

MI260: Bayesian Model-Based Meta-Analysis to Support Decision Making in Drug Development (3 CR)

MI260 provides an introduction to meta analysis concepts and methods, with a strong focus on model-based meta-analysis of summary data or a combination of summary and individual data from clinical trials to support decision-making in clinical drug development. Upon completion of the course, participants will be able to write a meta-analysis plan, design a model-based meta-analysis of clinical trial data to address strategic decisions in a clinical drug development program, and implement it using a Bayesian approach executed with WinBUGS and R. Participants will also be able to construct a model for the relationship between an efficacy- or safety-related clinical outcome and independent variables such as dose, time and patient characteristics by analysis of summary data from multiple studies, e.g., treatment means and standard deviations, and construct such a model by analysis of a combination of summary and individual data, as well as execute and interpret population simulations to support decision-making in clinical drug development. Participants may apply the 3 credit hours from this course to the Metrum Institute Certificate Program in Pharmacometrics.

Instructors

Bill Gillespie, Metrum Institute
Jonathan French, Pfizer

Prerequisites

Experience with PK-PD modeling and some familiarity and hands-on experience with nonlinear regression, mixed-effects modeling, Bayesian modeling using WinBUGS, and use of R (or S-PLUS). Applicable MI courses include: MI200, MI205 and MI250, or [contact us](#).

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.

Course Date(s)

Monday, August 8	8:30am – 4:30pm
Tuesday, August 9	8:30am – 4:30pm
Wednesday, August 10	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: \$3000 USD / Academic & government registration: \$1500 USD

Course Outline

1. Overview of meta-analysis concepts and methods
 - Why meta-analysis?
 - Different strategies and methods for meta-analysis
 - Problems and limitations of meta-analysis methods
 - Writing a meta-analysis plan
2. Introduction to model-based meta-analysis
 - Rationale and role of model-based meta-analysis in clinical drug development
 - Why do it?
 - What decisions benefit from model-based meta-analysis?
 - Motivating examples

- Why Bayesian? / Why BUGS?
3. Overview of the model-based meta-analysis process
 - Types of data and data sources
 - The process
 - Plan your modeling strategy
 - Identify key information you want to collect
 - Construct a database
 - Construct the modeling and simulation work plan
 - Implementation and application
 - * Model development
 - * Model application, e.g., simulations to support decision-making
 4. Database construction
 - Data sources
 - Data types, e.g., mean, mean change from baseline, percent change from baseline, standard deviation, standard error...
 5. Modeling sample mean data
 6. Hands-On Problem 1: Dose response model based on sample means
 7. Modeling sample standard deviations: why and how
 8. Population stimulations
 - Simulating probable ranges of population estimands, e.g., population mean, probability of an event, etc.
 - Using simulation results to support decision-making in a competitive market environment
 9. Hands-On Problem 2: Population stimulations
 10. Issues arising from analysis of summary data
 - Applying models developed to describe responses in individuals to summary data
 - Analysis of longitudinal data
 - Pitfalls of treating treatment arms as "super-patients"
 - Within-arm correlation
 - Approaches for addressing these issues
 11. Modeling other types of summary statistics
 - Number or fraction of patients with a particular outcome or that experience an event
 - Number or fraction of patients within each level of an ordinal scale
 - Number of events per patient
 - Summary statistics for time-to-event measurements
 12. Hands-On Problem 3: Longitudinal dose-response model based on longitudinal summary data
 13. Publication bias
 14. Issues arising from use of LOCF and OC data
 15. Combining summary and individual data
 16. Hands-on Problem 4: Longitudinal dose-response model based on a combination of summary and individual data
 17. Incorporating a broader range of data and knowledge
 - Leveraging the Bayesian framework to incorporate additional quantitative knowledge via informative prior distributions
 - Integrating preclinical, biomarker and clinical outcome data to improve prediction and decision-making in early clinical development
 18. Closing discussion