

BP210: Biological Light Microscopy

Biophysics 210, Biological Light Microscopy will cover all aspects of modern biological light microscopy with an emphasis on an understanding of the fundamental principles and how they influence the application of microscopy to solve biological problems. The course will be taught as a flipped classroom course; you'll watch video lectures on your own time, and the class time will be used for answering questions, working on small group problems, and in labs.

Download materials: <https://ucsf-calm.github.io/wiki/pages/references-and-education/BP210-2026.html>

Discussion Sections:

Discussion sections meet Tuesdays from 1-2:30 pm in Genentech Hall Room N114.

Discussion Section Topics

Week	Date	Topic
1	3/31	Intro to light, ray optics, optical path, Kohler illumination
2	4/07	Microscope Objectives and resolution
3	4/14	Fourier Optics and cameras
4	4/21	Fluorescence microscopy
5	4/28	Optical sectioning: confocal microscopy and TIRF
6	5/05	Optical sectioning: deconvolution and light sheet
7	5/12	Fluorescent biosensors and dynamics
8	5/19	Digital Images and image analysis
9	5/26	Super-resolution microscopy
10	6/2	Image analysis using Python

Lab Sessions:

Lab sessions meet on Thursdays or Fridays from 1-4 pm.

Students are assigned a specific lab session and should only attend that day of the week.

Lab Session Topics

Week	Date	Location	Topic
1	4/2;4/3	GHN114/MH1407	Build your own microscope
2	4/9;4/10	GH S252	Kohler alignment of microscope; resolution, NA
3	4/16;4/17	GH S252	Camera comparison and calibration
4	4/23;4/24	GH S252	Introduction to fluorescence microscopy, software control of microscope, PSF, shading correction
5	4/30;5/1	GH S252	Introduction to laser-scanning confocal, spinning disk confocal, TIRF, and light sheet microscopy
6	5/7;5/8	Varies	Introduction to multi-photon microscopy, SIM and deconvolution software
7	5/14;5/15	GH S252	Demonstration of live samples
8	5/21;5/22	GHN114	Image J and Cell Profiler tutorial
9	5/28;5/29	GHS227	Expansion Microscopy
10	6/4; 6/5	MH1407/ GHN114	Python Image Analysis