Vita

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<u>Presentations/Conferences/Publications:</u>

A Joint Mixed Model for Clustered Binary and Continuous Outcomes

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Tianyi Xia

in the Department of Mathematics & Statistics
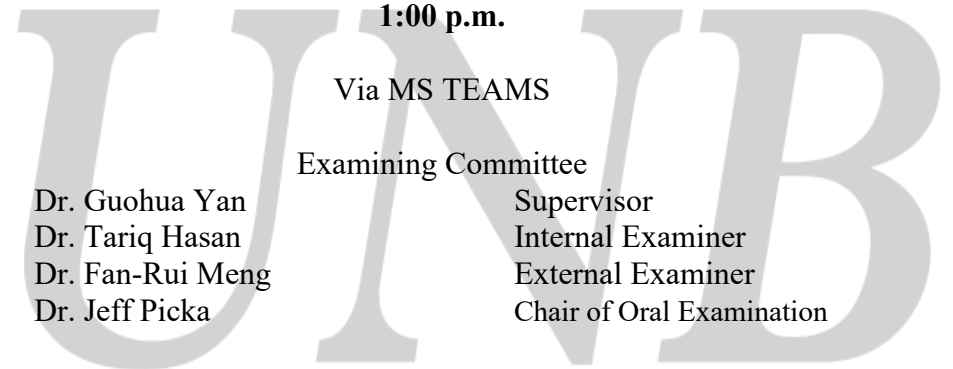
U.N.B., Fredericton, N.B.

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Via MS TEAMS

Examining Committee

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Abstract

Recently, statisticians are very interested in developing new methods for the data with different responses types. The generalized linear model (GLM) can analyze different responses separately. And the generalized linear mixed model (GLMM), the extension to the GLM, can consider both fixed effects and random effects. However, the difficulty lies in how to analyze two different responses at the same time, while considering fixed effects, random effects and the correlation between the responses.

In this thesis, we proposed a model through the GLMM based on Tweedie distribution and combine it with Bernoulli distribution to analyze simultaneously clustered binary responses and continuous response. The proposed model is very flexible as the Tweedie model can handle different distributions with different power index parameters. We used the best linear unbiased predictor (BLUP) in our model to provide optimal parameter estimates results.

We analyzed the toxicity study of ethylene glycol (EG) data to demonstrate the performance of our proposed model. We also conducted a simulation study to assess the overall model performance.