

STAT 5302 Intermediate Data Analysis II Spring Semester 2016

Lecture: MWF 3:00-3:55PM in Stillman Hall 235

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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

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 is a GE (General Education) *Data Analysis* course.

Goals: Students develop skills in drawing conclusions and critically evaluating results based on data.

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
Jan 11-15	Simple linear regression model, Least squares regression estimation, Inferential tools
Jan 18-22	Inferential tools (Ch.7), Interpretation after log transformation
Jan 25-29	Residual diagnostics, R-squared, Simple LR vs one-way ANOVA, Lack-of-fit test (Ch.8)
Feb 1-5	Multiple linear regression model, Power transformation, Creating explanatory variables
Feb 8-12	Interpretation of coefficients (Ch.9), Inference about regression coefficients
Feb 15-19	Linear combination of coefficients, Predictions
Feb 22-26	Testing a group of coefficients with F-test, Model comparison (Ch.10), Midterm
Feb 29-Mar 4	Residual plots, Model refinement, Weighted least squares
Mar 7-11	Influential observations, Case-influence statistics (Ch.11)
Mar 21-25	Sequential methods for variable selection, Model selection criteria
Mar 28-Apr 1	All subsets regression, Bayesian model selection, Model averaging (Ch.12)
Apr 4-8	Two-way ANOVA model, Additive/non-additive model, ANOVA table
Apr 11-15	Tests for a factor's effect, Sequential sum of squares, Multiple comparisons
Apr 18-25	Test for interaction and interaction plots, 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 (30%): There will be approximately bi-weekly assignments. Homework problems and solutions will be posted on Carmen. No late homework will be accepted.

Midterm (30%): tentatively on February 26 (Friday) in class.

Final exam (40%): on April 29 (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.

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.

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 University Rule (<http://oaa.osu.edu/procedures>).

Special Accommodations

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu/>.