in future sessions.

7. Contribution to Safety and Security

This activity contributes to biosafety and biosecurity by translating laboratory responsibility into an accessible collaborative experience. Students see that safety depends on preparation, containment and correct procedures, while security also requires controlled access, protection of materials and information and prevention of intentional misuse. The activity does not replace formal laboratory training. It complements it by developing risk awareness, responsible decision-making and a culture in which scientific innovation is evaluated not only for its effectiveness, but also for its safety, security and social responsibility.