HW 5
DUE: 10/20/2017 – 11:30 AM
MCDB 4312/5312

Analysis Questions:

1. Consider a CFP-YFP FRET pair:
    a. Draw the Jablonski diagram with energy levels labeled.
    b. What is the Forster distance?
    c. What is the FRET efficiency if the proteins are at a distance of 3 nm?
    d. " " 8 nm?
    e. What is the lifetime of the CFP when it's located 3 nm from the YFP as compared to when CFP is by itself?

2. TIRF
    a. What is the critical angle for light traveling from glass to air?
    b. " " glass to water?
    c. What is the minimum numerical aperture needed to create a through the objective TIRF image for a live cell on a coverslip?

3. Assume you're imaging a live cell with a TIRF angle of 78°.
    a. What is the penetration depth when using 561 nm light?
    b. At what distance would you reduce the intensity by 90%?
    c. At what distance would you reduce intensity by 90% moving from glass to air?

4. What is the Pearson's correlation coefficient of the following matrices:

2	4	3	4	1	3
1	3	3	2	4	3
1	4	1	2	2	1

Matlab Questions:

1. Load in the red and green yeast image from the website.
    a. Register the two images, and display the overlayed images.
    b. Print out the 3x3 matrix of the transform to overlay each image.
    c. Scatter plot the two images.
    d. Scatter plot the two images of JUST the cells.
    e. Calculate the PCC of the two images (whole and cells).