

Biostatistics with R – III: Generalized Linear Models

Curriculum Overview – Public Health Research Centre (PHRC) NYUAD

Course Descriptions

Generalized linear models (GLM) are an important class of nonlinear models, which represents a generalization of the classic linear regression model in regression analysis. While classical linear models assume that the error term is normally distributed, it can have a distribution from the class of the exponential family in GLMs. In addition to the normal distribution, the distribution class can also include the binomial, Poisson, gamma and inverse Gaussian distribution.

The aim of this course is to give a brief introduction to logistic regression model, Poisson regression model, and the negative binomial regression model with the open source, powerful and highly extensible free software ([R Project](#)) and RStudio ([RStudio Interface](#)). This course assumes that the course participants have been given an "Introduction To R".

Course Planning

These six courses modules are

- **Logistic Regression Model (2 sessions, each session lasts circa 90 minutes)**
 - Introduction and General Notations
 - Simple Binary Logistic Regression
 - Multivariate binary logistic regression model
 - Confidence Intervals of Regression Coefficients
 - Odds Ratios and Confidence Intervals
 - Predicted Values and Confidence Limits
 - The Worth of The Model – The Concordance-Index
 - The Quasi-Likelihood and Dispersion Parameter

- Poisson Regression Model in R (2 sessions, each session lasts circa 90 minutes)
 - The Poisson Distribution
 - The Mean-Variance Relationship
 - The Poisson Regression Assumptions and Offsets
 - Confidence Intervals of Regression Coefficients
 - The Incidence Rate Ratio (Relative Risk) and Confidence Intervals
 - Statistical Significance of The Estimates
 - The Model Overdispersion and the Quasipoisson
- Negative Binomial Regression in R (2 sessions, each session lasts circa 90 minutes)
 - Introduction
 - The Negative Binomial Distribution
 - The Negative Binomial Regression Model
 - The Estimates of the Risk Ratios and Confidence Intervals