

HW8

DUE: 12/01/2017 – 11:30 AM

MCDB 4312/5312

**Analysis Questions:**

1. Ratiometric imaging:
  - a. What advantages are offered by ratiometric imaging?
  - b. What are factors some factors in the intensity measurements that you cannot correct with ratiometric imaging?
  - c. What are disadvantages of using ratiometric imaging?
  
2. Sensor Artifacts:
  - a. Estimate how many free calcium ions exist in a HeLa cell at basal levels.
  - b. Considering each GCaMP sensor binds 4 calcium ions (Calmodulin domain), should you worry about altering basal calcium levels when expressing 20k FPs per cell?
  - c. What are some factors you should be concerned about when expressing GCaMP in the ER?
  - d. Estimate how many free calcium ions exist in an E. coli at basal levels.
  
3. Design a biosensor to sense the concentration of GABA? What are some steps you could take to improve the sensor?

**Matlab Questions:**

4. Load in cameraman.tif.
  - a. Calculate and plot the 2D Fourier Transform of the image. Make sure the DC component is in the center of the plot.
  - b. Make a mask to set some dominant high frequencies = 0 using roipoly with the 'closed' option.
  - c. Reconstruct the new Fourier filtered image.
  
5. Segment individual yeast cells in yeast\_image.tif.