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MI255-W: Exposure-Response Modeling of Categorical, Count and Time-to-Event Data Using Bayesian and Maximum Likelihood Methods (2 CR)

MI255 is an intensive course providing an introduction to modeling of categorical, count, and time-to-event data, and the practical use of WinBUGS and NONMEM® for such applications. The course provides some basic theory and illustrates some of the advantages of using Bayesian methods for these types of data sets. Participants may apply the 2 credit hours from this course to the Metrum Institute Certificate Program in Pharmacometrics.

Instructors

Bill Gillespie, Marc Gastonguay, and Metrum Institute staff

Prerequisites

Experience with PK-PD modeling and some familiarity with nonlinear regression, mixed-effects modeling, basic Bayesian principles, WinBUGS and R (or S-Plus) is required. Applicable MI courses include: MI200, MI205 (formerly MI220), MI210, MI212 and MI250, or contact us: info@metruminstitute.org.

Spring 2011 Schedule

TBD

Location

Live webcast

Fees

Regular registration: $2000 USD / Academic & government registration: $1000 USD

Course Outline

1. Motivating examples
2. General theory/background
   - Modeling from a probabilistic viewpoint: the likelihood function.
   - Maximum likelihood (ML) for continuous data
   - Extending ML to odd-type data
   - Hierarchical (mixed effects) modeling of longitudinal odd-type data
   - Bayesian modeling of odd-type data
3. Modeling binary data
   - Logistic regression models
   - Bernouli model for individual binary data
   - Binomial model for summary data
   - Mixed effects modeling of longitudinal binary data
4. Hands-on problem 1: Logistic regression for binary data
5. Model evaluation, esp. simulation-based approaches
6. Hands-on problem 2: Longitudinal binary data
7. Modeling ordered categorical data
   - Cumulative logit models
   - Modeling longitudinal data: comparative performance of approx. ML and MCMC
8. Hands-on problem 3: Longitudinal ordinal data
9. Modeling count data
   - The Poisson model
   - Variations on the Poisson model to deal with over-dispersion or “zero inflation”
10. Hands-on problem 4: Longitudinal count data
11. Modeling time-to-event data for a single event per individual
    - Principles and methods of survival analysis for modeling censored data
12. Hands-on problem 5: Time-to-event data: constant hazard model
13. Model with time-varying hazard
14. Modeling repeated time-to-event data
15. Closing discussion