

# University of Pennsylvania

## Biomedical Research Academy 2023 Syllabus

The Biomedical Research Academy has three components— lecture, journal clubs, and lab. Lectures will be held in the Levin Building Auditorium (aka Tedori Family Auditorium) and will run from 9-11 AM. Journal club meetings will be held in Fisher-Bennett Hall at either 11:15 AM or 12:15 PM. Lab will be held in Leidy Labs and Levin Labs at 1:30 PM and will run until approximately 4:30 PM.

### Executive Director and Lab Coordinator:

Jessica Ardis [jardis@sas.upenn.edu](mailto:jardis@sas.upenn.edu)  
Lecturer, Department of Biology, University of Pennsylvania

### Director and Lecturer:

Kieran Dilks, PhD [kdilks@sas.upenn.edu](mailto:kdilks@sas.upenn.edu)  
Teacher, Haddonfield Memorial High School

### Assistant Lab Coordinator:

Svetlana Kozik

### Journal Club Leaders:

Romie Azor  
Roseanne Davila-Rivera  
Samantha Fallacaro  
Adam Jabak  
Molly Nelson  
Sarah Offley  
Michael Scaglione  
Alexander Starr  
Adriana Stephenson  
Eliana Von Krusenstiern  
John Wagner  
Jianfei Zhao

### Labs:

**Lab Section A: Levin L11**  
**Lab Instructor:** Kelly Gallagher  
**Lab Assistant:** Mark Bray

**Lab Section B: Levin L12**  
**Lab Instructor:** John Wagner  
**Lab Assistant:** Sarah Dysinger

**Lab Section C: Leidy 114**  
**Lab Instructor:** Courtney Dresden  
**Lab Assistant:** Adriana Stephenson

**Lab Section D: Leidy 115**  
**Lab Instructor:** Katie Vazquez  
**Lab Assistant:** Katharine Hewlett

### Course Materials:

Students will access the lab manual and copies of assigned journal club articles via Canvas. Each student should also bring a notebook, pens/pencils, and a laptop computer if possible.

### Dress Code for Lab:

Some of the materials that you will be working with are hazardous. Therefore, you must dress appropriately. **Long pants only.** Shorts of any length are prohibited. **Open-toed shoes and sandals are prohibited.** No part of your foot should be visible. **Shirts must cover shoulders, back, and midriff, and must have sleeves.** A

short-sleeved shirt is acceptable. No part of your abdomen should be visible.

## **Schedule of Class Topics, Guest Talks and Laboratories**

### **Monday, July 10th**

9-10 AM: Orientation to Program

10 -11 AM: Introductory Lesson – Nucleic Acids and the Bead Game

**Lab:** Module 1 (Recombinant DNA): Introduction, Safety, Introduction to Module 1, Design promoters

### **Tuesday, July 11th**

9-10 AM: Introductory Lesson Part 2 - The Biological Divorce of Information Storage and Activity

10-11 AM: Guest Research Talk – Dr. Brian Gregory

**Lab:** Module 2 (Bradford Protein Assay): Pipetting, Introduction to Module 2, Bradford Protein Assay

### **Wednesday, July 12th**

9-10 AM: Guest Research Talk – Dr. Harald Schmidt

10-11 AM: Guest Research Talk – Dr. Nancy Spinner

**Lab:** Module 3 (Blood Typing): Introduction to Module 3; Isolate cheek cell DNA, set up PCRs (Exon 6, Exon 7, Rh factor)

### **Thursday, July 13th**

9-10 AM: Fundamentals of Biomedical Research

10-11AM: Guest Research Talk – Dr. Nancy Bonini

**Lab:** Module 3 (Blood Typing): Set up restriction digests of Exon 6 and Exon 7 PCRs, Rh factor gel electrophoresis; PCR exercises

### **Friday, July 14th**

9-10 AM: Analyzing Nucleic Acids: Diagnostics and Discovery

10-11 AM: Guest Research Talk - Valerie Sydnor, PhD Candidate

**Lab:** Module 3 (Blood Typing): Exon 6 gel electrophoresis; Analysis of Results from Rh factor gels; Restriction enzyme + electrophoresis exercise

### **Monday, July 17th**

9-10 AM: Biomedical Research Techniques

10-11 AM: Guest Research Talk – Madhura Nijasure, PhD Candidate

**Lab:** Module 1 (Recombinant DNA): GGA cloning with ordered oligos, paper activity, Restriction enzyme challenge activity

**Tuesday, July 18th**

9-10 AM: Antibiotic Resistance: Time to Panic?

10-11 AM: Going from Experiment to Model

**Lab:** Module 1 (Recombinant DNA): Transformations, transformation exercise

**Wednesday, July 19th**

9-10 AM: Molecular Talk - Viruses Making “Informed” Biological Decisions

10-11 AM: Guest Research Talk – Dr. Mechthild Pohlschroder

**Lab:** Module 3 (Blood Typing): Exon 7 gel electrophoresis, Analysis of Results from Exon 6 gels, Genetics of Blood Type Worksheet

**Thursday, July 20th**

9-10AM: Gene Expression Regulation and Disease

10-11 AM: Guest Research Talk – Dr. Scott Poethig

**Lab:** Module 3 (Blood Typing): Blood Typing Results and Conclusions

**Friday, July 21st**

9-10 AM: CRISPR-Cas-9: A Historical Perspective

10-11 AM: Guest Research Talk - Carter Merestein, PhD Candidate

**Lab:** Module 1 (Recombinant DNA): Pick colonies for cultures, Colony PCR, Phenotype analysis (Image J), Estimation of Transformation Efficiency

**Monday, July 24th**

9-10 AM: The Birth and Maturation of the Molecular Dogma

10-11 AM: Guest Research Talk – Dr. Mark Goulian

**Lab:** Module 1 (Recombinant DNA): Clean up PCR, submit for sequencing, Compare ImageJ results and color intensity in cultures versus promoter sequences, Module 1 Results and Preliminary Conclusions

**Tuesday, July 25th**

9-10 AM: The Microbiome as an Ecosystem

10-11 AM: Guest Research Talk – Dr. Michael Lampson

**Lab:** Module 4: (ELISA) Enzyme-linked Immunosorbent Assay (ELISA)  
to Track a Simulated Disease Outbreak

**Wednesday, July 26th**

9-10 AM: Biomedical Research Ethics

10-11 AM: Guest Research Talk – Dr. Nicholas Betley

**Lab:** Module 1 (Recombinant DNA): Align sequences, Module 1 Results  
and Conclusions

**Thursday, July 27th**

9-11 AM STUDENT JOURNAL CLUB PRESENTATIONS\*

1-3 PM STUDENT JOURNAL CLUB PRESENTATIONS

**Friday, July 28th**

9- 12 PM STUDENT JOURNAL CLUB PRESENTATIONS AND ACADEMY  
CLOSING

\*You are expected to attend all student journal club presentation sessions, not just the one at which your group presents.