



Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca

Instructor: [Dr. Tom Loughin](#)

Textbook:

Analysis of Messy Data Volume 1: Designed Experiments, 2nd ed. By George A. Milliken & Dallas E. Johnson. Publisher: Chapman & Hall/CRC

Course Description:

A modern approach to normal theory General Linear Models including models with random effects and “messy” data. Topics include experimental units, blocking, theory of quadratic forms, linear contrasts, analysis of covariance, heterogeneous variances, factorial treatment structures, means comparisons, missing data, random effects, mixed model formulation, estimation and inference, multi-unit designs, pseudoreplication, repeated measures.

Course Outline (tentative):

REVIEW, ELEMENTARY ISSUES (~3 weeks)

- Goals of ANOVA
- Experimental units and Experimental error
- Unit Design vs. Treatment Structure
- Completely Randomized Design
- Blocking/Randomized Complete Block Design
- Linear Model Theory and Quadratic Forms
- Linear Contrasts
- Analysis of Covariance
- Heterogeneous Variances
- Power/Sample Size Analysis

MULTI-WAY TREATMENT STRUCTURES (~2 weeks)

- Balanced and unbalanced cases
- Means models vs. effects models
- Methods of means comparisons
- Contrast construction
- Missing treatment combinations
- Heterogeneous variances
- Power/Sample Size Analysis

RANDOM EFFECTS AND MIXED MODELS (~4 weeks)

- Examples and Inference Spaces
- Models and Variance components
- Expected Mean Squares
- Mixed model Theory and Application
- Estimation
- Inference
- Power/Sample Size Analysis

MULTI-UNIT DESIGNS (~3 weeks)

Split-plots
Strip-plots
Extensions
Pseudoreplication
Repeated measures

STUDENT PRESENTATIONS (~1 week)

Grading Scheme (tentative):

Homework: 20%

Midterm: 20%

Project: 20%

Final: 40%

Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.

Revised June 2010