



Multi-level Models Summer Institute 2005

Francesca Dominici
Michael Griswold
The Johns Hopkins University
Bloomberg School of Public Health

Content

- Conceptual approaches to the analysis, and interpretation of studies with a multilevel or hierarchical (clustered) data structure.
- Development and implementation of random effects models that reflect multi-level structures for both predictor and outcome variables.
- Estimation and inference based on variance components, shrinkage estimation and Bayesian interpretations.
- Applications to health services, risk assessment, community intervention and small area estimation.

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Basics

- Course
 - 140.607.11 Multilevel Models (1 credit)
 - Gives an overview "multilevel statistical models" and their application in public health and biomedical research
 - Focuses on main ideas and examples
- Instructors
 - Francesca Dominici & Michael Griswold
- Web
 - www.biostat.jhsph.edu/bio607
- Evaluation
 - 4 quizzes, 1 homework

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Structure

- Module 1: Main Ideas & Background
- Module 2: Bayesian Hierarchical Models
- Module 3: A 2-stage model (NMMAPS)
- Module 4: Profiling Health Care Providers
- Module 5: Spatial Epidemiology

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Learning Objectives

- Students will acquire a basic understanding of:
 - concepts, interpretations and some computations associated with MLMs
 - when and why MLMs can or should be used
- Students will learn to:
 - formulate substantive questions in terms of multilevel models
 - interpret the results of basic analyses.

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Computing

- We'll use WinBUGS
- Why BUGS?
 - It's Free!
 - In MLMs, it's important to see distributions
 - e.g. Skewness of sampling distribution of variance component estimates
 - Important to incorporate **the uncertainties** in estimating random effects models
 - Lot's of online examples
- Note that WinBugs isn't very data input, or user friendly
- And, it's difficult to produce P-values

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Computing

■ Getting & Using WinBUGS

1. Go to <http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/contents.shtml>
2. Download [WinBUGS14.exe](#) under the **Obtaining the File** heading
3. Follow the instructions under **Installing WinBUGS 1.4 in Windows**
4. Fill out the online registration form and follow the instructions under the **Obtaining the key for unrestricted use** heading
5. Watch [WinBUGS - The Movie!](#)
(<http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/winbugsthemovie.html>)
6. Begin reading through the examples listed under help
7. You're ready to "go Bayes"

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Questions?

And Away we go!...

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