

# IAP 2024

## For Credit

### 7.102 – Introduction to Molecular Biology Techniques

January 8 – 19, 16 – 19, and 11 - 16 daily from 1-5 p.m.

Building 68 Room 089

Level: U | 6 units (0-5-1)

Instructors: Prof. Adam Martin, Dr. Mandana Sassanfar

Prerequisites: None - Note that this course is not a substitute for 7.002 or 7.003

This intensive 2-week “boot-camp” style course will provide hands-on instruction in basic molecular biology and microbiology techniques including sterile techniques, isolation and quantification of nucleic acid (DNA) and protein, agarose and SDS-PAGE gel electrophoresis, PCR, Cloning, microscopy, DNA sequence analysis, and bioinformatics. In addition students will learn to classify bacteria based on their shape, membrane structure and metabolism. Emphasis will be on real-world application, experimentation and trouble shooting in preparation for a successful UROP experience. This lab course will improve students’ troubleshooting and problem-solving skills. As in a real lab situation, some experiments will take longer than expected, or will need to be repeated. Priority will be given to freshmen with no prior research experience.

Students will be expected to spend every afternoon from 1-5pm in the lab. Labs may start earlier on some days.

Apply by December 15, 2023 by filling out this form and emailing it to Dr. Mandana Sassanfar. The class is limited to 16 students. No listeners. Applicants will be informed by December 18.

## Non-Credit

### Skills to Enhance Your Career

#### Communicating your Science Visually

Wednesday, January 10th, 2–4pm

68-181

#### Sebastian Lourido

Associate Professor of Biology, MIT Core Member, Whitehead Institute

In this interactive workshop, participants will learn how to use Adobe Illustrator and apply skills and tricks to present their research on slides, figures, or posters. With degrees in both science and art, Sebastian Lourido will equip participants with skills needed for illustrating their science and sharing it with the public.

## **Cultivating Everyday Mindfulness: Discovering Your Path to a Fulfilling Life and Career**

**Thursday, January 11th, 3:30–5pm**  
**68-180**

**Jia Jia Zhang, PhD**  
**Michaela Bartusel PhD**

In this workshop, we will introduce several mindfulness concepts and discuss why and how practicing mindfulness in everyday life can help develop your self-awareness and motivation to experience greater overall well-being in work and in school.

## **Fueled by Innovation: How Top Biotech Co-founders Ignite Startup Success**

**Friday, January 26th, 11:30am–1pm**  
**68-181**

**Gevorg Grigoryan, PhD**  
Co-founder and Chief Technology Officer, Generate Biomedicines  
**Reshma Shetty, PhD**  
Co-founder, President, and Chief Operations Officer, Ginkgo Bioworks  
**Thomas de Vlaam**  
Founder at Amylon Therapeutics Principal at Pillar VC  
**Jonathan Moore, PhD**  
Co-founder and Chief Science Advisor, Rectify Pharma

Delve into the founding narratives of Generate Biomedicines, Ginkgo Bioworks, Rectify Pharma, and Amylon Therapeutics. Refine your approach to company pitching with valuable do's and don'ts from an experienced venture capital perspective. Submit questions in advance here:

## **Structural Visualization for All!**

**Wednesday, January 31st, 3–5pm**  
**68-181**

**Lucas Farnung**  
Assistant Professor of Cell Biology, Harvard Medical School

Are you a cell biologist who wants to know how to present structure models like a pro? In this workshop, you will learn the best practices on presenting protein structures.

## **Demystifying Structural Prediction Algorithms: A Hands-on Workshop on AlphaFold**

**Thursday, February 1st, 3–5pm**  
**KI Luria Auditorium, 76-156**

**Sergey Ovchinnikov, PhD**  
Assistant Professor of Biology, MIT

Tailored to non-structural biologists, this workshop will teach you how to leverage the power of AlphaFold and interpret its results through real experimental examples!

## Finding the right path for you

### Community Outreach: From Ideas to Action

Wednesday, January 17th, 4–5pm  
68-181

**Noelle Wakefield, PhD**

Assistant Dean, Diversity Initiatives and Director, MIT Summer Research Program

**Gisselle Vélez Ruiz, PhD**

Associate Director, Diversity and Inclusion, Broad Institute

**Taylor Baum**

CEO and Founder of Sprouting

Join us for a panel discussion about outreach initiatives! Learn about our panelists' career trajectories and how to be involved in outreach efforts.

### From Lab to Leadership: Navigating Biotech & Pharma Career Trajectories

Thursday, January 18th, 4–5:30pm  
68-181

**Kathleen McGinness, PhD**

Vice President, Arrakis Therapeutics

**Bryce Carey, PhD**

Director, Vertex Pharmaceuticals

**Jon Kenniston, PhD**

Director, Takeda

Explore the journey from the bench to leadership roles with industry experts from Arrakis Therapeutics, Takeda, and Vertex Pharmaceuticals. They will discuss transitioning from academia to the dynamic biotech and pharma industries, highlighting the challenges and opportunities in mentorship and interdisciplinary teamwork.

### Teaching with a PhD: Exploring Teaching-focused Career Options

Wednesday, January 24th, 1–2pm  
68-181

**Leah Okumura, PhD**

Senior Instructor, Biological Sciences Laboratory, Wellesley College

**Summer Morrill, PhD**

Instructor in Science, Phillips Exeter Academy

**Elizabeth Dunphy, PhD**

Professor, Bunker Hill Community College

Interested in teaching but not sure what type of academic institution would be the best fit? Come learn about our panelists' experiences teaching at a high school, community college, and a primarily undergraduate institution.

## Careers Beyond the Bench: Using your PhD in the Business World

Thursday, January 25th, 1–2:30pm  
68-181

### **Lauren Mifflin, PhD**

Vice President of Company Creation, Frazier Life Sciences

### **Drew Lowery, PhD**

Director of Life Sciences, Global Prior Art

### **Stephane Ricoult, PhD**

Senior Director, Simon Kucher & Partners

Hear from industry leaders who successfully leveraged their graduate training in the business world. Learn about careers in consulting, IP patent law, and life sciences investment.

## Pathways to Industry: Internships and Postdocs

Monday, January 29th, 1–2:30pm  
68-181

### **Yami Acevedo-Sanchez, PhD Candidate**

Interned, Abbvie

### **Allen Sanderlin, PhD Candidate**

Internship course/Pfizer

### **Lara Tshering, PhD**

Postdoctoral Fellow, Pfizer

### **Lauren Cotnoir**

Abbvie Senior Specialist, R&D | Early Career Programs, Abbvie

### **Raghu Ram Katreddi, PhD**

Postdoctoral Fellow, Discovery Neuroscience, Abbvie

Come learn about internship and postdoc opportunities for current PhD students. Hear first hand experiences from past interns and current postdocs in industry, and come chat one-on-one with panelists and recruiters while enjoying refreshments after the panel.

## Integrative Structural Biology

### MICOS in focus: exploring mitochondrial dysfunction and aging through 3D reconstruction

*\*canceled\**

### **Dr. Antentor O. Hinton, Jr, PhD**

Assistant Professor, Department of Molecular Physiology and Biophysics, Vanderbilt University

### Tackling supramolecular complexes in innate immunity with cryo-EM and other approaches

Tuesday, January 9th, 4–5:30pm  
68-181

### **Hao Wu, PhD**

Asa and Patricia Springer Professor of Structural Biology, Harvard Medical School

## Using cryo-EM to build atomic models of ciliary axonemes

Tuesday January 16th, 4–5:30pm  
68-181

**Alan Brown, PhD**

Associate Professor of Biological Chemistry and Molecular Pharmacology, Harvard Medical School

## Integrated structural parasitology of malaria parasites

Tuesday, January 23rd, 4–5:30pm  
KI Luria Auditorium, 76-156

**Mimi Ho, PhD**

Assistant Professor in the Department of Microbiology & Immunology, Columbia University

## Harnessing AI to drive mechanistic discovery: lessons from genome maintenance

Tuesday, January 30th, 4–5:30pm  
68-181

**Johannes Walter, PhD**

Professor of Biological Chemistry & Molecular Pharmacology, Harvard Medical School

## Combining structural techniques to study protein motions

Friday, February 2nd, 4–5:30pm  
68-181

**Nozomi Ando, PhD**

Associate Professor of Chemistry and Chemical Biology, Cornell University

## Science and Society Seminar Series

*This lecture series is designed to help educate and inform department members about the current and historical intersections of race, gender, and class with scientific research. Specifically, we are interested in exploring this area in terms of how scientific research is conducted, how choices are made about where research efforts and funds are directed, and who benefits from research. Attendance is required for first-year PhD students and is open to all in the Biology community.*

## Effective and Ineffective Mentorship: Utilizing the Power of Saying “No”

*\*canceled\**

**Dr. Antentor Hinton**

Assistant Professor, Molecular Physiology and Biophysics, Vanderbilt University

The quality of mentorship may differ tremendously between individuals. Here, Dr. Hinton discusses his experience with both effective and ineffective mentorship. This talk further offers techniques to recognize and

respond to ineffective mentorship, such as utilizing the power of saying “no”. In this talk, Dr. Hinton offers tips both for mentees and mentors to recognize the various form of mentorship and maximize the effectiveness of mentorship.

## **Genomics for Indigenous Communities and People: Key Considerations**

**Tuesday, January 16th, 12–1pm**  
**68-181**

### **Dr. Krysal Tsosie**

Assistant Professor in the School of Life Sciences, Arizona State University

The next discoveries in genomic medicine are likely to be rare or uncovered variation from peoples largely absent in current datasets. Indigenous peoples—who have long-expressed concerns related to data sharing, privacy, and group risks of re-identification that are unlikely to be resolved in this open data movement—are presented with a catch-22 dilemma. How can Indigenous peoples benefit from clinical genetic testing even though they derive lower clinical utility and encounter severe structural barriers and inequities to care? How can they also contribute to genomic datasets, if they wanted to, and not be subject to data co-optation and commercialization in innovation pathways that are inaccessible to Indigenous peoples? Geneticists must realize that simply increasing the inclusion of Indigenous peoples in genomic datasets is not going to solve the health inequity problem. Instead, we need drastic shifts in benefit equity and data-decision equity—via machine learning, dynamic consent approaches, and Indigenous community data governance models—to change power imbalances commensurate with the fields’ exploitation of Indigenous peoples’ genomes.

## **Inclusive Teaching Micro Credential Workshop**

### **Part 1**

**Wednesday, January 10th, 3-5pm**  
**68-180**

### **Part 2**

**Wednesday, January 17th, 3-5pm**  
**68-180**

### **Darcy Gordon**

Instructor of Blended and Online Initiatives, MIT Department of Biology

### **Hallie Dowling-Huppert**

Diversity, Equity, and Inclusion Officer, MIT Department of Biology

*All talks organized by Hallie Dowling-Huppert, Diversity, Equity, and Inclusion (DEI) Officer, and the Graduate Committee*

## **Python IAP Bootcamp**

Instructors: Julia Dierkesheid, Julian Stanley and Prof. Joey Davis

Rough class structure:

- Five 90-minute sessions.
- Each session we’ll send you some additional readings/scripts to familiarize you with the material.

Prerequisites (detailed instructions for linux/mac/windows to follow):

- Fill out this google form: <https://forms.gle/Km3G8BWBsvZEEU3t8>
- Create an account to use google colab (<https://colab.research.google.com/>)

Day 1 | Introduction, variables | Monday, January 8, 2024, 3:00-4:30 p.m., 68-181

- Value of programming in biology
- Why python?
- Getting started with notebooks and scripts
- Overview of useful libraries
- Variables and variable types
- Where to look for more help
- Extended reading: Python Tutorial – Chapters 1, 3 [[docs.python.org/3/tutorial](https://docs.python.org/3/tutorial)]

Day 2 | Functions, and control structure | Thursday, January 11, 2024, 3:00-4:30 p.m., 68-181

- Defining functions, calling functions, function signatures
- Pass by reference vs pass by value
- Conditions – if/then/else
- For loops, while loops
- Extended reading Python Tutorial – Chapter 4 [[docs.python.org/3/tutorial](https://docs.python.org/3/tutorial)]

Day 3 | Data structures | Thursday, January 18, 2024, 3:00-4:30 p.m., 68-180 (note room change)

- Lists/arrays, iterators, dictionaries
- List & dictionary comprehension
- Numpy arrays
- Pros/cons of various data structure
- Extended reading: Python Tutorial – Chapter 5  
[\[docs.python.org/3/tutorial\]](https://docs.python.org/3/tutorial); [https://numpy.org/doc/stable/user/absolute\\_beginners.html](https://numpy.org/doc/stable/user/absolute_beginners.html)

Day 4 | Basic input/output, data wrangling I | Monday, January 22, 2024, 3:00-4:30 p.m., 68-181

- Opening, reading, and writing files
- Working with Pandas dataframes intro (selecting, merging, filtering, etc.)
- Exceptions, assertions, error handling
- Accepting user input (time permitting)
- Handling command line arguments (time permitting)
- Extended reading: Python Tutorial – Chapters 7, 8  
[\[docs.python.org/3/tutorial\]](https://docs.python.org/3/tutorial); [https://pandas.pydata.org/docs/user\\_guide/10min.html](https://pandas.pydata.org/docs/user_guide/10min.html)

Day 5 | Data wrangling II and plotting | Thursday, January 25, 2024, 3:00-4:30 p.m. 68-181

- Numpy array manipulation
- Pandas indexing
- Pandas filtering
- Extended reading: [https://pandas.pydata.org/docs/user\\_guide/dsintro.html](https://pandas.pydata.org/docs/user_guide/dsintro.html); [https://pandas.pydata.org/docs/user\\_guide/basics.html](https://pandas.pydata.org/docs/user_guide/basics.html); [https://pandas.pydata.org/docs/user\\_guide/io.html](https://pandas.pydata.org/docs/user_guide/io.html); [https://pandas.pydata.org/docs/user\\_guide/indexing.html](https://pandas.pydata.org/docs/user_guide/indexing.html)