STAT 402 - EXPERIMENTAL DESIGN AND ANALYSIS

Instructor: D.G. Bonett

Prerequisites: STAT 401 (or equivalent), working knowledge of SAS or SPSS

Readings: Dean, A. & Voss, D. (1999) *Design and Analysis of Experiments*, Springer.
Davis, C.S (2002) *Statistical Methods for the Analysis of Repeated Measurements*, Springer.
Keppel, G. (1991) *Design and Analysis: A Researcher's Handbook*, Prentice-Hall.

Part I. Single-factor Experiments (weeks 1 - 4)

Randomization, treatment factors; two-treatment experiments, confidence interval for difference in population means; single-factor experiments; confidence intervals for pair-wise comparisons and linear contrasts; measures of effect size; experiment-wise error rate; directional two-sided tests and equivalence tests; diagnostic methods; assumptions and effects of violating assumptions; sample size requirements.

Part II. Factorial Experiments (weeks 5 - 8)

Two-factor experiments; classification factors; main effects, 2-way interaction effects, and simple main effects; three-factor experiments; 3-way interaction effects; simple interaction effects; confidence intervals and tests; sample size requirements. ***Midterm Examination***

Part III. Experiments with Within-subject Factors (weeks 9 - 12)

Designs with a single within-subject treatment factor; randomized block, repeated measures, and cross-over designs; designs with two within-subject factors; confidence intervals and tests for linear contrasts of means; multivariate and approximate tests; assumptions and effects of violating assumptions; sample size requirements.

Part IV. **Experiments with Quantitative Factors and Experiments with Covariates** (weeks 13 - 15)

Designs with quantitative factors; designs with covariates; the general linear model; dummy variables; polynomial regression; parameter estimation, confidence intervals and tests; sample size requirements.

Final Comprehensive Examination (during finals week)

A total of 100 points may be earned on each examination and a total of 25 points may be earned on each of the four data analysis projects. Examinations are closed-book/notes.