Psychology 511 Fall 1987: Introducion to Statistical Inference and Analysis of Variance & Design of Experiments

Instructor: Robert Fagot
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Class Meetings: 9:30-10:50 Tu/Th (154 Straub) & 3:30-4:20 Tu/Th (248 Gilbert)

Texts: Glass, G. & Hopkins, K. (1984). Statistical Methods in Education and Psychology (2nd ed.), Prentice Hall.

Rosenthal, R. & Rosnow, R. (1985). Contrast Analysis, Cambridge University Press.

Reference texts:

Hays, W. Statistics (3rd ed.), Holt (Ch 1-9).

Keppel, G. (1982). Design and analysis: A researcher's handbook (2nd ed.), Prentice-Hall.

Kirk, R. E. (1982). Experimental Design. Procedures for the Behavioral Sciences (2nd ed.), Brooks/Cole.

Myers, J. L. (1979). Fundamentals of Experimental Design (3rd ed.), Allyn & Bacon.

Winer, B. J. (1971). Statistical Principles in Experimental Design (2nd ed.), McGraw-Hill.

(Over)

I. Introduction to Statistical Reference (Glass & Hopkins Ch 1-15)

0. Review: Descriptive statistics (Ch 1-5)
1. Elementary probability (Ch 9, LN #1)
2. Probability distributions (LN #2-3)
3. Normal distributions (Ch 6)
4. Expected value of random variables (LN #4)
5. Sampling distributions and estimation (Ch 10 & LN #5)
6. Hypothesis testing and inferences about population means (Ch 11 & 12; LN #6-11)
7. Inferences about variances (Ch 13; LN #12-16)
8. Inferences about proportions (Ch 14; LN #17, 18)
9. Introduction to linear regression and correlation (Ch 7, 8 thru sec 8.11; Ch 15 thru sec 15.8; LN #19-21)

II. Univariate Analysis of Variance (ANOVA) & Design of Experiments

1. Single factor design (Ch 16, G & H)
   A. Fixed effects model
   B. Basic data and notation
   C. Partitioning total sum of squares
   D. Expected mean squares & the F test
   E. Power of the F test
   F. Robustness of the F test

2. Asking specific questions of data (G & H Ch 17; R & R Ch 1-2)
   A. Error rates
   B. Contrast analysis
   C. Planned comparisons
   D. Trend analysis: orthogonal polynomials
   E. Comments on post hoc comparisons (data snooping)

3. Completely randomized multifactor designs (G & H Ch 18-19; R & R Ch 3-4)
   A. Fixed and random factors; mixed models
   B. Fixed effects model, two-way layout
   C. Expected mean squares
   D. Orthogonal contrasts and factorial designs
   E. Power
   F. Introduction to analysis of interaction

EVALUATION: Grade based on weekly assignments (optional), two midterm exams and a final exam.