Penn Summer
Biomedical Research Academy
Syllabus 2016

The biomedical program has three components—class, journal clubs, and lab. Class will meet in the Levin Auditorium, will begin at 9:00 AM and will run until 11:00 AM. Journal club meetings will be scheduled by the journal club leaders between the hours of 11:15 AM and 1:15 PM. Each journal club will meet for one hour during this time period. Lab begins at 1:30 PM and will usually run until 4:30 PM.

Executive Director and Lab Coordinator: Linda Robinson, PhD, Adjunct Assistant Professor Instructional Laboratory Coordinator Department of Biology, University of Pennsylvania linda3@sas.upenn.edu

Director and Lecturer: Kieran Dilks, PhD, Penn Biology PhD High School Teacher, Haddonfield High (NJ) kdilks@sas.upenn.edu

Teaching Assistant: Jessica Ardis jardis@mail.med.upenn.edu

Assist. Lab Coordinator: Svetlana Kozik

Journal Club Leaders: (12)
Divyansh Agarwal
Jessica Ardis
Amita Bansal
Elisia Clark
Seleeka Flingai
Mike Hogan
Eldin Jasarevic
Sanika Khare
Maria Murray
Timothy Stanek
Matthew Stetz
John Wagner

Labs:
Lab Section A: Leidy 114
Lab Instructor: Krystal Haislop
Lab Assistant: Jessica Ardis

Lab Section B: Leidy 115
Lab Instructor: Maurice Baynard
Lab Assistant: Linnet Ramos

Lab Section C: Levin L11
Lab Instructor: John Wagner
Lab Assistant: Raisa Kiseleva

Lab Section D: Levin L12
Lab Instructor: Lori Spindler
Lab Assistant: Maria Murray
Course Materials:

If you own a biology textbook from your high school biology course, please bring this textbook with you to Penn if you’re a residential student. This text will not be required for the academy, but background readings may be helpful. A limited number of copies of biology textbooks will be available to loan out during the program if you don’t own a biology textbook from your high school biology course.

Students will receive lab manuals and copies of assigned journal club articles. Each student should also have a notebook, folder, pens/pencils, and calculator, and should bring a laptop computer, a flash drive (memory stick), and a camera phone if you have one. Closed-toed shoes must be worn for afternoon laboratories.

Schedule of Lectures, Readings, Guest Lectures, and Laboratories

Tuesday, July 5th
9-10 AM: Orientation to Program
10-11 AM: Introductory Lesson – What is Biomedical Research?
**Article**: "Why we need more basic biology research, not less."

**Lab**: Module 1 (Pipetting): Introduction, Safety, Pipetting, Data analysis using Excel (bring laptops)

Wednesday, July 6th
9-10 AM: Biomedical Research Ethics
10-11 AM: The Birth and Maturation of the Molecular Dogma

**Lab**: Module 2 (Recombinant DNA): Introduction to Module 2
GGA cloning, paper activity

Thursday, July 7th
9-10 AM: Analyzing Nucleic Acids: Diagnostics and Discovery
10-11 AM: Guest Research Talk – Dr. Nancy Bonini

**Lab**: Module 2 (Recombinant DNA): Transformations, transformation exercise (bring laptops)

Friday, July 8th
9-10 AM: Guest Research Talk – Dr. Nancy Spinner
10-11 AM: Guest Research Talk – Dr. Mark Goulian

**Lab**: Module 3 (Blood Typing): Introduction to Module 3;
Isolate cheek cell DNA, set up Exon 6 and Exon 7 PCRs
Monday, July 11th
9-10 AM: Protein Structure Determination in Disease & Therapeutics
10-11 AM: Guest Research Talk – Dr. Tim Linksvayer

**Lab:** Module 2 (Recombinant DNA): Phenotype analysis (Image J), pick colonies for overnight cultures, colony PCR, PCR exercises (bring laptops and camera phones)

Tuesday, July 12th
9-10 AM: HIV: Lessons from Natural Resistance
10-11 AM: Guest Research Talk - Dr. Doris Wagner

**Lab:** Module 2 (Recombinant DNA): measure expression, clean up PCR and submit for sequencing
Module 3 (Blood Typing): Set up restriction digests of Exon 6 and 7 PCR products; Restriction enzyme and electrophoresis exercises (bring laptops)

Wednesday, July 13th
9-10 AM: CRISPR: The Bioengineering Game Changer
10-11 AM: Methicillin-resistant & Vancomycin-insensitive *Staphylococcus aureus* (MRSA & VISA)

**Lab:** Module 3 (Blood Typing): Exon 6 gel electrophoresis, Restriction analysis challenge activity (bring laptops)

Thursday, July 14th
9-10AM: Novel strategies to fend off bacterial pathogens
10-11 AM: Guest Research Talk – Dr. Brian Gregory

**Lab:** Module 3 (Blood Typing): Exon 7 gel electrophoresis, Genetics exercise, Data analysis

Friday, July 15th
9-10 AM: Gene Expression: Carbohydrate Intolerance
10-11 AM: Guest Research Talk – Dr. Andrew Binns
**Article:** "A New Kind of Inheritance" Scientific American. 2014 Aug; 311: 41-51

**Lab:** Module 3 (Blood Typing): Analysis of Exon 7 results; Analysis of Module 3 Results and Conclusions
Monday, July 18th
9-10 AM: MicroRNAs and Disease
10-11 AM: Signal Transduction & Perturbations of These Pathways

**Lab:** Module 2 (Recombinant DNA): Align sequence (bring laptops), DNA Sequencing Exercise, Module 2 Results and Conclusions

Tuesday, July 19th
9-10 AM: The Cell Cycle and Novel Strategies in Fighting Cancer
10-11 AM: Guest Research Talk – Dr. Scott Poethig

**Lab:** Module 4 (Disease Tracking ELISA): ELISA

Wednesday, July 20th
9-10 AM: Gene Therapy: Successes and Roadblocks
10-11 AM: Biology Psychology

**Lab:** Module 4 (Disease Tracking ELISA): Disease tracking, Discussion, Evaluations (bring laptops)

Thursday, July 21st
STUDENT JOURNAL CLUB PRESENTATIONS

Friday, July 22nd
STUDENT JOURNAL CLUB PRESENTATIONS

Evaluation

Class
Students will be evaluated based on performance on in-class questions (via clickers).

Lab
Students will be evaluated on lab performance. They will also turn in portions of their lab manuals to their Lab Instructors.

Journal Clubs
Students will be evaluated on participation in a small group journal club where they will read and discuss primary scientific literature and then use this information to prepare a group presentation at the end of the program.