IAP 2022

For Credit

7.102 – Introduction to Molecular Biology Techniques

January 9 – 26, daily from 12:30-5 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 10, 2021 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 11. Late applicants will be placed on the waiting list and informed by January 8.

Non-Credit

Skills to find your path

Delivering an Engaging Scientific Presentation

Monday, January 9th, 1-3 p.m.
KI Luria Auditorium, 76-156

Britt Glaunsinger, PhD
Associate Chair of the Department of Plant and Microbial Biology and Professor of Plant and Microbial Biology and Molecular and Cell Biology, UC Berkeley
Investigator, Howard Hughes Medical Institute

Back by popular demand! Come hear from Professor Britt Glaunsinger on how to design and deliver an effective and engaging scientific presentation. This seminar will be interactive, so attendees are encouraged to bring laptops to engage fully with the material.

Leveling Up Data Management

Friday, January 13th, 12-1 p.m.
Attendance by Zoom

Dr. Kristin Briney
Biology & Biological Engineering Librarian, Caltech

Dr. Briney, a scientific librarian who has authored several books on data management and sharing, will give her best tips on managing and storing data big and small. It is a truth universally acknowledged that a researcher in possession of data must be in want of better data management. Good data management means spending less time searching for old data files, always remembering the details of each experiment (because you wrote them down), and never losing your work even if your hard drive crashes. This talk highlights several fundamental data management practices that you can integrate into your research processes that will make it easier to find, use, and manage your data years into the future.

How to Talk to a Science Denier

Tuesday, January 17th, 11-12 p.m.
68-181

Lee McIntyre, PhD
Author and Research Fellow, Center for Philosophy and History of Science, Boston University

This talk will detail how to address science hesitancy when we speak to non-scientific audiences, from friends and family to the broader community. He will provide tools and techniques for communicating with and reaching out to science deniers.

Communicating your science visually

Wednesday, January 18th, 3-5 p.m.
68-181

Dr. Sebastian Lourido
Associate Professor, MIT Biology, 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.

Navigating competition in a world of collaborative science

Wednesday, January 25th, 3-4 p.m.
68-181

Dr. Jesse Boehm, PhD
Chief Scientific Officer, Break Through Cancer & Principal Investigator, MIT Koch Institute for Integrative Research
Dr. Benjamin Sun, MD, PhD
Associate Scientific/Medical Director, Biogen
Dr. Seychelle M. Vos, PhD
Assistant Professor, MIT Department of Biology

During this event, our panelists will participate in a moderated discussion on how to best navigate scientific competition. We will hear perspectives from both academia and industry on the difficult task of balancing collaborative connections with scientific ownership.

Finding the right path for you

Navigating the Changing Landscape of Academic Publishing in the Biosciences

Wednesday, January 11th, 1-2 p.m.
68-181

John W. Pham, PhD
Editor in Chief, Cell
Amy Brand, PhD
Director and Publisher, MIT Press
Jessica Polka, PhD
Executive Director, ASAPbio

John, Amy, and Jessica will discuss their journey through the world of academic publishing, commenting on their experience as trainees and professionals in the sector. The panel will also serve as a venue for a broader discussion on the current landscape of academic publishing and what this means specifically for current trainees in the biosciences. Broad topics of interest include open access movements, time-to-publish, the stakeholders in scientific publishing, and more.

Teaching-focused Careers in Academia

Thursday, January 26th, 12-1 p.m.
68-181

Dr. Anupama Seshan
Associate Professor at Emmanuel College
Dr. Leslie McClain
Visiting Assistant Professor at UMass Boston
Dr. Leah Okumura
Senior Instructor of Science Laboratories at Wellesley College

Join us for a panel discussion about academic careers that are centered around teaching! Learn about our panelists' career trajectories and how they prioritized teaching opportunities during their training.

Navigating work-life balance in biology-releated careers

Friday, January 27th, 10-11:30 a.m.
68-181

Joey Davis
Assistant professor of Biology, MIT
Stefani Spranger
Assistant professor of Biology, MIT
Sara Nochur
Chief DEI Officer, Alnylam
Matt Goldstein
Partner and Head of Clinical Strategy; Related Sciences

Come join us for a chat with experts from academia, biotech and VCs as they share their experiences with navigating work-life balance in their fields.

Time to exit: pros and cons of academic postdoc

Tuesday, January 31th, 12-1 p.m.
KI Luria Auditorium, 76-156

Constantine Mylonas
Principal Scientist I at Novartis Institutes for BioMedical Research (NIBR)
Chris Brennan
Scientist II at Entrada Therapeutics
Carson Burrington
Director, Human Resources at AVROBIO
Theresa Hwang
Scientist, Generate Biomedicines

In this discussion panel, we will hear from former MIT alumni about their experience moving to Industry right after their PhD or after finishing an academic postdoc and discuss their perspective on the benefits and disadvantages of doing a postdoc. We will also hear from a hiring manager's perspective on what they look for depending on the experience level of the applicants.

Career panel on MD, PhD or MD/PhD tracks

Friday, February 3rd, 12-1 p.m.
KI Luria Auditorium, 76-156

Michael Yaffe, MD/PhD
Joelle Straehla, MD
Nicolas Mathey-Andrews (Jacks Lab), MD/PhD Candidate
Stefani Spranger, PhD
Monty Krieger, PhD

This talk is for anyone interested in career choices, undergrads/pre-med school applicants encouraged.

Visualizing Immune Responses: The Importance of the Lymph Node

Generation and function of anti-viral T cells

Tuesday, January 10th, 3-4 p.m.*
KI Luria Auditorium, 76-156
updated time & location

Ulrich H. von Andrian, M.D.
Edward Mallinckrodt Jr. Professor of Immunopathology
Dept. of Immunology
Harvard Medical School
Program Leader, Basic Immunology
Ragon Institute of MGH, MIT and Harvard

Targeting Lymph Node Location for Tailored Immunity

Wednesday, January 11th , 9-10 a.m.
Hybrid 68-181

Joanna Groom, PhD
Associate Professor
National Health and Medical Research Council (NHMRC) Investigator fellow
Laboratory head in the Immunology Division, Walter and Eliza Hall Institute (WEHI), Melbourne, Australia

Spatiotemporal orchestration of cellular immunity

Friday, January 20th, 12-1 p.m.
KI Luria Auditorium, 76-156

Wolfgang Kastenmüller
Director, Institute of Systems Immunology I
University of Würzburg, Germany

Chemokine-organized lymph node niches enhance immune responses

Friday, January 27th, 12-1 p.m.
KI Luria Auditorium, 76-156

Andrew D. Luster, MD, PhD
Chief, Division of Rheumatology, Allergy & Immunology
Director, Center for Immunology and Inflammatory Diseases
Massachusetts General Hospital
Persis, Cyrus and Marlow B. Harrison Professor of Medicine
Harvard Medical School

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 Biology first-year Ph.D. students. All talks organized by Hallie Dowling-Huppert, Diversity, Equity, and Inclusion (DEI) Officer, and the Graduate Committee

"Constitutions selection": Darwin, race and medicine

Monday, January 9th, 3-4:30 p.m.
Hybrid 68-181

Dr. Suman Seth
Marie Underhill Noll Professor, History of Science, Cornell University

In the course of his discussion of the origin of variations in skin colour among humans in the Descent of Man, Charles Darwin suggested that darker skin might be correlated with immunity to certain diseases. To make that

suggestion, he drew upon a claim that seemed self-evidently correct in 1871, although it had seemed almost certainly incorrect in the late eighteenth century: that immunity to disease could be understood as a hereditary racial trait. This paper aims to show how fundamental was the idea of 'constitutions selection', as Darwin would call it, for his thinking about human races, tracking his (ultimately unsuccessful) attempts to find proof of its operation over a period of more than thirty years. At the same time and more broadly, following Darwin's conceptual resources on this question helps explicate relationships between conceptions of disease and conceptions of race in the nineteenth century. That period saw the birth of a modern, fixist, biologically determinist racism, which increasingly manifested itself in medical writings. The reverse was also true: medicine was a crucial site in which race was forged. The history of what has been called 'race-science', it is argued, cannot and should not be written independent of the history of 'racemedicine'.

Covid-19: A New Vaccine Apartheid

Date & time TBD
Hybrid KI Luria Auditorium, 76-156

Dr. Dwai Banerjee
MIT Associate Professor of Science, Technology and Society

The steady rollout of Covid-19 vaccines came attached with a series of difficult questions. Are vaccines a human right? Should patents be enforced in a way that puts people in the global South behind in a global queue? These questions are not new; the world struggled with these ethical dilemmas during the HIV-AIDS pandemic at the end of the twentieth century, when global South governments led by Nelson Mandela fought multinational pharmaceutical corporations for the right to essential life-saving drugs. Can the same strategies be mobilized to deal with inequalities in the distribution of the Covid-19 vaccine? This talk explains that in the present, multinational corporations and Euro-American governments are trying to reverse some of the key political visions and victories of HIV-AIDS internationalism, exploiting the urgency of the Covid-19 crisis to put in place a new vaccine apartheid.

Biology v 2.0: Rebuilding a science that is bigger, bolder, smarter, and more inclusive

Wednesday, February 1st, 12-1:30 p.m.
Hybrid 68-181

Dr. Brandon Ogbunu
MIT MLK Visiting Professor in Chemistry, Assistant Professor, Department of Ecology and Evolutionary Biology, Yale University

In this seminar, I propose that the state of modern biology requires a set of major and minor changes to keep pace with a changing world. Challenges include the rise of misinformation and anti-science sentiment, a replicability crisis, and widespread disillusionment from junior scientists—all forces that undermine the institution of merit and feed public mistrust in science. I highlight several specific areas in the science enterprise where reimagination and practical intervention could yield widespread, long-term benefits.

Python IAP Bootcamp

Biweekly 90-minute sessions January 10 – 26.

Instructor: Prof. Joey Davis

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

- Install anaconda (Python 3.8) on your computer/laptop from the link below: https://docs.anaconda.com/anaconda/install/.

Day 1 | Introduction, variables | Tuesday, January 10, 2023, 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]

Day 2 | Functions, and control structure | Thursday, January 12, 2023, 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]

Day 3 | Data structures | Tuesday, January 17, 2023, 3:00-4:30 p.m., 68-181

- 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://numpy.org/doc/stable/user/absolute_beginners.html

Day 4 | Basic input/output, data wrangling I | Thursday, January 19, 2023, 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://pandas.pydata.org/docs/user_guide/10min.html

Day 5 | Data wrangling II | Wednesday, January 25, 2023, 10:00 a.m. – 11:30 a.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/basics.html; https://pandas.pydata.org/docs/user_guide/io.html; https://pandas.pydata.org/docs/user_guide/indexing.html

Day 6 | Plotting & good practice | Thursday, January 26, 2023, 3:00-4:30 p.m., 68-181

- Matplotlib
- Conventions, comments, readability, modular testing, debugging
- Extended reading: https://pandas.pydata.org/docs/user_guide/visualization.html; https://matplotlib.org/tutorials/introductory/usage.html#sphx-glr-tutorials-introductory-usage-py;https://matplotlib.org/tutorials/introductory/pyplot.html#sphx-glr-tutorials-introductory-pyplot-

py;https://matplotlib.org/tutorials/introductory/sample_plots.html#sphx-glr-tutorials-introductory-sample-plots-py.

- Also consider exploring seaborn independently – you can learn more here: https://seaborn.pydata.org/tutorial.html#