



The University of Chicago  
Department of Statistics

MASTER'S THESIS PRESENTATION

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## **Growth Curve Models with Application to Glucose Data**

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110 Eckhart Hall, 5734 S. University Avenue

### **ABSTRACT**

Growth curve models are widely used in many areas such as economics, biology, medical research and epidemiology. In this thesis, we first present a brief view of this type of model and mainly discuss the models with particular form combining independent additive Gaussian processes with exponential covariance functions. Under this specific setting, we develop a strategy to obtain the REML estimates of variance components. As an application of growth curve models to clinical trials, Glucose data first reported by Zerbe (1979) is used here for illustration. Then, more than estimating the variance structure, this thesis shows several approaches to choosing a better mean structure. Also, we present a simple method to get the overall MLE and likelihood-based confidence interval for unknown parameter entering either variance or mean structure non-linearly. Finally, we focus on some interesting issues regarding this growth data set such as temporal trend, interaction effect and half-life of the effect.

*Key Words:* growth curve models; Gaussian process; exponential covariance function; REML; likelihood-based confidence interval; variance components; temporal trend; half-life.

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