Syllabus – STOR 435
Fall 2017 (August 22 – December 5)
TuTh 3:30-4:45pm
Hanes 120

Instructor: Jan Hannig   **Phone:** (919) 962-7511

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Office Hours: M 1:00 – 2:00 PM   **Course home page on**

W11:30AM – 12:30noon   http://www.unc.edu/~hannig/STOR435

and by appointment

Teaching Assistant: Haodong Wang   **E-mail:** haodong@live.unc.edu

TA Office: Hanes B1   **TA Office Hour:** MW 9:30 – 10:30AM

Target audience: Students in Statistics and Analytics, Mathematics, Computer Science, Physical Sciences and other majors and minors. It is assumed that students have working understanding of calculus of one and several variables.

Required Text:

- Blitzstein and Hwang, *Introduction to probability,* CRC Press

Optional Texts:

- Sheldon Ross. *A First Course in Probability*, 9th Edition, Prentice Hall
- Hogg and Tanis, *Probability and Statistical Inference,* Prentice Hall
- Grimmett and Stirzaker. *Probability and random Processes*, Oxford

Course goals and key learning objectives: The main goal of this course is to provide students with the fundamentals of probability theory that are necessary for more advanced courses in STOR, MATH, CS and other disciplines, and that can be used by students as a foundation for Statistics, Actuarial Science, Machine Learning, Analytics, Applied Mathematics and other areas.

Prerequisite: A good working knowledge of Mathematics 231-233 (calculus of one and several variables) or equivalent. Students will need some familiarity with manipulating single and double sums and should be comfortable with standard mathematical notation for sums, products, unions, intersections, sets and so on. They should be familiar with integration on the line (including the integrals of exponential functions and polynomials) and with multiple integrals in the plane. We also assume knowledge of some basic facts like the binomial theorem, the geometric series, and the series expansion of the exponential function.

Assessment: Your grade will be based on two midterm exams (40% of the grade), a final exam (40% of the grade) and weekly homework sets (20% of the grade). The instructor will also assign "extra credit problems" from time to time. If your total is above 90 you are assured an A- or an A. If you get above 80 you are assured of a B-, B, or B+ etc.

Course Outline: Selected topics from Chapters 1-10 of the book. See the end of this outline for more detailed description of the topics covered. The order of topics, emphasis and some content covered in class might be slightly different from the book. You will be responsible for material covered in class.

The list and ordering topics below is tentative and is subject to change. The sections from the book are also only meant as an approximate guide. For some topics, I might cover more or less than what is in the book. Consult your lectures for the exact collection of topics covered.

Lec.#	Topics Approx.	location in book
1	Course outline; Combinatorics	Sec 1.4 (with additions).
2	Axioms of Probability I	Sec 1.2 -1.6
3	Axioms of Probability II	Sec 1.2 -1.6
4	Conditional probability/Independence I	Sec 2.1 - 2.2
5	Conditional probability/Independence II	Sec 2.3 - 2.7
6	Discrete Random Variables	Sec 3.1- 3.7, 4.1, 6.4.
7	Binomial, Poisson and Poisson	Sec 3.3, 4.7 -4.8, 5.6
8	Geometric distribution, Sums of r.v.s	Sec 4.3, 4.2
9	Continuous r.v	Sec 5.1-5.3.
10	Normal dist., Normal approx. to Binomial	Sec 5.4, Example 10.3.6.
11	Exponential, Gamma, transformations	Sec. 5.5, 8.4, P339-342.
12	Joint distributions, Independence, Multinomial	Sec. 7.1, 7.4.
13	Joint distributions, Sums. MGF	Sec. 3.8, 8.2, 6.6
14	Conditional distributions and expectations	Sec.7.1, 9.1-9.2, 8.1.
15	Properties of Expectations	Sec. 7.3, 4.4,
16	Properties of conditional expectations	Sec. 9.3
17	Inequalities, Limit Theorems	Sec. 10.1.13, 10.2, 10.3.

Important dates:

Final Exam: see the published university schedule

Any student needing an excuse from regularly scheduled Final Exam because of 3 exams within 24-hour period *must obtain a written Dean excuse* and discuss the situation with the instructor *at least three weeks* before the regularly scheduled exam.

Midterm exams: September 26 and October 31 in class.

All exams will be closed books closed notes. Bring your calculator for exams!

Pre-exam: August 24 in class, worth 5% in **extra** credit

Homework: Assigned on Thursday and due next Thursday in class.

Late/missed homeworks will receive a grade of zero. Students are welcome to discuss the homework problems with other members of the class, but should prepare their final answers on their own.

Note: Students are expected to follow UNC honor code. The instructor reserves the right to make any changes he considers academically advisable. It is your responsibility to attend classes and keep track of the proceedings.