



## Master Thesis Defense

Speaker: Lee Zamparo

Supervisor: Dr. Butler

Examining Committee: Drs. Fevens, Krzyzak and Dr. Witte (Chair)

Title: Two Methods to Estimate Protein Copy Number from Image Data

Date: Tuesday Sept. 1, 2009

Time: 10:00 am.

Place: EV 3.101

### ABSTRACT

Experiments using microscopy which measure gene expression data usually do so indirectly, by recording the intensity of messenger RNA or proteins tagged with fluorescent agents, to produce semi-quantitative data measured by fluorescent intensity. However, quantitative measurements of mRNA or protein concentrations are imperative for developing predictive models of gene regulation networks. In the absence of experimental procedures designed to calibrate the conversion from intensity to concentration, a statistical model of the intensity values may be used to estimate this relationship. In this thesis, two different estimators are developed to estimate the relationship between intensity and protein copy number. The methods were applied to a data set of time-lapse protein expression data taken from embryos of *Drosophila melanogaster*. Both methods assume a linear relationship between intensity and concentration. When restricted to a specific protein, the methods produce very consistent results, and are in general agreement with other methods applied to similar data. The software used to generate the estimates is implemented as a series of scripts in R. The data is all drawn from FlyEx, and is available at <http://flyex.ams.sunysb.edu/flyex/>