STAT401 - Applied Methods in Statistics

Fall 2016

1:40pm - 2:55 TR Wilson 1-144

3:10pm - 4:00 R Reid 305

Instructor: Dr. Al Parker, Barnard (EPS) 304, parker@math.montana.edu*, 994-5145.

Office Hours: 3-4pm on Tuesdays and 11am-12pm on Wednesdays in Barnard (EPS) 304; 3:10-4:00pm on Thursdays in Reid 305; other times by appointment.

Course Webpage: http://www.math.montana.edu/parker/courses/STAT401

Text: Diez, Barr and Cetinkaya-Rundel. *OpenIntro Statistics*, 3rd ed., 2016. FREE download or $19.49 hard cover book available at https://www.openintro.org/stat/textbook.php

Prerequisite: Graduate standing and *Introduction to Statistics* (STAT216Q)

Topics: STAT 401 provides researchers with a general overview of statistics and is intended for graduate students not majoring in the mathematical sciences. This overview prepares students for higher level STAT courses such as graphical techniques (408), methods of data analysis (411/511), non-parametric methods (431), and sampling (446). We will cover chapters 1-7 in the text. Topics include: the basics of graphical techniques and sampling, transformations, sampling distributions, one-way ANOVA, multiple comparisons, contingency table analysis, and simple linear regression.

Learning outcomes: After completing this course, students will be able to: describe a data set using appropriate numerical and graphical measures; evaluate the validity of a statistical analysis; determine the scope of inference that can be made in a study; understand and implement the fundamental techniques of statistical inference; and **communicate results of a statistical analysis effectively in writing**.

Grading is based on approximately 610 total points:

- Exam 1: Thursday, September 29: 100 points (16%)
- Exam 2: Thursday, November 3: 100 points (16%)
- Comprehensive Final Exam: Tuesday, December 13, 2:00 - 3:50pm: 100 points (16%)
- Projects: 10 pts for first + 30 pts each for 10-11 projects for a total of 310-340 points (52%)

Letter grades will be assigned according to the following percentages:

F 0-59, D 60-64, D+ 65-69, C 70-74, C+ 75-79, B 80-84, B+ 85-89, A 90-100.

Exams: All exams are given in class and worked individually by each student. One 8.5" x 11" sheet of notes (written on only one side) is allowed for Exams 1 and 2. One 8.5" x 11" sheet of notes (written on both sides) is allowed for the Final Exam. Equation sheets will be provided for each exam. There are no make up exams.

Projects: A project will be assigned each week, except for weeks that include scheduled exams. Most projects consist of a data analysis component (numerical and graphical) and an interpretation component. Reports for completed projects must be turned in by due date and time. A complete solution to each project will be posted on the STAT401 web page. Each student is responsible for reading and understanding the solution. Expected project topics are listed below.

- Project 0: Installing R
- Project 1: Data
- Project 2: Sampling Plans and Experimental Designs
- Project 3: Descriptive Statistics
- Project 4: Distributions and Transformations
- Project 5: Sampling Distributions
- Project 6: Estimation
- Project 7: One Sample Hypothesis Testing and Confidence Intervals
- Project 8: Two Sample Hypothesis Testing and Confidence Intervals
- Project 9: One-way ANOVA
- Project 10: Contingency Table Analysis
- Project 11: Simple Linear Regression

Reports for projects will be graded for content as well as for the organization and quality of the write-up. Of particular note:

- Reports must be typed.
- Answers to questions should be numbered the same as the questions themselves.
- Results and statements in response to specific questions in a report must be substantiated by calculations, a logical argument, and/or computer code and output. If you have a question about which questions require justification, then ask.
- ALL computer code and output used to complete a project are to be included in your report. Never just paste in computer code to answer a question. Answer each question using proper English sentences, then reference the appropriate computer output if appropriate.
- Any Table or Figure included in your report must be numbered, labeled and referenced from the body of your report. Next to the number for each Table and Figure, a short descriptive caption should be given.

Computer Software: The FREE software R will be used for examples discussed in class, exam questions, and projects. At your own risk, you may use a different software package for projects. The Course Notes for Chaper 1 show how to install R on your computer, and give an introduction to using R. Subsequent Course Notes show relevant R code for data analyses. This code will need to be modified to complete the projects.

Help: When working on projects, you may provide help to and/or receive help from your classmates. What a great way to learn! However, each student must hand in an **independent** write-up of each project.

I will always make time to help answer your questions. Feel free to email questions. Email is the best way to set up a time to meet with me outside of office hours. If you email me with a question about R, paste in any relevant R-code and R-output.

Disabilities: If you have a documented disability for which you will be requesting an accommodation, contact me and the Disabled Student Services as soon as possible.