

University of Pennsylvania

Biomedical Research Academy 2022 Syllabus

The Biomedical Research Academy has three components— lecture, journal clubs, and lab. Lectures will be held in the Leidy Labs and will run from 9-11 AM. Journal club meetings will be held at either 11:15 AM or 12:15 PM. Lab begins at 1:30 PM and will run until approximately 4:30 PM.

Executive Director and Lab Coordinator:

Jessica Ardis jardis@sas.upenn.edu
Lecturer, Department of Biology, University of Pennsylvania

Director and Lecturer:

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

Assistant Lab Coordinator:

Svetlana Kozik

Journal Club Leaders:

Maeve Coughlan
Emma Goodman
Connor Hill
Rina Kim
Sonia Lombroso
Sarah Offley
Wil Prall
Michael Scaglione
Alexander Starr
Adriana Stephenson
Eliana Von Krusenstiern
John Wagner

Labs:

Lab Section A: Levin L11
Lab Instructor: Vinayak Mathur
Lab Assistant: Jillian Pote

Lab Section B: Levin L12
Lab Instructor: John Wagner
Lab Assistant: Emily Kim

Lab Section C: Leidy 114
Lab Instructor: Aurora MacRae-Crerar
Lab Assistant: Adriana Stephenson

Lab Section D: Leidy 115
Lab Instructor: Katie Vazquez
Lab Assistant: Laura Ohl

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.** This means that no part of your abdomen should be visible- just your hands and neck.

Schedule of Class Topics, Guest Talks and Laboratories

Monday, July 11th

9-10 AM: Orientation to Program
10 -11 AM: Introductory Lesson – The Central Dogma

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

Tuesday, July 12th

9-10 AM: The Central Dogma
10-11 AM: Guest Research Talk – Dr. Michael Lampson

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

Wednesday, July 13th

9-10 AM: Analyzing Nucleic Acids: Diagnostics and Discovery
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 14th

9-10 AM: Fundamentals of Biomedical Research
10-11AM: Guest Research Talk - Dr. Doris Wagner

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

Friday, July 15th

9-10 AM: Biomedical Research Techniques
10-11 AM: Guest Research Talk - Madhura Nijsure, PhD Candidate

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

Monday, July 18th

9-10 AM: Going from Experiment to Model
10-11 AM: Guest Research Talk – Valerie Sydnor, PhD Candidate

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

Tuesday, July 19th

9-10 AM: Antibiotic Resistance: Time to Panic?
10-11 AM: Guest Research Talk – Dr. Nancy Bonini

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

Wednesday, July 20th

9-10 AM: Molecular Talk - Viruses Making “Informed” Biological Decisions
10-11 AM: Guest Research Talk – Dr. Brian Gregory

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

Thursday, July 21st

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 22nd

9-10 AM: CRISPR-Cas-9: A Historical Perspective
10-11 AM: Guest Research Talk - Leon Palao, PhD Candidate

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

Monday, July 25th

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 26th

9-10 AM: The Microbiome as an Ecosystem
10-11 AM: Guest Research Talk – Sienna Pyle, PhD Candidate

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

Wednesday, July 27th

9-10 AM: Biomedical Research Ethics

10-11 AM: Guest Research Talk – Dr. Harald Schmidt

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

Thursday, July 28th

9-11 AM STUDENT JOURNAL CLUB PRESENTATIONS

1-3 PM STUDENT JOURNAL CLUB PRESENTATIONS

Friday, July 29th

9- 12 PM STUDENT JOURNAL CLUB PRESENTATIONS