MA 405 ~ Probability and Statistics II
Spring Semester 2019-2020

Instructor: Dr. Melissa Gardenghi
Office: Alumni 38
Office Hours: MWF 10-10:50 am; T 2:00-2:50 pm; others by appointment
Email: mgardeng@bju.edu
Course Website: https://math.bju.edu/ma405/
Textbook: *Freund's Math Statistics* Eighth Edition by Miller and Miller, Prentice Hall.
Calculator: TI 89, TI-Nspire-CAS with statistical program loaded.

Catalog Description: Type of convergence in probability, law of large numbers, Tschebytscheff's inequality, central limit theory proven, development of point and interval estimates and hypothesis testing, regression, ANOVA, Chi square. *Second semester, three credits. Prerequisite: Ma 404*

Course Context:
This course supports the following objectives of the mathematics and actuarial programs:

MM1: Progress logically from premises to valid conclusions in a variety of mathematical contexts.
MM2: Apply mathematics to model real-life situations.
MM3: Select and use technology for understanding, as well as a labor-saving or problem-solving tool.

ASM1: Solve problems using standard mathematical techniques.
ASM2: Progress logically from premises to valid conclusions in a variety of mathematical and applied contexts including analysis, statistics (both theoretical and applied), probability and finance.
ASM3: Apply mathematics to actuarial problems (such as financial math and probability modeling) in exercising the biblical mandate to have dominion over the earth.
ASM4: Use technology as a tool for understanding as well as a labor-saving or problem-solving tool.

Course Goals:

CG1: Develop mathematical maturity in statistical modeling, problem solving, application of probability and statistics, and the use of standard mathematical tools (calculus, series, linear algebra, etc.). MM1, MM2, MM3, ASM1, ASM2, ASM3, ASM 4.
CG2: Develop the theory and use of advanced probability models, data analysis, and an understanding of the nature of mathematics and how to study it. MM1, MM2, ASM1, ASM2, ASM3.

Course Objectives: The student will be able to:

1. Develop and use advanced distributions (Poisson, Gamma, Beta, and Multivariate Normal distributions)
2. Develop and use change of variables methods.
3. Estimate model parameters using MOM/MLE/percentile matching and evaluate the quality of their estimators.
4. Discuss the theoretical foundations of hypothesis testing, including the Neyman-Pearson Lemma and the likelihood ratio test.

Course Requirements and Evaluation:

1. Approximately three unit in-class tests. Each test will be worth approximately 200 points.**
   Tentative Test Dates: Ch 3-6 Feb 11; Ch 7-8 March 10; Ch 10-12 April 21
2. Weekly homework rubrics – 5 points each, for 14 weeks.

3. Corresponding homework for each unit. Recommended problems are posted on the course webpage. The homework rubric will be due at the beginning of class on a test day (unless otherwise stated), and will be worth approximately 10 points each. Homework problems themselves will NOT be collected.
4. A cumulative final exam, worth 250 points.

Grading Scale: Standard 10 point scale.

General Policies:

1. Compliance with student handbook policies is expected during class.
2. No assignment will be accepted after the due date without prior permission of the instructor. Work may always be completed early (see your professor if you wish to take a test early).

   Exceptions may be granted by your professor in emergencies. Contact your professor asap by email to notify them of the emergency. Requests for exceptions should be made in person asap.
3. University attendance policy is in effect (see http://home.bju.edu/life/policies/class-attendance-policy.php for details).

   Scheduled tests/quizzes should be taken before your *planned absence*; please contact your professor to make arrangements for doing so. You are personally responsible to get notes from your classmates and discuss the missed material with them. You should not expect your professor to privately re-teach you the material you missed. If an unannounced quiz/assessment is taken during the class that you miss, you will NOT be allowed to make it up, and you WILL receive a zero on the assignment.

   Missing a test because you feel you are not prepared to take it is **not** acceptable. Work missed for this reason will not made up and you will receive a zero on the assignment.

   For *absences due to incapacitating illness or emergency*, you should contact the instructor as soon as you realize you will not be in class in order to make arrangements for making up any missed work. Tests will be made up without penalty for the first occurrence. Each subsequent time a test is missed because of incapacitating illness or emergency, an additional 10 percent grade penalty for that test will be incurred.
4. University academic integrity policy is in effect (see http://home.bju.edu/academics/ for more details).

   Cheating is defined as any use of unauthorized helps, and plagiarism is defined as taking someone else's words and/or ideas and claiming them as your own.

   Doing your own work brings glory to God. The claiming of someone else's work as your own is cheating and is a sin. All work done for this class needs to be your own. If information is taken from other sources (which is at times appropriate), it always needs to be referenced and credit given where it is due. Use standard referencing techniques as taught in En 102. Solutions found on the internet are not to be copied.

   Tests: In today's age of technology, cheating includes getting unapproved help from a source on the internet and/or using an Excel/SPSS file to provide you with additional information during a test. The presence of any unauthorized material on your desk or open on your computer (including but not limited to notes, email, chat windows, help websites, etc.) while taking a test, will be construed as cheating and will be dealt with as such. Cheating on a test will result in a zero on the test plus any penalties imposed by the Academic Integrity Committee.

   If you have a question about any source you are considering using, please gain your professor's approval before using it. You are always permitted to ask your professor for help. Any help they choose to provide is acceptable.