

University of Pennsylvania

Biomedical Research Academy 2024 Syllabus [DRAFT]

The Biomedical Research Academy has three components— lecture, journal clubs, and lab. Lectures will be held in the Levin Building Auditorium (aka Tedor Family Auditorium) and will run from 9-10:45 AM. Journal club meetings will be held in Fisher-Bennett Hall from 10:55-11:55 AM. Lab will be held in Leidy Labs and Levin Labs at 1:30 PM and will run until approximately 4:30 PM.

Director and Lecturer:

Kieran Dilks, PhD kdilks@sas.upenn.edu
Teacher, Haddonfield Memorial High School

Executive Director and Lab Coordinator:

Ryan Dilks dilks5@gmail.com
Teacher, Cherokee High School

Assistant Lab Coordinator:

Svetlana Kozik

Journal Club Leaders:

Romie Azor
Roseanne Davila-Rivera
Christine Faunce
Connor Hennessey
Adam Jabak
Mariela Lopez Valencia
Molly Nelson
Sarah Offley
Adriana Stephenson
Eliana Von Krusenstiern

Labs:

Lab Section A: Levin L11

Lab Instructor: Raegan Petch
Lab Assistant: Sarah Dysinger

Lab Section B: Levin L12

Lab Instructor: Katie Vazquez
Lab Assistant: Adriana Stephenson

Lab Section C: Leidy 114

Lab Instructor: Caela Long
Lab Assistant: Eva Agostino

Lab Section D: Leidy 115

Lab Instructor: Jordan McKinney
Lab Assistant: Maxime Zamba-Campero

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 8th

9-10 AM: Orientation to Program

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

Lab: Experiment 1 (Recombinant DNA): Part 1: Introduction, Safety, Introduction to Experiment 1, Design promoters

Tuesday, July 9th

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

10-11 AM: Guest Research Talk – TBD

Lab: Experiment 2 (Bradford Protein Assay)

Wednesday, July 10th

9-10 AM: Guest Research Talk – TBD

10-11 AM: Guest Research Talk – TBD

Lab: Experiment 3 (ELISA Assay and Epidemiology)

Thursday, July 11th

9-10 AM: Fundamentals of Biomedical Research

10-11AM: Guest Research Talk – TBD

Lab: Experiment 1 (Recombinant DNA): Part 2: GGA cloning with ordered oligos, paper activity, Restriction enzyme challenge activity

Friday, July 12th

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

10-11 AM: Guest Research Talk - TBD

Lab: Experiment 1 (Recombinant DNA): Part 3: Transformations, transformation exercise

Monday, July 15th

9-10 AM: Biomedical Research Techniques

10-11 AM: Guest Research Talk – TBD

Lab: Experiment 1 (Recombinant DNA): Part 4: Pick colonies for cultures, Colony PCR, Phenotype analysis (Image J), Estimation of Transformation Efficiency

Tuesday, July 16th

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

10-11 AM: Going from Experiment to Model

Lab: Experiment 1 (Recombinant DNA): Part 5: Clean up PCR, submit for sequencing, Compare ImageJ results and color intensity in cultures versus promoter sequences, Experiment 1 Results and Preliminary Conclusions

Wednesday, July 17th

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

10-11 AM: Guest Research Talk – TBD

Lab: Experiment 1 (Recombinant DNA): Part 6: Align sequences, Experiment 1 Results and Conclusions

Thursday, July 18th

9-10AM: Gene Expression Regulation and Disease

10-11 AM: Guest Research Talk – TBD

Lab: Experiment 3 (Blood Typing): Part 1: Introduction to Module 3; Isolate cheek cell DNA, set up PCRs (Exon 6, Exon 7, Rh factor)

Friday, July 19th

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

10-11 AM: Guest Research Talk - TBD

Lab: Experiment 3 (Blood Typing): Part 2: Set up restriction digests of Exon 6 and Exon 7 PCRs, Rh factor gel electrophoresis; PCR exercises

Monday, July 22nd

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

10-11 AM: Guest Research Talk – TBD

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

Tuesday, July 23rd

9-10 AM: The Microbiome as an Ecosystem

10-11 AM: Guest Research Talk – TBD

Lab: Experiment 3 (Blood Typing): Part 4: Exon 7 gel electrophoresis, Analysis of Results from Exon 6 gels, Genetics of Blood Type Worksheet

Wednesday, July 24th

9-10 AM: Biomedical Research Ethics

10-11 AM: Guest Research Talk – TBD

Lab: Experiment 3 (Blood Typing): Part 5 Blood Typing Results and Conclusions

Thursday, July 25th

9-11 AM STUDENT JOURNAL CLUB PRESENTATIONS*

1-3 PM STUDENT JOURNAL CLUB PRESENTATIONS

Friday, July 26th

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.