



OEC 2021

Team PHP

“Design is not just what it looks like and feels like. Design is how it works.”

—STEVE JOBS, CO-FOUNDER OF APPLE

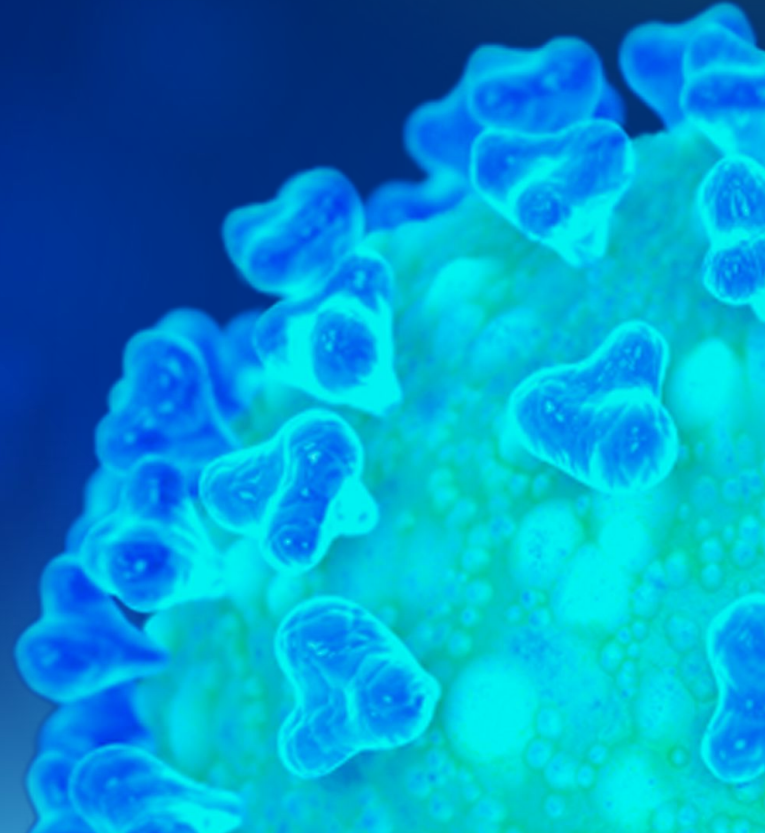
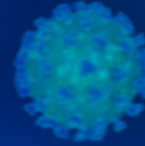


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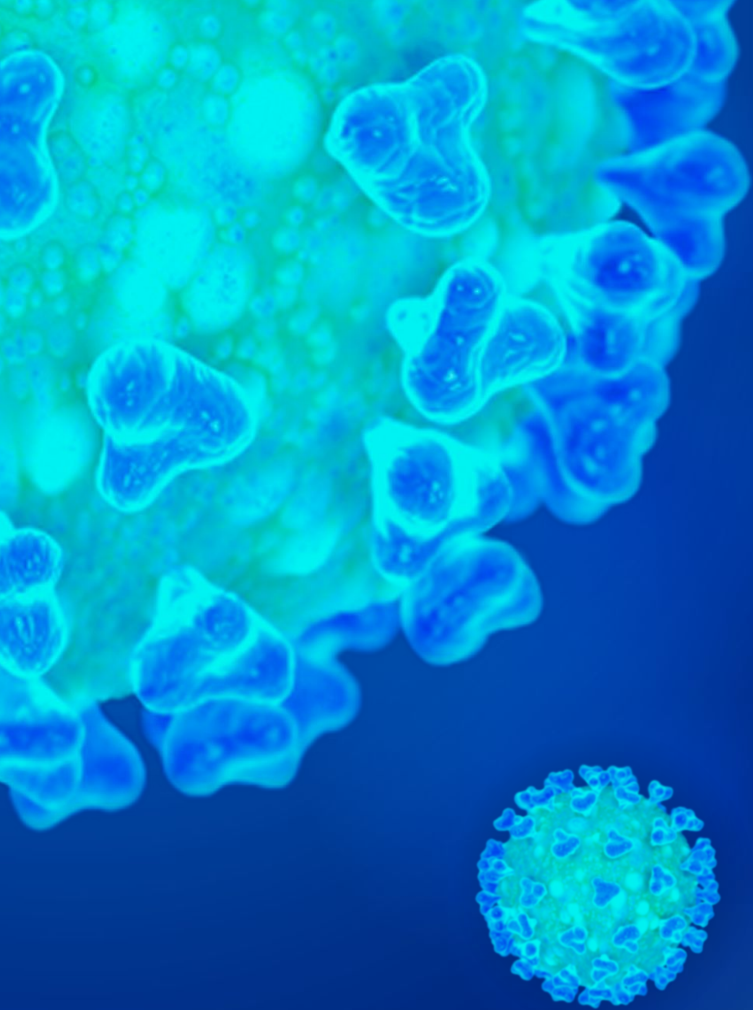
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01. OUR TEAM

TEAM PHP

We are passionate, goal-driven Engineering students with a love for design and programming. Below we've listed our team and the workload each member inherited.

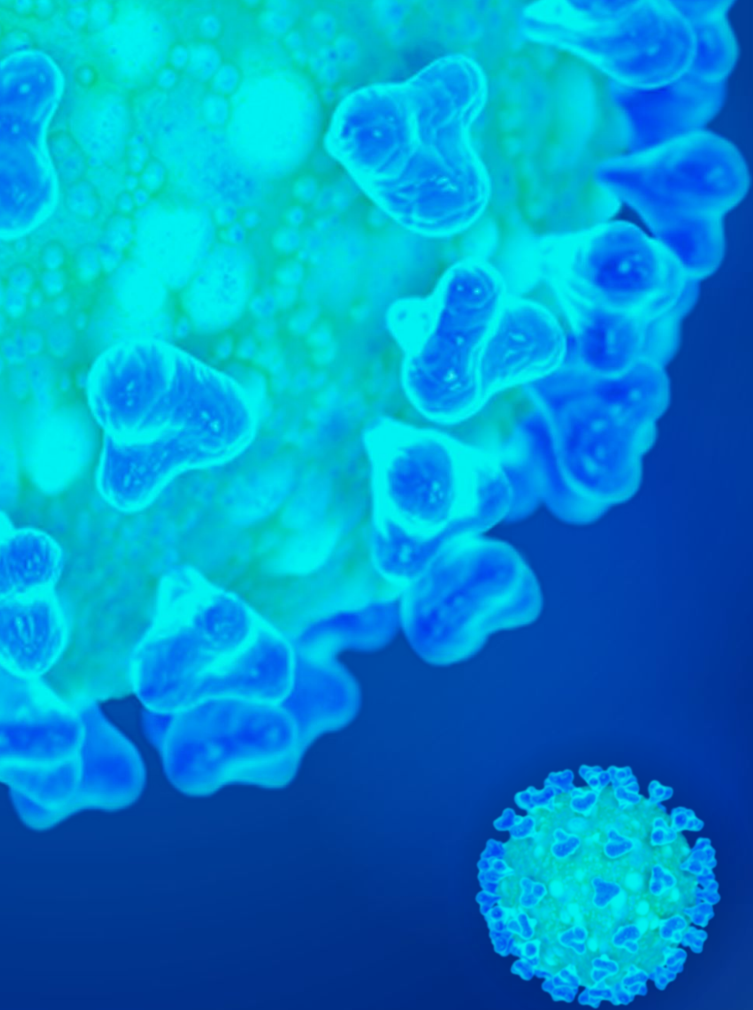
- Cassidy Linhares - 25%
- Mitchell Hicks - 25%
- Aayush Bajaj - 25%
- Austin Page - 25%



Member Participation

Given the open-ended nature of this project, we knew that our solution had to be unique to set us apart from the competition. Knowing that, we divided the workload as evenly as possible to ensure our team was efficient, while still pertaining to each member's strengths.





02. Collaboration Process

Establishing Software Development Process

Agile Development Process

STEP 01: Understanding Requirements

reading project outline
and rubric

STEP 03: Code Implementation

Implementing design plans

STEP 02: Designing/Planning

Jam board session and
establishing initial plan



Establishing Software Development Process

STEP 04: Testing/Debugging

Using a combination of black box and white box testing



STEP 05: Refinement

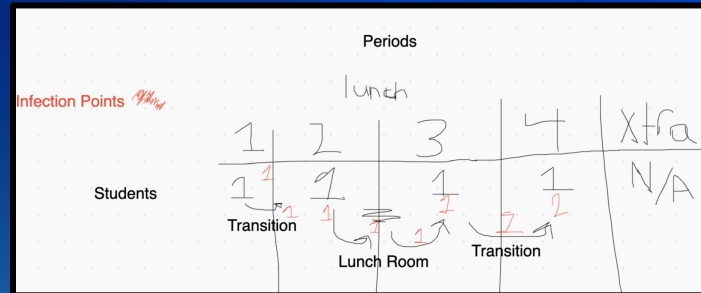
Fixing any bugs or errors found in testing phase

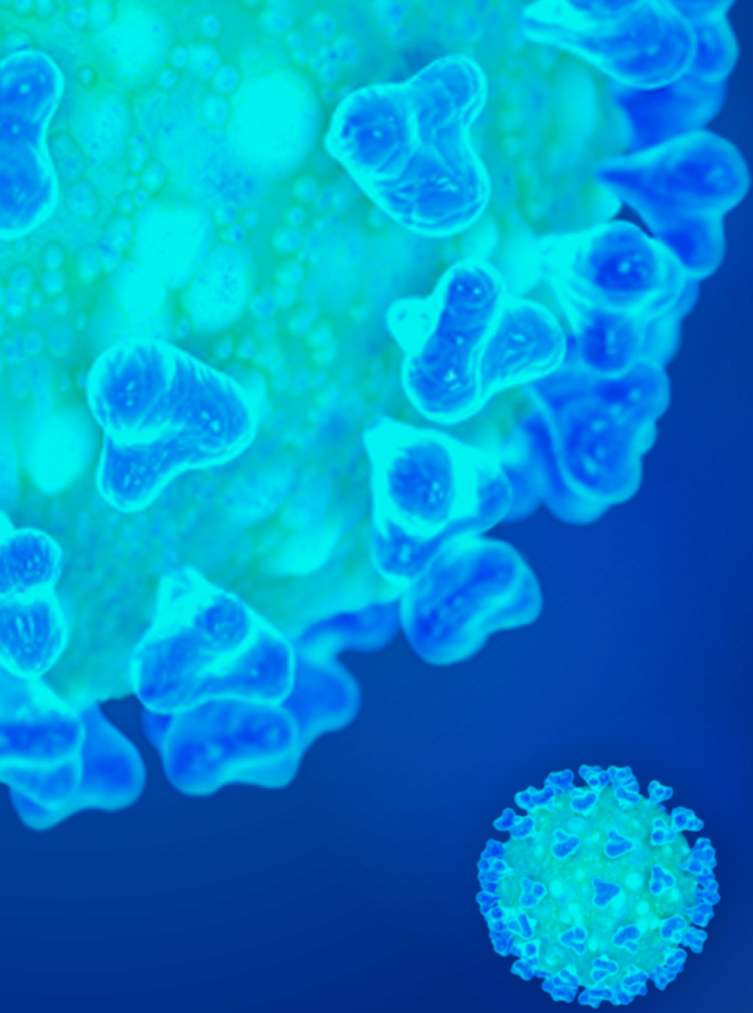
Planning

We used many tools in the planning process to really help team member engagement and collaboration. This benefited us greatly because it allowed us to share ideas as if we were together in the same room



- Discord (audio/video communication and screen sharing)
- AWWapp.com (sharing whiteboard)
 - This allowed us to draw ideas and brainstorm provide
 - Jam board
- Google Drive (Share files)



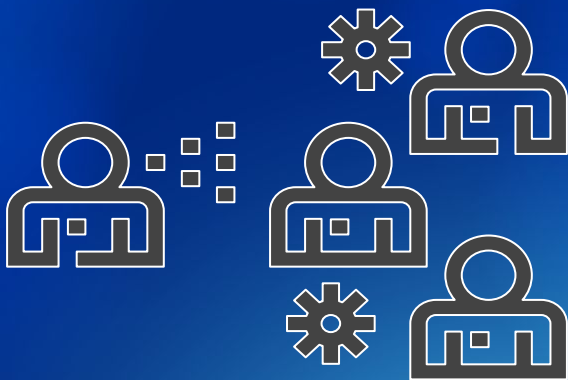


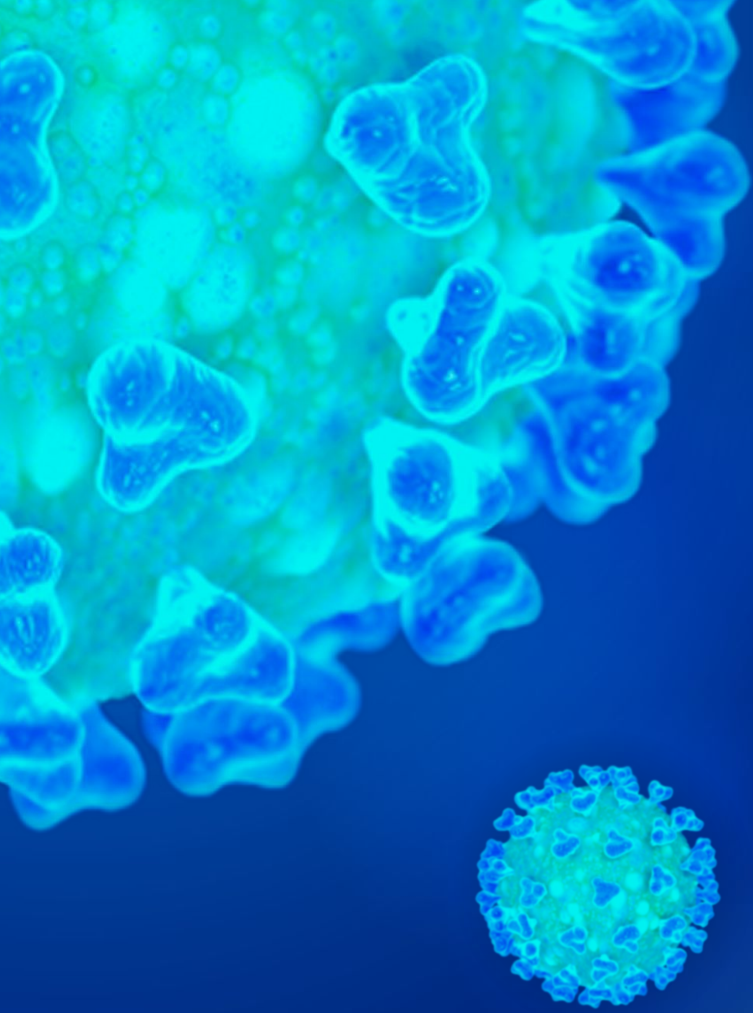
03. Project Goal

Our Goal

We set out to achieve a complex program that could be used to help identify and track the spread of ZBY1 in the school environment.

We wanted our program generate a simple text file that can be accessed by school staff and personnel to help identify people who may be infected with ZBY1 after each day.





04.

Our Plan

Assumptions Made

We made a few assumptions with regards to calculating the spread of the virus, as well assumptions were made about the school. These assumptions will ultimately lower our programs accuracy

- Everyone in the school goes into a large room for lunch (i.e. cafeteria)
- No Spread occurs while students are in the hallways before and after school
- All extracurricular activities have the same spread rate average formula as in class activities, this even includes activities that are conducted outside (i.e. soccer)

Pro's and Con's

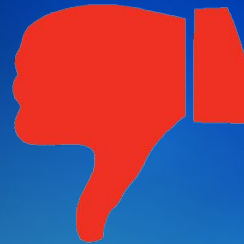
Pros of our implementation:

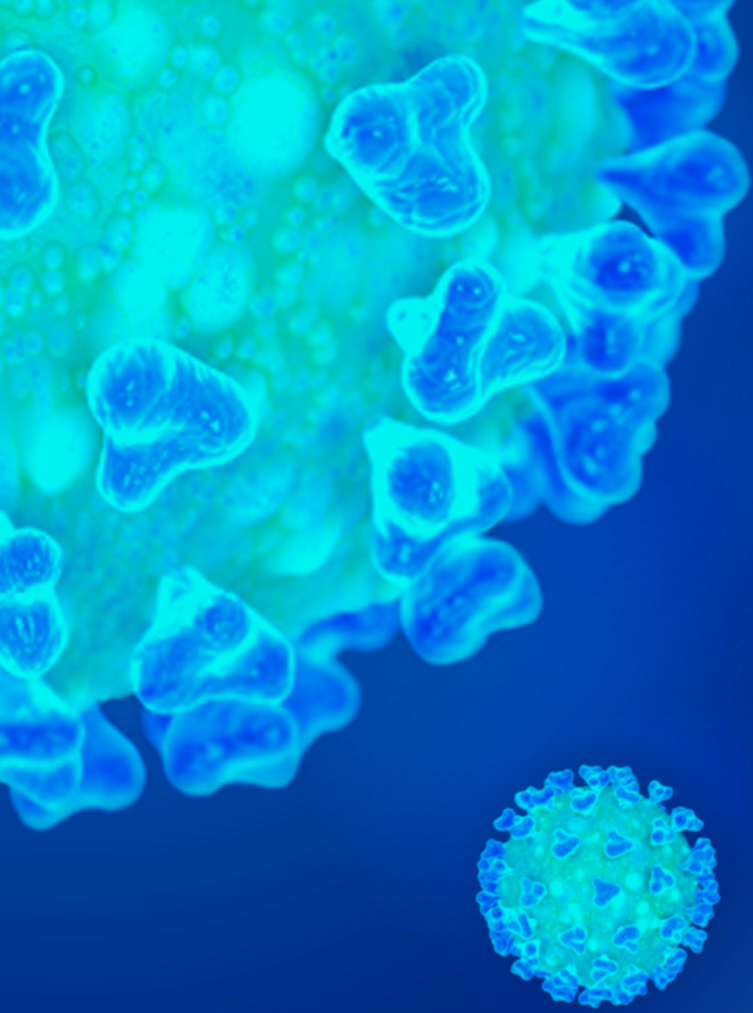
- Our program has been simplified using objects which allows for more accuracy of spread and representation
- Simple and Easy for users to understand a result



Cons of our Implementation:

- It may not be efficient on time complexity
- Results may not be as accurate as it could be





05. Code Breakdown

Python

For our project we decided to use an OOP language that we were all comfortable with. This is why we decided to use python.

Another benefit for using python is the fact that they have intuitive built in libraries



Program Walkthrough

```
# PERSON CLASS - Used to make an Object for any student, ta, teacher at any given time
class Person():
    def __init__(self, id, lname, fname, grade, extracurricular, conditions, infected):
        self.id = id
        self.lname = lname
        self.fname = fname
        self.grade = grade
        self.extracurricular = extracurricular
        self.conditions = conditions
        self.sickness = 0
        self.infected = False
        self.gradeFactor = (1.25 ** (grade - 9))
        self.healthFactor = 1.7 if conditions else 0
        self.threshold = 10

    def updateInfection(self, totalPoints):
        self.sickness += (totalPoints * self.gradeFactor) * self.healthFactor
        if self.sickness >= self.threshold:
            self.infected = True
```

```
class Day():
    def __init__(self, period1, period2, period3, period4):
        self.periods = [period1, period2, period3, period4]
        self.courseNames = {}
        self.determineSpread()
```

```
class Course:
    def __init__(self, name, section):
        self.name = name
        self.section = section
        self.peopleInClass = []
        self.infectedPeople = []

    def addPerson(self, Person):
        self.peopleInClass.append(Person)

        if Person.infected:
            self.infectedPeople.append(Person)

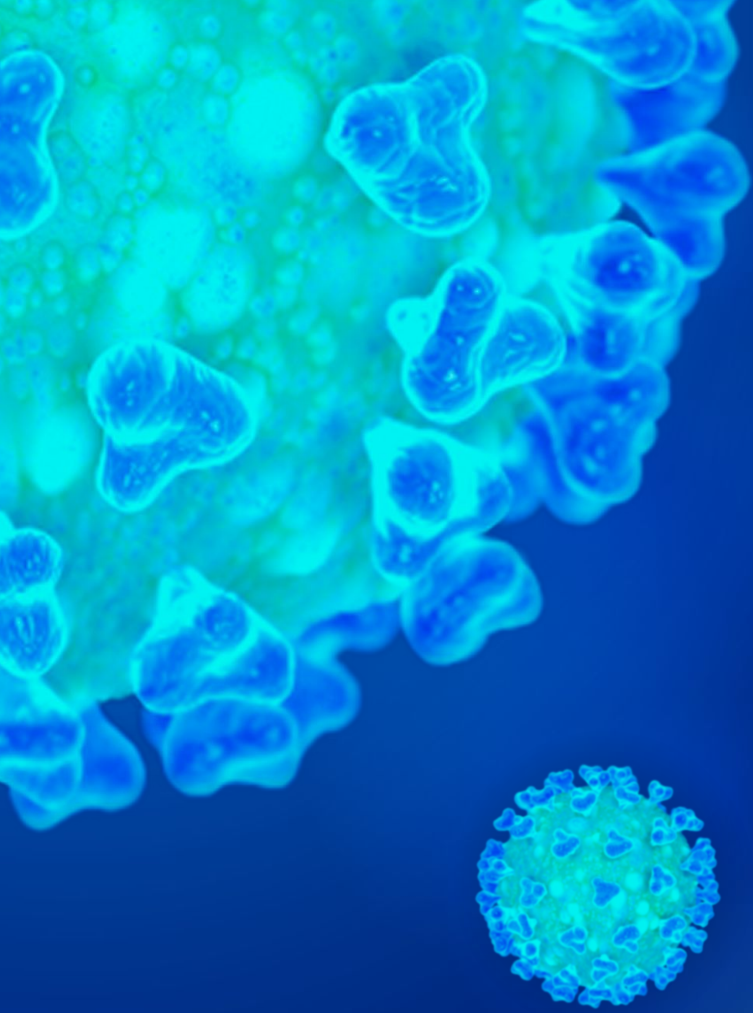
    def updatedInfected(self):
        for person in self.peopleInClass:
            if (person.infected == True):
                if person not in self.infectedPeople:
                    self.infectedPeople.append(person)
```

Design Justifications

We chose to represent the teachers, TAs, and students all as one class because they are all people who share common attributes and capable of catching ZBY1. The only difference is that the older you are, the more likely you are to contract it. The classes that exist in our program are person, course, and day. We believe that this a good way to accurately depict the environment

Another design decision we made is that we would use a point system to determine how likely a person will contract the virus. The higher your points, then the more likely you are to contract the virus.

The choice we made is to have the school population be a person and then each person is assigned to their respective course. The day consists of periods which consists of a list courses that each person is enrolled into. Then we can go through each day at the school as the students, teachers, and TAs would.



06. Issues and Resolutions

Initial Problems

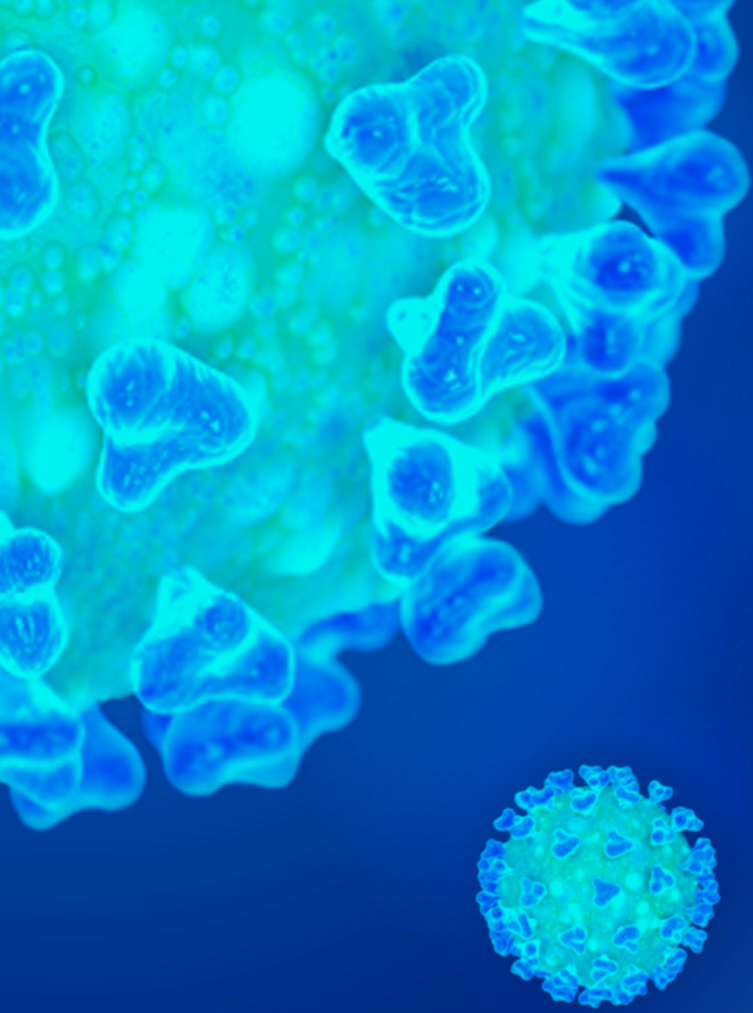
- Understanding how to calculate the spread rate of ZBY1
 - **Solution:** Experimenting with a percentage based system than switching to a more reliable points system
- Understanding every aspect of where students, teachers and TA's come in contact with infected people
 - **Solution:** re-grouping and re-reading requirements
- Figuring out the best approach to calculating whether a person is infected or not
 - **Solution:** Using a base case for people not infected yet, which is 0 and using 1 for people, at the start of each day
- Problems with communication using virtual coding/design sharing software
 - **Partial Solution:** using collaborative software like Discord, Google Drive and Ripl.it



Improvements

- Include hallway and lunch, and extracurriculars as possible sources of infection
- Continue to modify and make more accurate calculations to the spread of the virus
- Separate in-class vs outside extra curricular activities with appropriate spread rates





07.

Accreditations

References and Tools

COLLABORATIVE TOOLS

- Discord - collaborative communication
- AWW App - collaborative drawing/visualization
- Repl.it - collaborative coding
- Google Drive - collaborative file management
- Github - collaborative code management



PYTHON LIBRARIES

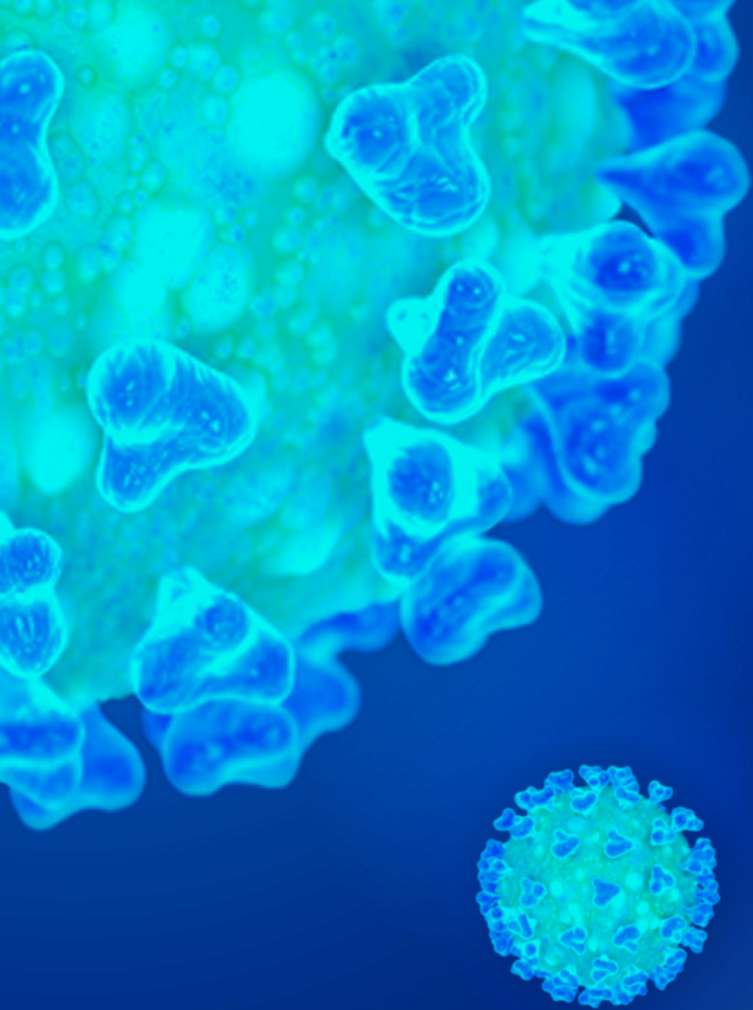
- Pandas - reading/parsing data (specifically .xlsx files in our case)



OTHER

- SlidesGo - virus slide template





08.

Conclusions

Key Takeaways

This project provided our group with very important lessons that we will carry with us throughout the rest of our degree and in our careers.

Key Lessons

- The power of teamwork and collaboration
- Making sure you complete the task required by the given deadline
- Stressing the importance of being flexible and having a willingness to adapt to changing situations
- The importance of infection control
- Managing time wisely

Thank You OEC

This was a great experience for our team and we appreciate all the hard work that OEC members took to put it together.

Thank you,

Team PHP

Questions

