MA381 Introduction to Probability with Statistical Applications

Course Overview: The goal of this course is to equip you with the basic concepts and tools of probability so that you can successfully construct and use probability models. In other words, after taking this class you should understand the basics of modeling random phenomena.

How to Do Well: Warning! For most of you this will be your first exposure to constructing and using random models instead of the deterministic models discussed in your other courses. Therefore this course represents a significant departure from the mathematics you have seen previously. Therefore, in order to succeed you may need to spend more time studying the material and doing problems than in your prior math courses. In addition, to be successful in this course you should

1. Stay current on the material
2. Review the material and/or do at least one problem daily
3. See me and/or the tutoring center if you don't understand something

Electronic Classroom Etiquette:

No cellphones: At no point is your cell phone to be seen, heard, or used between the starting and ending bells for our period. Any individual using his/her cell phone, e.g. viewing it and/or texting, during class will be assessed a 1% reduction overall class grade reduction for each infraction.

No laptops: Except for rare occasions, you will not need your laptops. Therefore, unless instructed otherwise by me, you will not need to bring your laptop. Laptop use unrelated to the course is prohibited during class.

Course Resources:

Text: *Fundamentals of Probability with Stochastic Processes, third edition* by Saeed Ghahramani, ISBN 0-13-145340-8.

Webpage: www.rose-hulman.edu/class/ma/inlow/Math381/

Software: For some hw problems you may need Maple. You will not be using Maple on quizzes or exams.

Office Hours: Office hours are 11:00 to 12:00 and 1:30 to 2:00, MTThF. Please do not come to my office between noon and 12:40 (start of 6th) since I prep for class during this time. My office is G-210A (Crapo).

E-mail: I check my e-mail throughout the day and occasionally during the evening. I try to respond in a timely fashion relative to the urgency of the question.

Grades: Your grade in the course will computed using the following:

Homeworks: I plan to assign one or two hw's a week. Selected problems will be graded in depth; completion credit will be given for the others. Late and/or e-mailed hw's are not accepted.

Quizzes: There will be at least 3 (announced) quizzes. There are no make-up quizzes. If a valid excuse is provided (in a timely fashion) for a missed quiz, the average of the other quizzes will be used to determine the value of that quiz; otherwise, the value of the quiz will be 0.

Exams: There will be 3 midterms. There are no make-up exams. If a valid excuse is provided, the value of the missed exam will be determined using the final.

Final: There will be a final. Part of the final will cover new material; the remainder will be comprehensive

Formula: Grades will be determined using the usual 90/80/70/60 breakdown, but I reserve the right to curve your grade upward. Below are the point breakdowns:

Homeworks:	70
Quizzes:	100
Exams:	3*100
Final:	150
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Total	620

Academic Misconduct: The Rose-Hulman student handbook states that academic misconduct "includes actions such as cheating, plagiarizing, or interfering with the academic progress of other students." In accord with the handbook, I reserve the right to give reduced or no credit for work dishonestly done and to levy further penalties. For more details, see the student handbook.

Attendance: You are expected to attend every class. If you miss a class, you are expected to see me and discuss what you missed in class that day. I will warn you if I feel you have missed too many classes. Once you are warned, I reserve the right to give you a failing grade if you continue to miss classes.

Course Outline: The following provides an overview of the topics and methods (in order) which we will cover in the course:

Chpt. 1 (1.1-1.4): Basic probability models, Kolmogorov Axioms, set operations and events

Chpt. 2 (2.2-2.4): Basic counting principles, combinations, and permutations

Chpt. 3 (3.1-3.5): Conditional probability, laws of multiplication and total probability, Bayes' Theorem, independence

Chpt. 4 (4.1-4.5): Random variables (RV's); distribution functions; discrete RV's; expectations, variances, and moments of discrete RV's

Chpt. 5 (5.1-5.3): Bernoulli, binomial, Poisson, geometric, hypergeometric, and negative binomial discrete RV's

Chpt. 6 (6.1-6.3): Absolutely continuous RV's, density functions, functions of RV's, expectaions and variances

Chpt. 7 (7.1-7.3): Uniform, normal, and exponential RV's

Chpt. 8 (8.1-8.3): Joint distribution of bivariate RV's, independent RV's, conditional distributions

Chpt. 10 (10.1-10.4): Expected values of sums of RV's, covariance, correlation, conditioning on RV's

Chpt. 11 (11.1-11.3, 11.5): Moment generating functions, sums of independent RV's, Chebychev Inequality, central limit theorem

Supplement Statistical applications: estimators, confidence intervals, and hypothesis tests