

MAT 3701: Probability and Statistics I

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1. COURSE CONTENT

The fundamental ideas of probability theory and its application to statistics, including: data description; counting techniques; sample spaces and probability measures; random variables, distributions, and densities; expectation, variance, and covariance; important special distributions and densities; useful functions of random variables (particularly moment-generating and characteristic functions). As well as being of interest for their own sake, these topics form the foundation for the study of statistics in MAT 3702.

2. GENERAL OBJECTIVES & PREREQUISITES

The objectives of this course fall into three major categories of fairly equal importance:

- Conceptual understanding
- Technical proficiency
- Application

Each of these objectives must be mastered, and study of each one will reinforce the others: conceptual understanding makes sense of techniques, and techniques are the basis for applications; coming full circle, application of ideas deepens conceptual understanding. *Thorough conceptual understanding is reflected in the ability to clearly explain the reasons for procedures, explore creative approaches to problems, and – yes, this is an upper-level mathematics course – prove theorems.* (However, since the course in theoretical foundations, MAT 2800, is not a prerequisite for this course, and since this course is designed to be accessible to students whose only university mathematics background consists of calculus, theory will not be quite as emphasized as in some other courses at this level, and no previous theoretical experience will be assumed.)

Prerequisite knowledge: Please be advised that calculus will be assumed and used extensively. You must understand and be able to work with limits and continuity, differentiation, and integration.

3. REQUIREMENTS

Class participation: You are expected to be in class every day and to work steadily on assignments. Be prepared to present your progress toward solutions of problems. Expect to participate constructively and politely in discussions.

Homework & Quizzes: Written homework problems will be regularly assigned and graded, with comments. You may hand in joint papers; just give credit at the top to all of the authors of a homework paper. The authors of a joint paper will receive the same grade.

There may be occasional quizzes, which may be unannounced, whose purpose is to help you solidify your comprehension and assess how well you know the material. They will count only if they help you; in this case, they will be averaged into your homework grade.

Midterm Exam: There will be a single (1) midterm exam (in addition to the final), which may be partially given in take-home format. Make-up exams will be given only under extraordinary circumstances or in case of serious emergency; prior permission to miss an exam must be obtained from the professor if at all possible.

Final exam: The final exam will be comprehensive. It may be partially or entirely given in take-home format, and it may include an oral component.

4. GRADING

I do not grade on a “curve”. Under no circumstances will your grade directly depend on how your fellow students do. If you do a good job of learning the material, you will receive a good grade, regardless of how well the other members of the class perform. Don’t forget that the reverse is also true: if you do a poor job of learning the material, you will receive a poor grade, regardless of how poorly everyone else does.

Short-answer and purely computational problems will be scored on a percentage basis, with grades assigned according to the standard scale: 90% or above earns an A, 80% or above, but less than 90%, earns a B, and so forth. A score of less than 60% earns a failing grade (F). On problems that require essay solutions or proofs, I will directly assign letter grades, based on the objectives stated above and standards clarified in class. These letter grades correspond to my judgement of quality as follows:

- A Excellent. The work exhibits mastery of nearly all important ideas, including those which are subtle or difficult, much insight and originality, highly coherent organization and fine expository style. Errors and omissions, if any, are minor.
- B Good. The work exhibits substantial understanding of most important ideas, including some which are subtle or difficult, some insight and originality, coherent organization and correct usage, grammar and spelling. There are some substantive errors or omissions.
- C Fair. The work exhibits basic understanding of many fundamental ideas, although not those which are subtle or difficult, and demonstrates some coherence. The presentation is readable, with at most minor errors of usage, grammar or spelling. There are many substantive errors or omissions.
- D Poor. The work exhibits some understanding of a few fundamental ideas, but not those which are subtle or difficult, and it fails to demonstrate coherence. Usage, grammar and spelling are mostly correct. There are a great many substantive errors or omissions.
- F No credit. The work exhibits too few of the positive qualities noted above to be worthy of credit.

All scores and grades will be converted to the 0 (F) – 4 (A) scale for averaging. (100% ↔ 4.5, 90% ↔ 3.5,) Each requirement will count toward your final grade as follows:

Homework:	40%
Midterm Exam:	30%
Final Exam:	30%

Complete honesty on assignments and exams is expected of all students.