



## Graduate Math and Physics Seminar

# The effect of Statistical Error Model Formulation on the Fit and Selection of Mathematical Models of Tumor Growth for Small Sample Sizes

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### Abstract:

When fitting a mathematical model to a given data set using inverse problems, the correctness of both the mathematical model and the statistical error models are important since an incorrect statistical or observational model directly affects both the estimates and their corresponding standard errors. The effects of these models, among many other factors, are dependent on the sample size and the information content of the data set. In this article, we investigate how the choice of the statistical error model affects the mathematical model fit and accuracy of parameter estimates in small sample size tumor growth data sets. We specifically seek to determine the appropriate statistical error model for small sample size breast, lung and HPV tumor growth data sets obtained from studies on mice. We find that for small sample sizes the selection of the best statistical error model is not straightforward and requires the examination of multiple criteria for model fit and uncertainty. Therefore, selection of the best mathematical model is not an easy process for small sample size tumor data and selection of a model based on few data points may not prove accurate. We encourage further research on the optimal design of experiments (duration and number of observations) in order to best fit mathematical models to tumor growth data.

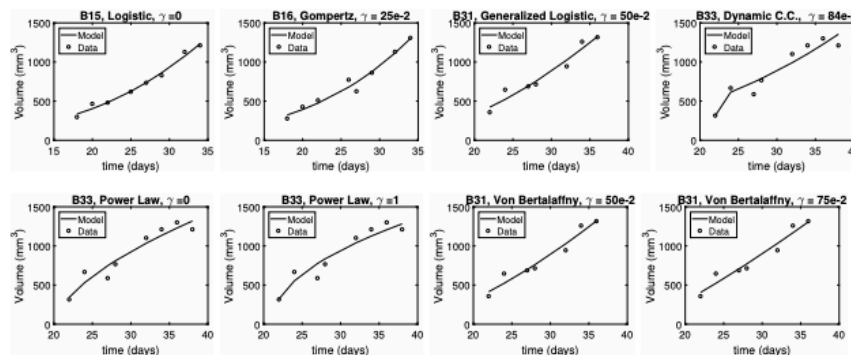


Figure 4: Sample model fits of selected mathematical and statistical models for breast tumor data

*When:* Monday, April 8, 2019, 6:00-7:00 pm

*Where:* CSUCI, Sierra Hall 2411