# GRADUATE SEMINAR


## Yanzhao Cheng


# A CONSTRUCTION OF ASYMPTOTIC CONFIDENCE ELLIPSES FOR PATHOGEN PARAMETERS OF BETA-POISSON DOSE-RESPONSE MODEL


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**Monday, November 30th**

2:00 PM

Math Lounge (CW307.20)


**Abstract:** Beta-Poisson model is one of the most important and widely used parametric dose response models in microbial risk assessment. My talk is divided in two parts. The first is the Theoretical Part. We establish that the Method of Moments and the Method of Maximum Likelihood for parameter estimation do not work directly for a construction of a confidence ellipse. Therefore, we need to discover a suitable approximate distribution function of the Beta-Poisson Dose-Response model first. Then, we derive the Maximum Likelihood estimates for the approximate model. After that, we construct Fisher information matrix. In the final, we construct a normal approximation that gives confidence regions for parameters of the approximate Beta-Poisson dose-response model. The second part is the Simulation Part. In this part, we are going to use R programming to run simulations to confirm our findings from the Theoretical Part. We consider 8 group of the pathogen parameters. We find the Maximum Likelihood estimates for the parameters, the percentages of absolute relative errors and actual coverage probabilities for confidence ellipses of parameters for the approximate Beta-Poisson dose-response model at 95 % confidence level base on simulations 10000 times.


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Mathematics and Statistics