

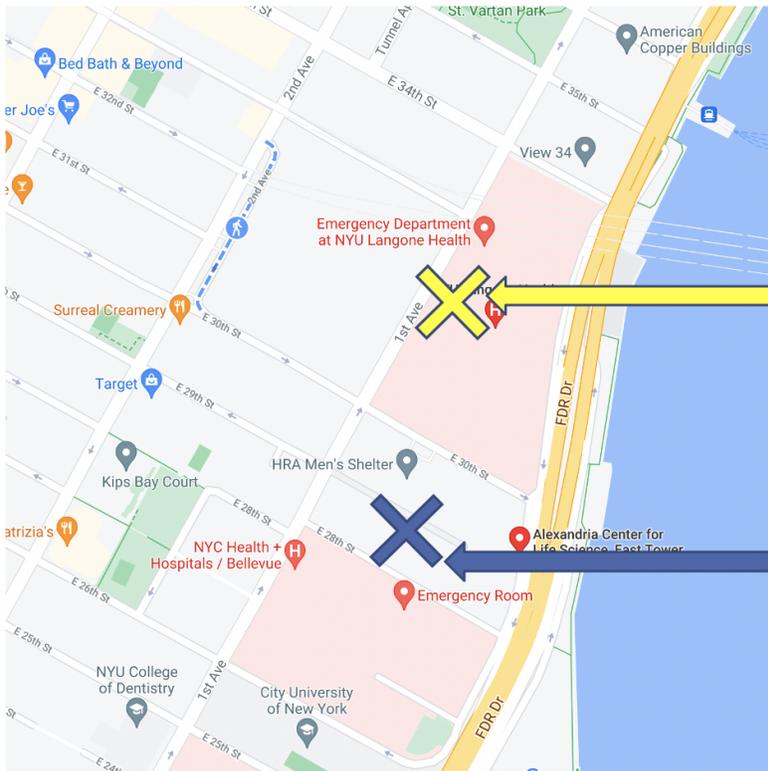
NYU GROSSMAN SCHOOL OF MEDICINE

***NYU SCIENCE IMMERSION PROGRAM  
(NYU-SIP)***

- 1. Gain exposure to biomedical research***
- 2. Learn practical career development skills***
- 3. Get long-term, 1-1 mentorship***
- 4. Be exposed to a variety of science-related careers***

# Maps to NYU

Where we will meet you each morning:

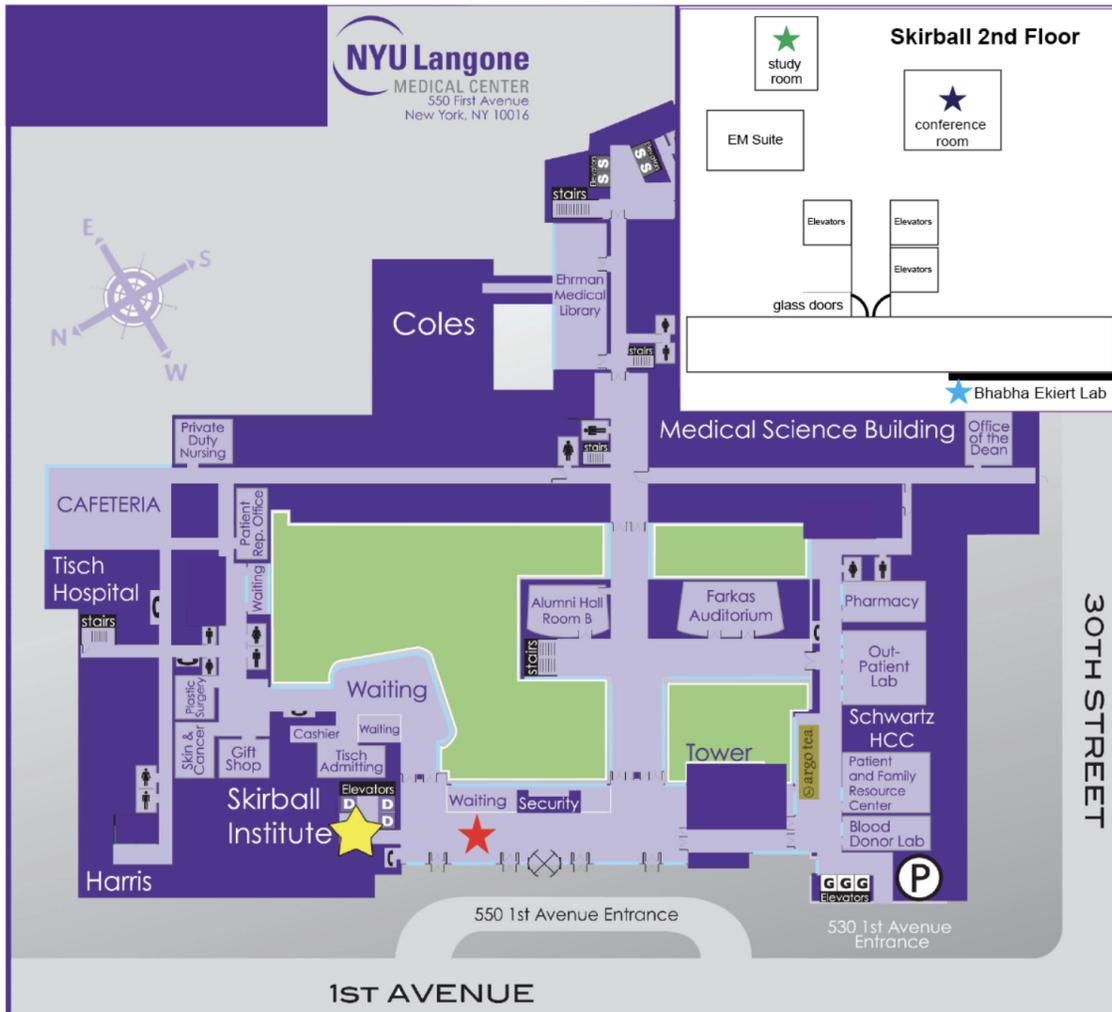


**NYU Medical Center**  
**550 1st avenue,**  
**New York, NY 10016**  
Meeting point on  
Monday  
Tuesday,  
Wednesday and  
Friday mornings

**Alexandria West**  
**430 E 29th St**  
Meeting point on  
Thursday

## Detailed map of the Medical Center / Skirball location:

Most of the sessions will be held at the Skirball Institute located at 550 1st avenue.  
On Monday morning, your mentors will be waiting for you in the lobby of the Medical Center (indicated by the red star). The entrance is on 1st Avenue, between 31st and 33rd street.



-  Meeting point (Day 1)
-  Bhabha Ekiert Lab
-  Study room
-  Skirball Institute
-  Conference room

# Schedule

**Table 2. Schedule for Immersion Week.** Scientific activity modules, career development, science in daily life, social activities/mentor bonding

	Monday Aug 2	Tuesday Aug 3	Wednesday Aug 4	Thursday Aug 5	Friday Aug 6
9 - 10.30 am	Intro / welcome / ice breakers  <i>Skirball, 4th FL CR</i>	Lab Activity	Synthesis of yesterday's experiment <i>Skirball, 5th FL CR</i>	Lab Activity  <i>Alexandria West Cadwell Lab</i>	Prepare presentations  <i>Skirball, 2nd FL CR</i>
10.30 - noon	<b>Career development I:</b> Navigating career decision making <i>Skirball, 4th FL CR</i>	<i>Skirball, 2nd FL Bhabha-Ekiert lab</i>	<b>Career development II :</b> Identifying mentors & research opportunities <i>Skirball, 5th FL CR</i>	Lab Activity  <i>Alexandria West Cadwell Lab</i>	<b>Career development IV:</b> Biomedical research <i>Skirball, 2nd FL Study Room</i>
Noon - 1pm	Lunch break <i>Skirball, 4th FL CR</i>	Lunch break <i>Skirball, 5th FL Study Room</i>	Lunch break <i>Skirball, 5th FL CR</i>	Lunch break <i>Alexandria West 4th FL CR</i>	Lunch break <i>Skirball, 4th FL CR</i>
1 - 2.30 pm	Facility tours  <i>Skirball, 2nd FL, Study Room</i>	Lab Activity	<b>Career development III:</b> Transitioning From a Two-Year to Four-Year College <i>Alexandria West 4th FL CR</i>	Lab Activity  <i>Alexandria West Cadwell Lab</i>	<b>Career development V:</b> Transitioning to STEM jobs in Pharma <i>Skirball, 4th FL CR</i>
2.30 - 3 pm	Lecture - Intro to Bhabha Ekiert Lab  <i>Skirball, 5th FL CR</i>	<i>Skirball, 2nd FL Bhabha-Ekiert lab</i>	Lecture - intro to concepts for Thurs. Lab Activity <i>Alexandria West 4th FL CR</i>	Lab Activity  <i>Alexandria West Cadwell Lab</i>	Presentations  <i>Skirball, 4th FL CR</i>
3 - 4 pm	Intro to concepts for Lab Activity  <i>Skirball, 5th FL CR and Skirball, 2nd FL Bhabha-Ekiert lab</i>	How to make a presentation  <i>Skirball. 4th FL CR</i>	Lecture - intro to concepts for Thurs. Lab Activity  <i>Alexandria West 4th FL CR</i>	Wrap-up / synthesis of yesterday's experiment  <i>Alexandria West 4th FL CR</i>	Wrap up, feedback, evaluation   Discussion of mentoring program, first activity  <i>Skirball, 4th FL CR</i>
4 - 5pm				Prepare the presentations <i>Alexandria West 4th FL CR</i>	COVID vaccine center - Lecture & tour - 5pm <i>660 First Avenue on the 7th floor</i>
Social evening	TBD				Dinner (5.30pm)

# Syllabus

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## Introduction

The overall goal of this program is to provide exposure to biomedical research and the wide variety of science-related careers.

This is not your average science course! In one action-packed week, you will get immersed in lab activities, interact with scientists in different fields and from different backgrounds, see cool microscopic organisms using state-of-the-art equipment, learn the many different ways you can achieve your goals and succeed in science, and do many other cool things...

This on-site immersion week consists of different modules:

- 2 science activity modules in 2 different biomedical research labs at the medical center
- 5 career development workshops with panel discussions
- Core facility tours
- ... and social activities

## Your responsibilities as a student

- Arrive on time and attend all events
- Wear appropriate lab attire (no open-toed shoes; pants recommended). Scientists usually dress casually (jeans, T-shirts, etc.); spills sometimes happen in the lab, so leave your nicest clothes at home!
- Maintain a safe lab atmosphere
- Fill out a pre- and post- course surveys
- And, most importantly: participate, ask questions (there are no stupid questions). This is your opportunity to gather the information you need, and network with scientists from diverse fields and backgrounds
- Get to know your mentor
- On Friday afternoon, you will give a short presentation on what you've learned during this week. Don't worry, you will get help from your mentors and get a "how to make a presentation" workshop

## Inclusivity statement

One of the key aspects of this course is that our members represent a rich variety of backgrounds and perspectives. The team is committed to providing an atmosphere for learning that respects diversity. While working together to build this community, we ask all members (students and instructors) to:

- Share their unique experiences, values, and beliefs
- Be open to the views of others
- Honor the uniqueness of their colleagues
- Appreciate the opportunity that we have to learn from each other in this unique setting

- Value each other's opinions and communicate in a respectful manner
- Keep confidential discussions that may be personal
- Use this opportunity together to discuss ways in which we can create an inclusive environment in this course and across the scientific community

# Workshops

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Two of the goals of this program are to give you practical tools and skills for the next steps of your careers, and to give you exposure to different possibilities of a career in STEM via a series of career development workshops.

## Main contact / organizer:



Noelle Antao

[Noelle.Antao@nyulangone.org](mailto:Noelle.Antao@nyulangone.org)

## Career development I: Navigating career decision making

Monday, 10.30am - noon

There are many career options for people interested in science and in human health; choosing which path is right for you can be difficult. We gathered a group of panelists on different trajectories in science to talk about their educational paths, their choices, and their careers. They will talk about their motivations in choosing the career they chose, and what day-to-day life looks like in their fields.

### Panelists:

1. **Dr. Adriana Heguy** is the director of the Genome Technology Center, one of NYU Langone's core research facilities. She did her undergraduate degree in Montevideo Uruguay, then completed her PhD at University of Southern California. She is an internationally known Latin American genomics scientist, who has been conducting research tracing COVID-19 variants within NYC populations since the start of the pandemic.
2. **Dr. Jenna Newman** is a postdoctoral fellow at the Icahn School of Medicine at Mount Sinai studying tumor immunology. She received her PhD in Microbiology and Molecular Genetics from Rutgers University in 2019, where she studied intratumoral influenza vaccines as an immunotherapy for cancer. She previously received a degree in Molecular Biology (A.B.) from Princeton University in 2015.
3. **Liana Goehring** is an MD/PhD student who has completed two years of medical school and is in her first year of graduate school. Liana studies genomic instability using ovarian cancer models. Originally from the Bronx and Pennsylvania, Liana completed her undergraduate at Wellesley College in Boston studying chemistry and French. After

graduating, she worked as a research assistant at Dana-Farber Cancer Institute in Boston, MA several years before applying to MD/PhD programs. After completing her MD/PhD training she hopes to pursue oncology and cancer biology in both a clinical and research setting.

4. **Dr. Salvatore Aspromonte** completed his undergraduate training at Fairfield University where he majored in psychology with a concentration in neuroscience. Initially he had aspirations of being a psychologist but decided instead to pursue medical school during his junior year of college. He went on to complete his medical school training at Rutgers Robert Wood Johnson Medical School and is currently completing a residency in pediatrics at New York Presbyterian Weill Cornell Medical Center. After residency, he plans on completing a fellowship in pediatric oncology.
5. **Frankie Hamilton** is a third-year nursing PhD student whose main research focus is on alcohol use disorders, specifically focusing on the military population. Frankie is originally from Astoria, Queens and completed his undergraduate degree at Cornell University in Ithaca, NY, studying Human Development. He also has a Master's Degree in Business Administration from Hofstra University and a Master's of Science Degree in Nursing from Hunter College. Frankie was formerly a high school chemistry teacher but has been a nurse for about eleven years. He has numerous professional certifications and currently works as a nurse administrator while he completes his graduate research.



Adriana Heguy  
[Adriana.Heguy@nyulangone.org](mailto:Adriana.Heguy@nyulangone.org)



Jenna Newman  
[Jenna.newman@mssm.edu](mailto:Jenna.newman@mssm.edu)



Liana Goehring  
[Liana.Goehring@nyulangone.org](mailto:Liana.Goehring@nyulangone.org)



Salvatore Aspromonte  
[Saa9216@nyp.org](mailto:Saa9216@nyp.org)

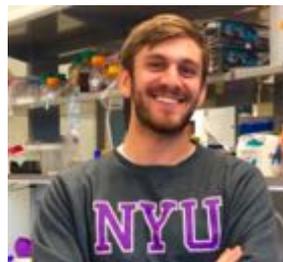


Frankie Hamilton  
[frankie.hamilton@gmail.com](mailto:frankie.hamilton@gmail.com)

### Organizers:



Nora Herzog  
[Nora.Herzog@nyulangone.org](mailto:Nora.Herzog@nyulangone.org)



Andrew Bazley  
[Andrew.Bazley@nyulangone.org](mailto:Andrew.Bazley@nyulangone.org)

### Resources:

Website to read abstract of researchers and have an idea of what they're working on:

<https://pubmed.ncbi.nlm.nih.gov/dmed>

<https://scholar.google.com/>

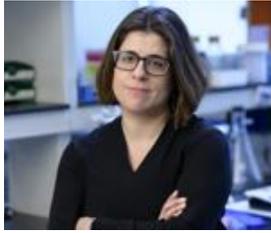
## Career development II : Identifying mentors & research opportunities

Wednesday, 10.30am - noon

Some of the most important resources for developing your career are the personal relationships you'll build and the hands-on experience you'll get. In this workshop, we'll share our stories of getting our first research experiences and the guidance we've received from mentors who helped us along the way. At the end of the workshop you'll be prepared to take the next step toward joining a research lab and identifying mentors to help you with your career.

### Panelists

1. Agnel Sfeir, Member and Professor, Memorial Sloan Kettering Cancer Center
2. Fred Rubino, postdoctoral fellow, Lehmann/Bhabha/Ekiert labs, NYU Langone Health
3. Mark MacRae, 4th year graduate student, Bhabha/Ekiert labs, NYU Langone Health
4. Tiffany Tsou, Graduate Student (2nd year), Boeke Lab, NYU Langone Health
5. Olivia Sacco, research fellow, Sfeir Lab, Memorial Sloan Kettering Cancer Center



Agnel Sfeir (co-organizer)  
[sfeira@mskcc.org](mailto:sfeira@mskcc.org)



Fred Rubino (co-organizer)  
[frederick.rubino@med.nyu.edu](mailto:frederick.rubino@med.nyu.edu)



Mark MacRae  
[mark.macrae@nyulangone.org](mailto:mark.macrae@nyulangone.org)



Tiffany Tsou  
[tiffany.tsou@nyulangone.org](mailto:tiffany.tsou@nyulangone.org)



Olivia Sacco  
[saccoo@mskcc.org](mailto:saccoo@mskcc.org)

### Resources and notes:

#### Road map for finding a research opportunity

- Talk to professors in your favorite courses
- The QCC Office of Academic Affairs
  - [undergraduateresearch@qcc.cuny.edu](mailto:undergraduateresearch@qcc.cuny.edu)
  - <https://www.qcc.cuny.edu/ur/index.html>
- Look through department faculty listings & lab websites
- Reach out to your SIP mentor
- Ask us!

#### Book club

- The Code Breaker by Walter Isaacson (Agnel)
- The Brain That Changes Itself by Norman Doidge (Olivia)
- Genome by Matt Ridley (Olivia)
- Napoleon's Buttons by Penny LeCouteur & Jay Burreson (Olivia)
- Some Assembly Required by Neil Shubin (Tiffany)
- "Hello PhD" podcast (Tiffany)
- "This Week in Microbiology" podcast (Fred)

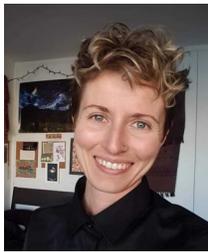
## Career development III: Transitioning From a Two-Year to Four-Year College

Wednesday, 1-2.30pm

Learn about the process from transitioning from QCC to a four-year university. Renee Rhodd, (Director, Transfer Resource Center, QCC), from QCC will discuss the steps students will need to take for a smooth transition from QCC. Dr. Arthee Jahangir, associate director of Postdoctoral Affairs, will moderate a conversation with NYU Vilcek neuroscience graduate student Brooke Holey, about her experiences receiving an associate's degree from Santiago Canyon College to transferring to the University of California, Berkeley for her bachelor's degree.

### Panelists

1. Brooke Holey, a Vilcek/NI student in David Schneider's lab.
2. Renée Rhodd, MA. Director, Transfer Resource Center at Queensborough Community College (CUNY)



Brooke Holey  
[Brooke.Holey@nyulangone.org](mailto:Brooke.Holey@nyulangone.org)



Renée Rhodd  
[rrhodd@qcc.cuny.edu](mailto:rrhodd@qcc.cuny.edu)

### Organizer



Arthee Jahangir  
[Arthee.Jahangir@nyulangone.org](mailto:Arthee.Jahangir@nyulangone.org)

### Additional information from Renée Rhodd's presentation:

<https://www.qcc.cuny.edu/transfer/WebSlides/index.html#slide=1>

<https://www.qcc.cuny.edu/calendar/views/category/trcEvents/index.html>

Several universities have a SURP program. Example on information about SURP at NYU:  
<https://as.nyu.edu/content/nyu-as/as/departments/biology/outreach/surp.html>

## Career development IV: Biomedical research disciplines

Friday, 10.30am - noon

The goal of this workshop is to discuss several fields, questions and model systems addressed in biology research. We will go through a brief history of the field before discussing current research in biology. Finally, we will have a panel discussion with 3 scientists from diverse research backgrounds and model systems to get their unique perspectives on their fields.

### Panelists

1. Mariya London - immunologist working with mice
2. Veronica Jove - neuroscientist, mosquitoes
3. Tiago Bruno Rezende de Castro - bioinformatician and immunologist, big data and mice
4. Mericien Venzon - microbiologist, worms



Mariya London (organizer)  
[Mariya.London@nyulangone.org](mailto:Mariya.London@nyulangone.org)



Veronica Jove  
[Jove.veronica@gmail.com](mailto:Jove.veronica@gmail.com)



Tiago Bruno Rezende de Castro  
[trezende@rockefeller.edu](mailto:trezende@rockefeller.edu)



Mericien Venzon  
[Mericien.Venzon@nyulangone.org](mailto:Mericien.Venzon@nyulangone.org)

## Career development V: Transitioning to STEM jobs in Pharma

Friday, 1-2.30pm

In this workshop you will learn about the life sciences industry and how to successfully transition from pre- and post-graduate degrees to a career in STEM. Our panelists will share their experiences and describe the steps they took to secure their positions after graduation.

## Panelists

1. Kathleen Mai, B.S.  
Scientist  
Pfizer, Pearl River, NY

Education:

A.S. Biology, Raritan Valley Community College

B.S. Laboratory Animal Science, Rutgers University-New Brunswick

2. Paul Muller, Ph.D.  
Scientist  
Kallyope, New York, NY

Education:

B.S. Biochemistry, Stony Brook University

Ph.D. Gastrointestinal Neuroimmunology, The Rockefeller University

3. Rashaun Potts, M.S.  
Research Associate III, Department of Basic Biomedical Sciences  
University of South Dakota Sanford School of Medicine, Sioux Falls, SD

Education:

B.S. Biology, Portland State University

M.S. Cellular and Molecular Biology, San Francisco State University

M.S. Immunology, UC Davis



Kathleen Mai

[Kathleent.Mai@pfizer.com](mailto:Kathleent.Mai@pfizer.com)



Paul Muller

[Paul.Muller@kallyope.com](mailto:Paul.Muller@kallyope.com)



Rashaun Potts

[Rashaun.Potts@usd.edu](mailto:Rashaun.Potts@usd.edu)

## Organizer



Kristen Lokken-Toyli

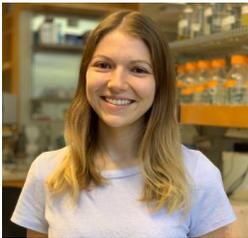
[Kristen.Lokken-toyli@nyulangone.org](mailto:Kristen.Lokken-toyli@nyulangone.org)

## “How to make a presentation” workshop

Tuesday, 3-5pm

One of the most important aspects of science is communication. Interesting findings need to be shared once they are made, otherwise no one will know about them! In biology, communicating your science can take many forms. The one that reaches the biggest audience (the world!) is a publication. But communicating your work can be on a smaller scale too - in the form of a talk at an international conference, a scientific poster to your department, or a small presentation to your lab at your weekly lab meeting. All forms of presentations are important in science, and it is essential to learn how to effectively share your work to spread the knowledge. In this workshop you will learn how to give a presentation that summarizes what you have learned from your scientific research over the last week.

### Organizer



Juliana Ilmain

[Juliana.Ilmain@nyulangone.org](mailto:Juliana.Ilmain@nyulangone.org)

# Tours

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## Microscopy core facility tour

Monday 1-2.30pm

You will visit 2 core facilities:

- The microscopy core facility  
<https://med.nyu.edu/research/scientific-cores-shared-resources/microscopy-laboratory>
- The cryo-electron microscopy core facility  
<https://med.nyu.edu/research/scientific-cores-shared-resources/cryo-electron-microscopy-laboratory/>

During this visit, you will have the opportunity to interact with scientists working at core facilities, see different types of imaging (light, electron and cryo electron microscopy), and observe some samples at the microscopes. You will also learn what scientists in core facilities do.

### Tour facility team



Alice Liang, microscopy core facility director  
[Fengxia.Liang@nyulangone.org](mailto:Fengxia.Liang@nyulangone.org)



Bill Rice, cryo-EM core facility director  
[William.Rice@nyulangone.org](mailto:William.Rice@nyulangone.org)



Michael Cammer  
[Michael.Cammer@nyulangone.org](mailto:Michael.Cammer@nyulangone.org)



Alice Paquette  
[Alice.Paquette@nyulangone.org](mailto:Alice.Paquette@nyulangone.org)

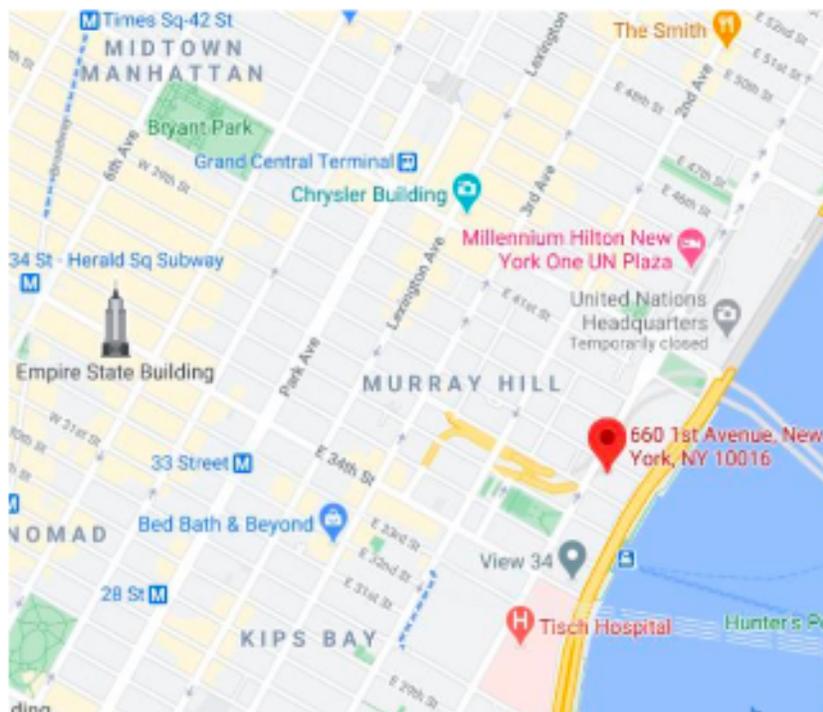
## Tour of the vaccine center

Wednesday 5pm

Scientific research usually takes place out of the public view, and the impact of science on our daily lives often goes unnoticed and is taken for granted. However, the COVID-19 pandemic has brought biomedical research to the forefront of the national/international conversation, and the rapid development of safe and effective vaccines will soon allow us to return to our normal lives.

Initial vaccine trials for the Pfizer vaccine were carried out at the Vaccine Center at NYU, under the supervision of Dr. Mark Mulligan. In a special evening event, Dr. Mulligan will give a short lecture on the development of the vaccine, and Juania Erb will give tour of the vaccine center.

**Directions:** The NYU Langone Vaccine Center is located at **660 First Avenue on the 7th floor**, at the intersection of First Avenue and East 38<sup>th</sup> Street in Manhattan. Please click for directions [here](#).



### Session leaders:



Mark Mulligan

[Mark.Mulligan@nyulangone.org](mailto:Mark.Mulligan@nyulangone.org)

Mahnoor Ali



Tamia Davis

[Tamia.Davis@nyulangone.org](mailto:Tamia.Davis@nyulangone.org)

[Mahnoor.Ali@nyulangone.org](mailto:Mahnoor.Ali@nyulangone.org)

# Lab safety

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## General Work Procedures

- Never work in the laboratory without the supervision of an instructor or supervisor.
- Always perform the experiments or work as directed by the instructor.
- Immediately report any spills, accidents, or injuries to an instructor.
- Never leave experiments while in progress.
- Never attempt to catch a falling object.
- Do not remove any equipment or chemicals from the laboratory.
- Coats, bags, and other personal items must be stored in designated areas, not on the bench tops or in the aisle ways.
- Notify your instructor or group leader of any latex allergies or other sensitivities that you may have to particular chemicals, if known.
- Keep the floor clear of all objects (e.g., ice, small objects, spilled liquids).
- Keep work area neat and free of any unnecessary objects.
- Never block access to exits or emergency equipment.
- Never pour chemical waste into the sink drains or wastebaskets.  
Properly dispose of broken glassware and other sharp objects (e.g., syringe needles) immediately in designated containers.

## Apparel in the Laboratory

- Wear disposable gloves, as provided in the laboratory, when handling hazardous materials.
- Remove the gloves before exiting the laboratory.
- Wear shoes that adequately cover the whole foot; low-heeled shoes with non-slip soles are preferable. Do not wear sandals, open-toed shoes, open-backed shoes, or high-heeled shoes in the laboratory.
- Secure long hair and loose clothing (especially loose long sleeves, neck ties, or scarves).

## Hygiene Practices

- Keep your hands away from your face, eyes, mouth, and body while using chemicals.
- Food and drink, open or closed, should never be brought into the laboratory
- Never use laboratory glassware for eating or drinking purposes.
- Wash hands after removing gloves, and before leaving the laboratory.
- Remove any protective equipment (i.e., gloves) before leaving the laboratory.

## Conduct

- Do not engage in practical jokes in the laboratory.
- Never run in the laboratory.
- Do not sit on laboratory benches.

## Chemical Handling

- Check the label to verify it is the correct substance before using it.
- Do not directly touch any chemical with your hands.
- Hold containers away from the body when transferring a chemical or solution from one container to another.
- Never touch, taste, or smell any reagents.
- Never place the container directly under your nose and inhale the vapors.
- Never mix or use chemicals not called for in the laboratory exercise.
- Clean up all spills properly and promptly as instructed by the teacher.

## Emergency Procedures

- Know the location of all the exits in the laboratory and building.
- Know the location of the first-aid kits in the laboratory.
- In case of an emergency or accident, evacuate the building via the nearest exit.

# Lab activities I -

Monday, 2.30-5pm; Tuesday 9am-3pm; Wednesday 9-10.30am

**Title:** Investigating the function of lipid transport tunnels in bacteria

## **Background:**

Many life-threatening infections are caused by bacteria, which must be treated with antibiotics. Unfortunately, many bacteria are now becoming resistant to antibiotics, resulting in over 700,000 global annual deaths. All bacterial cells are surrounded by membranes which act as protective barriers against antibiotics. Bacteria build their membranes using lipids, which are transported via proteins within the cell. Identifying which systems transport these lipids, and how they work, is essential for us to understand how bacteria build their membranes to protect themselves against antibiotics.

## **Objective:**

The aim of this practical is to gain an understanding of how protein shapes are linked to their function. The practical will focus on a protein whose shape and size allow it to translocate lipids from one membrane to another. The protein is called **L**ipophilic **E**nvelope-spanning **T**unnel B (LetB), a lipid transport protein, and is found in bacteria, where it can bridge the two membranes of double-membraned bacteria. We will explore engineered variants of the LetB protein, in which the protein is designed to be different lengths. Students will be divided into teams, and each team will be given one variant of the protein. The goal of the practical is for the students to use biochemical, biophysical and functional characterization to identify which variant they have been given. In this way, we will synthesize protein structure and biochemistry to understand protein function. From this practical, the students will gain experience in microbiological techniques, protein purification, SDS-PAGE and negative stain electron microscopy. This is based upon real research underway in the laboratory, some of which was just published last year by people you will meet in the lab (Isom, Coudray, & MacRae, et al. *Cell* 2020).

## **The team:**



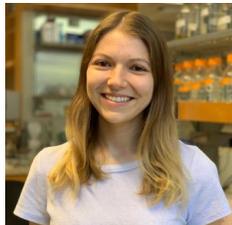
Gira Bhabha  
[gira.bhabha@gmail.com](mailto:gira.bhabha@gmail.com)



Damian Ekiert  
[damian.ekiert@ekiertlab.org](mailto:damian.ekiert@ekiertlab.org)



Sabrina Giacometti



Juliana Ilmain

[Sabrina.Giacometti@nyulangone.org](mailto:Sabrina.Giacometti@nyulangone.org)



Georgia Isom  
[georgiaisom@gmail.com](mailto:georgiaisom@gmail.com)

[Juliana.Ilmain@nyulangone.org](mailto:Juliana.Ilmain@nyulangone.org)



Michael Jaroenlak  
[Pattana.Jaroenlak@nyulangone.org](mailto:Pattana.Jaroenlak@nyulangone.org)



Joseph Sudar  
[Joseph.Sudar@nyulangone.org](mailto:Joseph.Sudar@nyulangone.org)

## Lab activities II -

Wednesday, 2.30-5pm; Thursday, 9am-4pm

### Introduction to the microbiome

This short lecture will introduce the gut microbiome and how it impacts health and disease. It will cover the basics of transkingdom interactions in the gut by comparing and contrasting commensalism, mutualism, and parasitism. Students will also be introduced to how we collect and analyze microbiome samples and how we have utilized these tools for recent studies in the Cadwell Lab.

### Lab activity 2: Microbiome-mediated hatching of *T. muris* eggs

**Background:** Helminths, or parasitic worms, infect over 1.8 billion people worldwide, mostly in developing countries. *Trichuris trichuira*, the whipworm, is one of the three major soil-transmitted helminths. Standard therapies targeting helminth infections are less than 50% effective against the whipworm. In order for the whipworm to infect a new host, ingested eggs from the environment must hatch inside the host cecum. This initial stage of its life cycle has been shown to be dependent on bacteria. Understanding the role bacteria play during hatching and also during later stages of *Trichuris* development present possibilities to discover novel targets for treatment.

### Objective:

In the lab activity, you will explore bacteria-mediated hatching of *Trichuris* eggs using an *in vitro* assay. Each pair will be given a different microbe. At the conclusion of the activity, data from all

groups will be collated and analyzed as a group. Do some strains elicit hatching better than others? Can this tell us anything about what may be necessary for hatching to occur?

**The team:**



Ken Cadwell  
[Ken.Cadwell@nyulangone.org](mailto:Ken.Cadwell@nyulangone.org)



Krystal Ching  
[Krystal.Ching@nyulangone.org](mailto:Krystal.Ching@nyulangone.org)



Christin Herrmann  
[Christin.Herrmann@nyulangone.org](mailto:Christin.Herrmann@nyulangone.org)



Mariya London  
[Mariya.London@nyulangone.org](mailto:Mariya.London@nyulangone.org)



Shushan Sargsian  
[Shushan.Sargsian@nyulangone.org](mailto:Shushan.Sargsian@nyulangone.org)



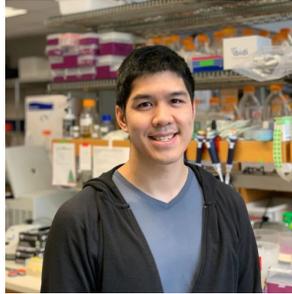
Mericien Venzon  
[Mericien.Venzon@nyulangone.org](mailto:Mericien.Venzon@nyulangone.org)

# Mentors

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Ismail Ahmed  
[ismail.ahmed@nyulangone.org](mailto:ismail.ahmed@nyulangone.org)



James Chen  
[James.Chen@nyulangone.org](mailto:James.Chen@nyulangone.org)



Krystal Ching  
[Krystal.Ching@nyulangone.org](mailto:Krystal.Ching@nyulangone.org)



Alannah Lejeune  
[Alannah.Lejeune@nyulangone.org](mailto:Alannah.Lejeune@nyulangone.org)



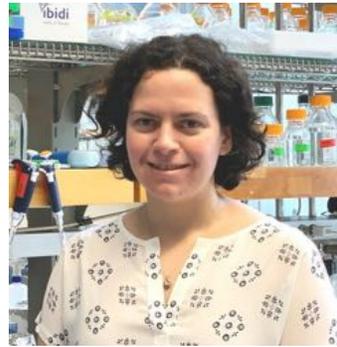
Benjamin Lin  
[benjamin.lin2@nyumc.org](mailto:benjamin.lin2@nyumc.org)



Mariya London  
[Mariya.London@nyulangone.org](mailto:Mariya.London@nyulangone.org)



Catherina Mobini  
[catherina.mobini@nyulangone.org](mailto:catherina.mobini@nyulangone.org)



Cristina Santarossa  
[Cristina.Santarossa@nyulangone.org](mailto:Cristina.Santarossa@nyulangone.org)



Austin Schinlever  
[Austin.Schinlever@nyulangone.org](mailto:Austin.Schinlever@nyulangone.org)



Margaux Sica  
[Margaux.sica@nyulangone.org](mailto:Margaux.sica@nyulangone.org)



Tiffany Tsou  
[tiffany.tsou@nyulangone.org](mailto:tiffany.tsou@nyulangone.org)

# Overall organization team

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Gira Bhabha  
[gira.bhabha@gmail.com](mailto:gira.bhabha@gmail.com)



Kenneth Cadwell  
[Ken.Cadwell@nyulangone.org](mailto:Ken.Cadwell@nyulangone.org)



Nicolas Coudray  
[nicolas.coudray@nyulangone.org](mailto:nicolas.coudray@nyulangone.org)



Damian Ekiert  
[damian.ekiert@ekiertlab.org](mailto:damian.ekiert@ekiertlab.org)



Mark MacRae  
[mark.macrae@nyulangone.org](mailto:mark.macrae@nyulangone.org)



Ashton Murray  
[Ashton.Murray@nyulangone.org](mailto:Ashton.Murray@nyulangone.org)



Amicha Robertson  
[Amicha.Robertson@nyulangone.org](mailto:Amicha.Robertson@nyulangone.org)



Kenneth Stapleford  
[Kenneth.Stapleford@nyulangone.org](mailto:Kenneth.Stapleford@nyulangone.org)

# Advisors

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## Queensborough Community College



Maria Mercedes Franco  
[MFranco@qcc.cuny.edu](mailto:MFranco@qcc.cuny.edu)



Monica Trujillo  
[MTrujillo@qcc.cuny.edu](mailto:MTrujillo@qcc.cuny.edu)

# Mentees... in action



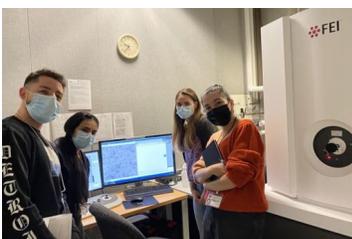
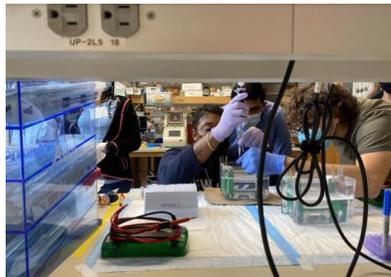
Workshop sessions



Core facility tour



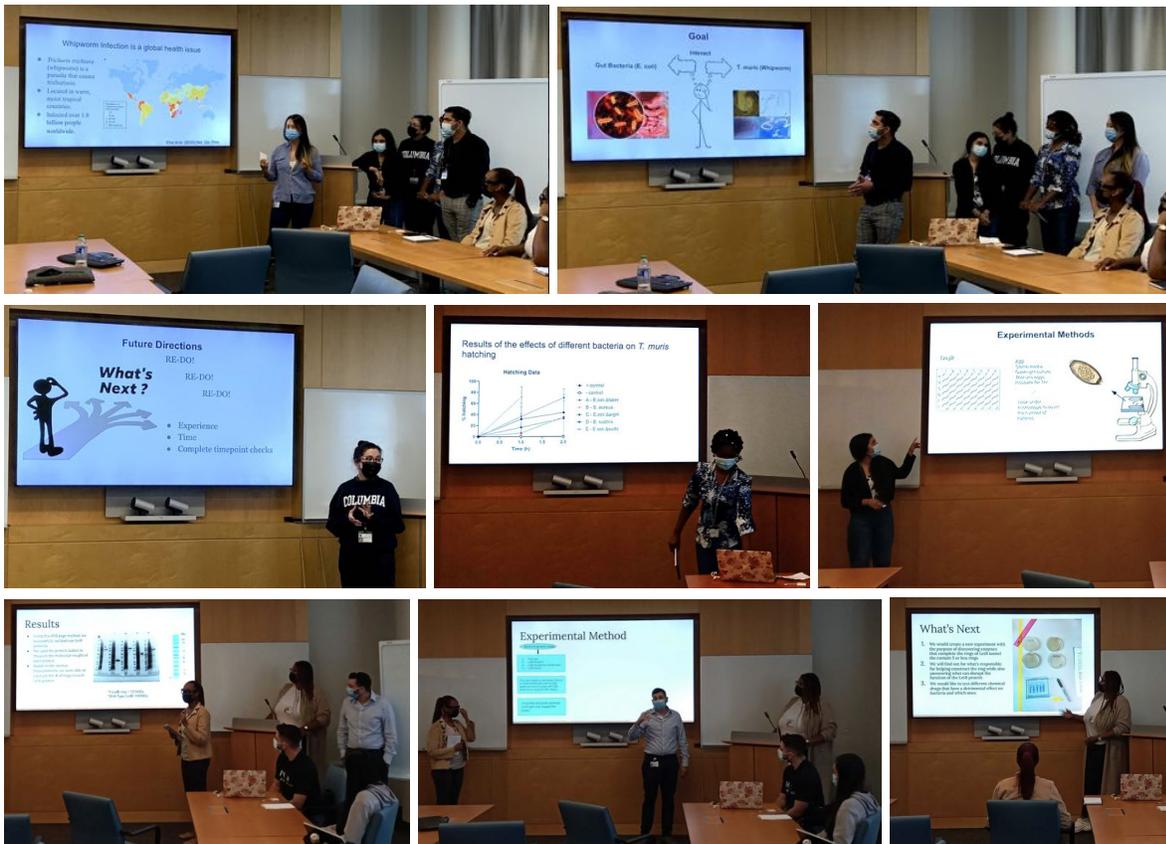
Vaccine center tour



Lab activity I



Lab activity II



Final day presentations



# Sponsors

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Lab notebooks were provided by Burroughs Wellcome Fund