



# **Applied Mixed Models**

Presented by Linda Young

**Dept. of Statistics, University of Florida**

**Sponsored by  
The New Jersey Chapter of the American Statistical Association**

**Friday March 16  
Embassy Suites Hotel  
121 Centennial Avenue  
Piscataway, New Jersey 08854**

## **Abstract**

Data sets from designed experiments, sample surveys, and observational studies often contain correlated observations due to random effects and repeated measures. Mixed models can be used to accommodate the correlation structure, produce efficient estimates of means and differences between means, and provide valid estimates of standard errors. Repeated measures and longitudinal data require special attention because they involve correlated data that arise when the primary sampling units are measured repeatedly over time or under different conditions. Normal theory models for random effects and repeated measures ANOVA will be used to introduce the concept of correlated data. These models are then extended to generalized linear mixed models for the analysis of non-normal data, including binomial responses, Poisson counts, and over-dispersed count data. Methods of assessing the fit and deciding among competing models will be discussed. Accounting for spatial correlation and radial smoothing splines within mixed models will be presented and their application illustrated. The use of SAS System's PROC GLIMMIX will be introduced as an extension of PROC MIXED and used to analyze data from pharmaceutical trials, environmental studies, educational research, and laboratory experiments.

This workshop is for those who want to learn about the theory and application of linear and generalized linear mixed models. The material is presented at an applied level, accessible to participants with training in linear statistical models and previous exposure to linear mixed models. Some experience with SAS's PROC MIXED would be helpful.

## Schedule

8:00 - 8:30 AM	Breakfast: Coffee, juice, and muffins available
8:30 - 10:10 AM	Fixed and Random Effects Split plot analysis Linear Mixed Models and Generalized Linear Mixed Models
10:10 - 10:30 AM	Break
10:30 - 12:00 PM	Modeling the Covariance Structure in a Repeated Measures Setting
12:00 - 1:00 PM	Lunch buffet
1:00 - 2:30 PM	Accounting for Spatial Variability
2:30 - 2:50 PM	Break
2:50 - 4:00 PM	More Advanced Correlation Structures

## Cost

The registration fee for this event is \$80 on or before Friday March 2 (early bird date), and \$100 after. For a limited number of full-time students, it is \$30 on or before that date, and \$40 after. All registrations with payment must be received by Monday March 12. To register (or if there are questions) send an e-mail with your name, affiliation, and phone number to Vatsala Karwe at [vatsalakarwe@gmail.com](mailto:vatsalakarwe@gmail.com) and mail your check (made out to "New Jersey Chapter ASA") to her at this address:

**Vatsala V. Karwe**  
**32 Revere Road**  
**Monmouth Junction, NJ 08852**  
Tel: 609-495-4075

For the early bird rate, the check must be postmarked by Friday March 2. Please do not mail any checks postmarked after Friday March 9.

## Directions

To get to the Embassy Suites Piscataway, take the NJ Turnpike to exit 10, take Route 287 North approx. 11 miles to exit 9 (River Road) Highland Park. Make left off exit and proceed to jughandle turn on right hand side labeled Centennial Avenue. Take Centennial Ave quarter mile and turn left at first traffic light into the parking lot. Hotel phone: 1-732-980-0500.

## Biographical Sketch

Dr. Linda J. Young is a Professor of Statistics at the University of Florida where she teaches, consults, and conducts research on statistical methods for studies in public health, agricultural, environmental, and ecological settings. Dr. Young has a Ph.D. from Oklahoma State University. She has been a faculty member at Oklahoma State University, the University of Nebraska, and the University of Florida. Dr. Young has more than 100 publications in over 50 different journals, constituting a mixture of statistics and subject-matter journals, and two books with a third one currently in press. A major component of her work is collaborative with researchers in the agricultural, ecological, environmental, and health sciences. Her recent research has focused on linking disparate data sets and the subsequent analysis of these data using spatial statistical methods. Dr. Young has been the editor of the *Journal of Agricultural, Biological and Environmental Statistics*. She is currently associate editor for *Biometrics*, *Journal of Environmental and Ecological Statistics*, and *Sequential Analysis*. Dr. Young also has a keen interest in statistics education at all levels, having worked with students and teachers from Kindergarten through High School as well as undergraduate, graduate, and post-graduate training. Dr. Young is a recipient of the American Statistical Association's Founders Award, a fellow of the American Statistical Association and an elected member of the International Statistical Institute. She has served on numerous panels for the National Science Foundation and the Environmental Protection Agency.