**Psychology 501 – Foundations of Behavioral Research**

*Instructor:* Douglas G. Bonett (dgbonett@iastate.edu)

*Prerequisites:* Stat 401 or equivalent

*Office:* 487B Science I (office hours: MWF 10:30-11:00 and 2:15-2:45)


### Weeks **Statistics Review Topics**

1-2 Populations and population parameters; random samples and parameter estimates; standard error of estimate; confidence intervals; properties of confidence intervals; hypothesis testing; p-values; sample size requirements.

3 Gaussian (Normal) distribution; sampling distributions; estimator bias; Central Limit Theorem; probability concepts; assumptions and effects of assumption violation; ethical issues.

4-5 2-group designs; confidence intervals for mean difference and proportion difference; hypothesis testing; assumptions and effects of assumption violation; sample size requirements.

6-8 One-factor designs; confidence intervals for linear contrast of means and proportions; one-way ANOVA and eta-squared; two-factor designs; main effects, interaction effects, and simple main effects; two-way ANOVA and partial eta-squared; sample size requirements; assumptions and effects of assumption violation.

9-10 Simple linear regression model; Pearson correlation; confidence intervals for slope and correlation; sample size requirements; assumptions and effects of assumption violation.

11-12 Multiple linear regression model; analysis of variance and squared multiple correlation; partial correlation; confidence intervals for slopes, multiple correlation and partial correlation; regression models with interaction effects; simple slopes; confidence intervals for simple slopes; polynomial regression models; regression models with dummy coded predictor variables; confidence intervals for difference in zero-order, partial, and multiple correlations; standardized slopes; sample size requirements; assumptions and effects of assumption violation.

13-14 Within-subjects designs; confidence intervals for mean difference and linear contrast of means; within-subjects ANOVA and partial eta-squared; two-factor within-subjects experimental design; sample size requirements; designs with one between-subjects factor and one within-subjects factor; assumptions and effects of assumption violation.

### Weeks **Research Methods Topics**

1-2 Survey research designs; uses and limitations of survey research; types of measurements; study populations and target populations.

3 Confidence interval interpretation; choice of confidence level; convenience samples; misuses of hypothesis testing and advantages of confidence intervals; ethical issues in human subject research.

(continued)
4-5  Causal relations; 2-group experimental design; standardized mean difference (Cohen’s $d$); nonexperimental designs; experiments with convenience samples; threats to internal validity; expectancy effects; external validity; manipulation checks.

6-8  One-factor experimental designs; data analysis strategy in two-factor designs; standardized effect sizes; uses of factorial designs; designs with unequal sample sizes.

9-10  Correlational research; uses and limitations of correlational research; reliability assessment; effects of reliability on statistical analyses; types of validity evidence.

11-12  Statistical control using multiple linear regression and partial correlation; comparing zero-order, partial, and multiple correlations across groups.

13-14  Within-subjects experimental designs; standardized mean difference; uses and limitations of within-subjects experimental designs; two-factor within-subjects experimental designs; mixed designs; uses and limitations of quasi-experimental designs.

15  Review

Assessment:

1) Midterm Examination (modules 1-4): 100 points, closed book/notes. Oct 21
2) Final Comprehensive Exam: 130 points, closed book/notes. Dec 12 9:45-11:45
3) Homework assignments: 70 points. There are seven data analysis homework assignments that are each worth 10 points.

The letter grade for the course will be determined as follows:

- 279 – 300: A
- 270 – 278: A-
- 261 – 269: B+
- 249 – 260: B
- 240 – 248: B-
- 231 – 239: C+
- 219 – 230: C
- 210 – 218: C-
- 201 – 209: D+
- 189 – 200: D
- 180 – 188: D-
- 0 – 179: F

Disability Accommodations

If you have a documented disability that requires accommodations, contact the Student Disability Resources office, located on the main floor of the Student Services Building, Room 1076 (515-294-7200) to obtain a Student Academic Accommodation Request that describes the needed accommodations.

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