

Quantitative Imaging and Analysis for Biologists (QIAB) – 2020

Location: Online (BlueJeans or Zoom)

Lecture Dates & Times: Tuesdays & Thursdays, Sept. 29 – Nov. 12, 10 am – 12 noon

TA Office Hours: Fridays 11 am – noon or by appointment at <https://bluejeans.com/5693391678/>

Organizer: Andrea Stout (astout@pennmedicine.upenn.edu) and Melike Lakadamyali (melikel@pennmedicine.upenn.edu)

TA: Liz Gallagher (Elizabeth.Gallagher@pennmedicine.upenn.edu)

Required materials: a laptop with the free software Fiji (<http://imagej.net/Fiji#Downloads>) installed.

Schedule of topics and speakers

Day	Tuesday 9/29/20	Thursday 10/2/20	Tuesday 10/6/20	Thursday 10/8/20
Speaker	Andrea Stout	Andrea Stout	Andrea Stout	Melike Lakadamyali
Topic for 10-12 lecture	Fundamentals: light, image formation, fluorescence; widefield vs confocal	Image data properties: signals, noise, sampling.	Intro to Fiji & digital data: data types, display adjustments, and annotations	Fluorescence labeling, probes; sample prep for live or fixed cells,
Activity for this week	Canvas quiz on optics and acquisition		Fiji Exercises – set 1	

Day	Tuesday 10/13/20	Thursday 10/15/20	Tuesday 10/20/20	Thursday 10/22/20
Speaker	Andrea Stout	Andrea Stout	Andrea Stout	Andrea Stout and Sandra Maday
Topic for 10-12 lecture	Processing topics and simple measurements	Intro to macros in ImageJ and Fiji	Introduction to segmentation and object-based measurements	Machine learning with Fiji and ilastik
Activity for this week	Fiji Exercises – set 2		Fiji Exercises – set 3	

Day	Tuesday 10/27/20	Thursday 10/29/20	Tuesday 11/3/20	Thursday 11/5/20
Speaker	Andrea Stout	Melike Lakadamyali	Andrea Stout	Mustafa Mir and Nicolas Plachta
Topic for 10-12 lecture	Working with 3D and 4D data in Fiji; Odds & Ends	Tracking concepts (simple object tracking, manual tracking, Trackmate)	Quantitative colocalization basics as implemented in Fiji	Advanced methods (super-res, FRET, FLIM, FCS)
Activity for this week	Fiji Exercises – set 3 continued		Fiji Exercises – set 4	

Day	Tuesday 11/10/20	Thursday 11/12/20
Topic for 10-12 lecture	5-minute student presentations	

Grading for the course:

Your final grade for the course will be based on the following:

Participation: This includes participation during class sessions as well as on Canvas quizzes and Fiji exercises

Out-of-class homework: The Fiji exercises will include questions to be answered on Canvas and some file submissions. We will not assign grades but we will keep track of each student's submissions.

End-of-class presentations: The last two class sessions are set aside for student presentations: each student must give a very short (no more than 10 minutes) presentation that is either (a) an explanation of an image analysis protocol that makes use of one or more methods discussed in this class; or (b) an instructional presentation on how to use a Fiji plugin or other open source software (such as CellProfiler) that we did not cover in class.