MA 405 ~ Probability and Statistics II
Spring Semester 2021-2022

Instructor:	Dr. Melissa Gardenghi
Office:	Alumni 38
Office Hours:	Daily by appointment (see below to schedule)
Preferred Method of Communication:	MS Teams; personal correspondence by personal chat and general course/content related questions in the course general channel
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/Software:	TI 89, TI-Nspire-CAS with statistical program loaded/access to R and RStudio

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 two unit in-class tests. Each test will be worth approximately 200 points.[**]
   Tentative Test Dates: Ch 3-6 Feb 3; Ch 7-8 March 3
2. In class quizzes as announced over Ch 10-15, various points

3. Weekly homework rubrics – 8 points each, for 15 weeks. Recommended problems are posted on the course webpage. Homework problems themselves will NOT be collected.
4. Data modeling project, worth 400 points.
5. 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. The classroom is to be a professional environment. That means your attention is expected to be on course related material, and you are expected to positively contribute to the class. I reserve the right to ask you to leave class should your attention be elsewhere (sleeping, surfing the internet, working on assignments for another class, etc.).

2. Late Policy:

   - Weekly HW/progress reports are penalized at 25% per calendar day late (automatically in Canvas).

   - Written assignments/projects are penalized at 15% off if turned in with 3 calendar days of the due date, and are a 0 after that. Oral presentations are a 0 if not presented on the day assigned.

   - In-class tests must be taken by the date given in class unless there is incapacitating illness (see attendance policy below). .

   - Work may always be completed early (contact your professor if you wish to take a test early).

   Exceptions may be granted by your professor in emergencies. Contact your professor asap by Teams to notify them of the emergency.

2. BJU attendance policy is in effect (see https://home.bju.edu/bju-policies/ 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 an in-class test because you feel you are not prepared to take it is **not** acceptable. Work missed for this reason will not be 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 to make arrangements for making up any missed work. In-class 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.

3. University academic integrity policy is in effect (see https://home.bju.edu/bju-policies/ 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.

   Homework: While you are encouraged to work together on the homework assignments, simply copying someone else's solution is not acceptable. Your homework should represent your work and your understanding of the work.

   Projects: You are encouraged to discuss the general ideas of data analysis as discussed in this course with your classmates, but are **not** permitted to "work together" on your project (outside of your own group and any faculty appointed advisors). Your projects must represent your own ideas and your own work.

In-Class Tests: In today's age of technology, cheating includes getting unapproved help from a source on the internet and/or using your calculator to provide you with additional information during a test. The presence of any unauthorized material on your desk while taking a test, will be construed as cheating and will be dealt with as such. Cheating on a test will be submitted to the Academic Integrity Committee.

Take-Home Tests: Take-home tests are also expected to represent your own work. All guidelines for in-class tests also apply to take-home tests unless explicitly stated otherwise in the directions. No collaboration, discussion, consultation, etc. with any person is permitted. Cheating on a test will be submitted to 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.