STAT422 - Mathematical Statistics

Spring 2017 12pm MWF Wilson 1-144

Instructor: Dr. Al Parker, Barnard/EPS304, 994-5145, parker@math.montana.edu.

Office Hours: Mondays, Wednesdays and Fridays: 11am-12pm; other times by appointment.

Course Web Page: http://www.math.montana.edu/~parker/courses/STAT422

- **Text**: Wackerly, Mendenhall, and Scheaffer. <u>Mathematical Statistics with Applications</u>, 7th edition. Brooks/Cole. 2008.
- **Software**: The FREE software R may be used for examples discussed in class, exam questions, and projects. At your own risk, you may use a different software package. R is available at http://cran.r-project.org/

Prerequisite: STAT421 (chapters 1-6 of the text)

- **Topics**: The goal of STAT422 is to provide an introduction to the *theory* of point estimation, interval estimation, and hypothesis testing. In the text, we will cover:
 - Chapter 7: sampling distributions, central limit theorem, normal approximation of the binomial
 - Chapter 8: bias, mean squared error, point estimation, confidence intervals, sample size calculations
 - Chapter 9: relative efficiency, consistency, sufficiency, minimum variance unbiased estimation, method of moments, maximum likelihood estimation
 - Chapter 10: hypothesis testing, power, likelihood ratio tests
 - Chapter 15: non-parametric tests
 - Chapter 16: Bayesian point estimation, interval estimators, and hypothesis testing
- Learning outcomes: Upon completing this course, a student will be able to demonstrate knowledge and use of *probability theory* as a *foundation* for statistical inference; *derive* estimators, hypothesis tests and confidence intervals for unknown parameters; compare and evaluate estimators, hypothesis tests and confidence intervals based on desirable statistical properties; demonstrate a basic understanding of computer simulation; and apply concepts to practical problems and relate them to other coursework and experiences in statistics

Grading is based on about 500 total points:

- Exam 1: Friday, February 17: 100 points (20%)
- Exam 2: Friday, March 31: 100 points (20%)
- Comprehensive Final Exam: Thursday, May 4, 6:00–7:50pm: 100 points (20%)
- Projects: about 20 points each for a total of about 200 points (40%)

Letter grades will be assigned according to the following percentages:

F 0-59, D 60-66, D+ 67-69, C 70-76, C+ 77-79, B 80-86, B+ 87-89, A 90-100.

- **Exams**: All exams are in class, worked individually, and are "closed book." Calculators are allowed, cell phones are not. If an extreme circumstance occurs (e.g., illness or previously scheduled activities vital to academic program), notify me prior to the exam and provide appropriate documentation. Otherwise, there are no make-up exams.
- **Projects**: A project will be assigned roughly each week, except for weeks that include scheduled exams. To receive full credit, projects must be turned in when due. To have late work considered for partial credit, you must notify me ahead of time.
- **Participation**: You are expected to actively participate in class by verbally asking questions (e.g., from the last project) and by verbally answering questions posed to you. Questions posed in class are designed to (1) assist in your learning rather than to demonstrate what you have learned; (2) reinforce concepts; and/or (3) motivate new topic(s). If you prefer to "pass" on a question, no worries, just respond "pass".
- **Help**: When working on projects, you may provide help to and/or receive help from any of your fellow 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 may be requesting an accommodation, contact me and Disabled Student Services as soon as possible.