Special Topics: Exploration and Analysis of DNA Microarray and Protein Array Data

ROOM: Hill 552, TIME: to be arranged.
WEB PAGE: http://www.rci.rutgers.edu/~cabrera/690
EMAIL: cabrera@rci.rutgers.edu
INSTRUCTOR: Javier Cabrera. 471 Hill Center. x5295.
OFFICE HOURS: Wed.4:00pm-6:00 pm. or by appointment.

1st Meeting will be held in HLL 552 on Wed. 9/3 at 10 A.M.

(The textbook will be available in October but notes will be available on the web page.)

Grading:
Homework: 35%
Final paper: 45%
Class participation: 10%

Syllabus:

1. Introduction.
Organization of the course. Computing with R. Web page for the class.

2. A brief introduction to Genomics.
Genes, DNA, Gene expression, Hybridization assays and other laboratory techniques. The human genome. Genome variations and their consequences. The role of genomics in biomedical research. Proteins.


4. Processing the scanned image and data extraction
Converting the scanned image to the spotted image. Quality issues. Adjusting for background.

5. Preprocessing microarray data.
Expression level calculation for oligonucleotide microarrays Normalization. Concordance correlations and concordance maps. Outlier identification

Replication, Technical replicates and Biological replicates. Oligonucleotide arrays. Estimating fold change in two-channel experiments. Bayes estimation of fold change
7. Two-group comparative experiments.
Basics of statistical hypothesis testing. Robust t-tests. Simple multiplicity adjustments.

The basic linear model. Fitting the model in two stages. Multichannel experiments.
Experimental design considerations. Temporal studies.

9. Clustering.

Fisher’s Linear discriminant analysis and other classification procedures. Classification strategies using large numbers of genes.

11. Protein arrays.