

MI200: Getting Started With Bayesian PK-PD Modeling & Simulation Using WinBUGS (1 CR)

MI200 provides an introduction to Bayesian modeling and the practical use of WinBUGS for PK-PD applications. Participants may apply the 1 credit hour from this course to the Metrum Institute Certificate Program in Pharmacometrics.

Instructors

Bill Gillespie and Metrum Institute staff

Prerequisites

Experience with PK-PD modeling and some familiarity and hands-on experience with nonlinear regression, mixed-effects modeling, and use of R (or S-PLUS). Applicable MI courses include: MI220 or contact us: info@metruminstitute.org.

Computer Hardware/Software

This course requires a Windows laptop computer with an available USB 2.0 port. All required software used for hands-on examples will be freeware/open-source software and simple instructions will be provided for users to configure their computers before the course.

Summer 2010 Schedule

Monday, August 16 8:30am-4:30pm

Location

College of the Atlantic
105 Eden Street
Bar Harbor, ME 04609

Accommodations

Metrum Institute does not provide hotel accommodations for students. All travel accommodations must be arranged independently.

Fees

Regular registration: \$1000 USD / Academic & government registration: \$500 USD

Course Outline

1. Introduction to Bayesian statistical principles and methods
 - Bayes' Rule
 - Bayesian modeling & inference process
2. Computation for Bayesian modeling
 - Key challenge of Bayesian modeling and inference: high-dimensional multiple integration
 - General computational approach: posterior simulation
 - Brief intro to Markov chain Monte Carlo simulation
3. WinBUGS basics
 - What is it?
 - How do I get it?
 - How do I run it?
 - WinBUGS demo: Linear regression
4. Introduce PK-PD modeling case study to be used throughout the course
5. Hands-on example 1: Simple nonlinear regression, e.g., a PK-PD model relating a single exposure metric to a single continuous PD outcome
6. Topics in Bayesian model development using WinBUGS I
 - Using WinBUGS scripts
 - R tools for running WinBUGS and analyzing MCMC simulations
 - Assessing convergence

- Programming hierarchical models (aka mixed effect or population models)
- 7. Hands-on example 2: Nonlinear mixed effects, e.g., a PK-PD model relating observed drug concentrations to continuous PD measurements at the same time
- 8. Topics in Bayesian model development using WinBUGS II
 - BUGSModelLibrary for pharmacometric modeling: Introduction & demonstration
 - Dealing with censored data in WinBUGS
- 9. Additional topics & closing discussion
 - Considerations in deciding whether to use Bayesian modeling with WinBUGS versus maximum likelihood modeling with NONMEM[®] (or other ML tools)
 - What didn't we cover?