Workshop series: Fundamentals of linear mixed models for designed experiments

Instructor: Josefina Lacasa, PhD, Assistant Professor, Department of Statistics, Kansas State University.

Dates: 03/26, 03/28, and 03/31 | **Time:** 3-5 pm | **Location:** BB 1092.

Overview: Linear mixed models are widely used for analyzing data generated by designed experiments. This workshop series aims to help practitioners gain understanding and develop the intuition for the most common assumptions in mixed models.

Target audience: K-State faculty, research scholars and graduate students interested in the applications of mixed models for modeling data generated by designed experiments.

Software and computer requisites: Since model applications will be demonstrated using R software, prior experience using R software will be convenient but not required. Likewise, attendees are encouraged to bring their laptops, but will be able to follow the content regardless.

Tentative schedule:

Day	Topic
Wednesday 03/26/2025	**Fundamentals of linear mixed models** • Introduction to the intuition behind mixed models. • How to build a statistical model. • Fitting a mixed model to experimental data. • Model diagnostics.
Friday 03/28/2025	**Modeling data generated by designed experiments** • Identifying data structures. • The eternal dilemma of modeling blocks as fixed or random. • Repeated measures designs (potential).
Monday 03/31/2025	**Modeling non-normal data generated by designed experiments** • Modeling data with non-normal responses. • Model diagnostics for non-normal GLMMs.

Recommended textbooks:

- Gelman, A. and Hill, J. (2006). Data Analysis Using Regression and Multilevel/Hierarchical Models (1st ed.). Cambridge University Press. [link]
- Milliken, G.A., & Johnson, D.E. (2009). Analysis of Messy Data Volume 1: Designed Experiments, Second Edition (2nd ed.). Chapman and Hall/CRC. [link]
- Stroup, W.W., Ptukhina, M., & Garai, J. (2024). Generalized Linear Mixed Models: Modern Concepts, Methods and Applications (2nd ed.). Chapman and Hall/CRC. [link]