



Course Syllabus

Topic 1: Skin Structure and Diseases

We look at our skin every day from the outside, but have you ever wondered what it looks like on the inside? Why is your skin soft, yet at the same time tough? Why does your skin look “full” when you are young, and then “saggy” with age? Ever wondered what skin diseases look like?

- Not only will you learn what normal skin and skin diseases like acne, psoriasis and eczema look like from the outside, but you will learn how they look on the inside, using a microscope and tissue sections of skin. You will get to stain sections of skin yourself with special dyes that allow you to see the structure of the skin under a ten-headed microscope.

Topic 2: The Skin Microbiome and Bioethics

Amazingly, our normal healthy skin is home to millions of microbes that far outnumber our own skin cells! These microbial organisms help to keep our skin healthy and ward off disease-causing bacteria and fungi. In week 2 you will:

- Learn about the different types of skin-associated microbes, their functions in skin health and disease, and the methods that scientists use to study them.
- Grow microbes from your very own skin, test them for antimicrobial resistance, and use polymerase chain reaction (PCR) to amplify the microbial DNA for further analyses. Your microbes' DNA will be sent to the Penn Next Generation Sequencing Core facility so that it can be sequenced. You will get to analyze these sequences in Week 3, in order to identify the exact microbial species that are living on your skin.
- We will discuss the ethics of real and hypothetical clinical cases involving skin diseases. Is it OK to enroll a patient in a clinical trial that would not ultimately benefit that patient but might help others? Become the doctor, patient, mother, father, and scientist in these thought-provoking cases.

Topic 3: Techniques for Analyzing the Skin and its Microbes

Fine tune your bench skills and find out what your results mean. How do researchers do this work and on what? Take a look at our research mice and BLAST your data!

- You will perform experiments on DNA from your very own skin microbes. You will analyze your skin microbial DNA using a technique called agarose gel electrophoresis. You will also identify the bacterial strains living on your skin by using a computer method called BLAST searching to analyze their DNA sequences.
- Did you know that you can get DNA from the skin cells you see under a microscope, and this DNA called “Laser Capture Microdissection”. Using this technique you will “cut out” cells from specialized slides using a laser and collect them for analysis.
- Did you know that scientists can alter genes in mice in order to study their functions? You will see some of these mouse mutants, and learn how disruption of a specific gene can lead to altered structure, texture or color of the hair, as well as other skin phenotypes.

Topic 4: Skin Disease Diagnosis and College Planning

Walk away with an understanding of how research directly effects the care a patient receives. Hear from professionals that do research AND see patients. Listen to a panel of real patients talk about their journal with skin diseases! Begin to plan your next steps with our summer internship application and college planning course.

- Diagnose the Disease! In this session you will use what you have learned at PASH to diagnose common skin diseases from patient photos and microscopic images of the skin. This will give you a taste of what it's like to be a dermatologist.
- We will end PASH with a session on planning and preparing for the college application process. Learn how to get one step closer to your career in science or medicine by preparing a resume, writing a personal statement, and practicing for interviews.