

STAT 5302 INTERMEDIATE DATA ANALYSIS II
SPRING SEMESTER 2018

Lecture: MWF 1:50-2:45PM in N054 Scott Lab

Instructor:

Dena Asta
Office: 317 Cockins Hall
Office Hours: Tues and Thurs 2:00PM-3:00PM or by appointment
Email: dasta@stat.osu.edu or asta.1@osu.edu

Grader: TBD

Prerequisites: 5301 or permission of instructor.

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 Science and Engineering Library (SEL).

Website: The course has a web page on Carmen. You will find the class schedule, homework assignments, solutions, and other course announcements on the web page. Please check it on a regular basis.

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 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 8-12 | Simple linear regression model, Least squares regression estimation, Inferential tools |
| Jan 17-19 | Inferential tools (Ch.7), Interpretation after log transformation |
| Jan 22-26 | Residual diagnostics, R-squared, Simple LR vs one-way ANOVA, Lack-of-fit test (Ch.8) |
| Jan 29-Feb 2 | Multiple linear regression model, Power transformation, Creating explanatory variables |
| Feb 5-9 | Interpretation of coefficients (Ch.9), Inference about regression coefficients |
| Feb 12-16 | Linear combination of coefficients, Predictions |
| Feb 19-23 | Testing a group of coefficients with F-test, Model comparison (Ch.10), Midterm |
| Feb 26-Mar 2 | Residual plots, Model refinement, Weighted least squares |
| Mar 5-9 | Influential observations, Case-influence statistics (Ch.11) |
| Mar 19-23 | Sequential methods for variable selection, Model selection criteria |
| Mar 26-30 | All subsets regression, Bayesian model selection, Model averaging (Ch.12) |
| Apr 2-6 | Two-way ANOVA model, Additive/non-additive model, ANOVA table |
| Apr 9-13 | Tests for a factors effect, Sequential sum of squares, Multiple comparisons |
| Apr 16-23 | Test for interaction and interaction plots, Tests for block effects (Ch.13) |

Grading

Your course grade will be based on homework assignments, one midterm, and a comprehensive final exam.

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|-----------------|-----|---|
| Homework | 30% | |
| Midterm | 30% | tentatively on Feb 23 (Friday) in class |
| Final | 40% | May 1 (Tuesday) 4:00-5:45PM |

Homework: There will be approximately bi-weekly assignments. Homework problems and solutions will be posted on Carmen. No late homeworks will be accepted. Homework is due at the beginning of class.

Exams: 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. More details will be given on the course website.

Academic Misconduct

Although students are encouraged to work together on assignments, each student must submit their own written work in his or her own words. Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with University Rule (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>.