STAT 5302 Intermediate Data Analysis II
Spring Semester 2017

Lecture: MWF 3:00-3:55PM in Cockins Hall 232

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Textbook: *The Statistical Sleuth: A Course in Methods of Data Analysis* (Third Edition) by F.L. Ramsey and D.W. Shafer.
The textbook is on reserve in the 18th Avenue Library.

Website: The course has a web page on Carmen (`http://www.carmen.osu.edu/`). You will find the class schedule, homework assignments, solutions, and other course announcements on the web page. Please check it on a regular basis.

Prerequisites: 5301 or permission of the instructor

Computing: You will be required to do some basic statistical analyses on the computer using the statistical software package R for your assignments. Information on R will be given on the course website.

Course Description

STAT 5302 is the second course in a two-semester sequence in Intermediate Data Analysis (5301-5302). We assume that students are familiar with organizing and summarizing data, the nature of relationships between variables, sampling distributions and the underlying rationale for hypothesis tests and confidence intervals. We also assume that students are comfortable with a variety of models and inferential procedures. Specifically, the material in 5302 relies heavily on the additive model (see the early part of the text for a description of this model) and one-way ANOVA. The course will cover simple linear regression, multiple linear regression, and two-way (and multi-way) ANOVA. For each of the common statistical methods covered in the course, we will focus on generation of appropriate models for data, estimation of the model parameters and their inference, and model diagnostics. Applications of the methods will be illustrated with data analysis.

STAT 5302 satisfies the General Education (GE) requirement in *Data Analysis*.

Expected Learning Outcomes: Students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

Tentative Course Schedule

Week	Topics
1	Simple linear regression model, Least squares regression estimation
2	Inferential tools for regression (Ch.7)
3	Interpretation after log transformation, ANOVA for regression, Residual diagnostics
4	R-squared, Simple LR vs one-way ANOVA, Lack-of-fit test (Ch.8)
5	Multiple linear regression model, Power transformation, Creating explanatory variables
6	Interpretation of coefficients (Ch.9), Least squares method for multiple linear regression
7	Inference about regression coefficients and linear combination of coefficients, Predictions
8	Testing a group of coefficients with F-test, Model comparison (Ch.10)
9	Model checking with residual plots, Model refinement, Weighted least squares
10	Influential observations, Case-influence statistics (Ch.11)
11	Sequential methods for variable selection, All subsets regression
12	Model selection criteria, Bayesian model selection, Model averaging (Ch.12)
13	Two-way ANOVA model, Additive/non-additive model, ANOVA table
14	Tests for a factor's effect, Test for interaction and interaction plots, Sequential sum of squares Multiple comparisons, Tests for block effects (Ch.13)

Grading

Your course grade will be assigned on the basis of performance on homework assignments, a midterm, and a comprehensive final exam.

Homework (20%): There will be approximately bi-weekly assignments. Homework problems and solutions will be posted on Carmen. No late homework will be accepted.

Midterm (35%): tentatively on February 27 (Monday) in class.

Final exam (45%): on April 28 (Friday) 4:00-5:45PM in the regular classroom
No make-up exams will be given. The final exam will be cumulative, but will emphasize the more recent material. Exam rules will be announced in class.

Academic Misconduct

Although students are often encouraged to work together on assignments, each student must submit their own written work in their own words. Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with the University Rule (`http://oaa.osu.edu/coam.html`).

Special Accommodations

Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, slds@osu.edu; `http://slds.osu.edu`.