STAT 461/661. Introductory Probability

University of Nevada, Reno. Fall 2018

Instructor: Andrey Sarantsev.
Dates: August 27–December 11.
Time and Place: Tue, Thu, 1500–1615, Ansari Business (AB) 102.
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Office: Davidson Math & Science Center (DMS) 234.
Office Hours: Tue, Thu 0930–1130, Wed 1300–1400 in my office.
Prerequisites. MATH 283: Calculus I, II, III with grade C or better.

Textbook: *Lecture Notes on Probability Theory and Stochastic Processes.* They are posted on UNR Canvas and on my web page, in PDF and HTML (accessible) formats. We wil closely follow them, and we will take homework problems from them. Recommended but not required: Larsen, Marx, *An Introduction to Mathematical Statistics and its Applications,* 5th edition. This will be also used for the subsequent course: STAT 467 Statistics.

Student Outcomes. Upon completion of this course, students will be able to:

1. demonstrate understanding of randomness
2. use probability models to explain simple random phenomena
3. compute summaries of probability distributions (univariate and multivariate)
4. compute measures of location, dispersion, and association
5. find probability of interest for many univariate and multivariate distributions
6. use asymptotic results provided by Law of Large Numbers and Central Limit Theorem
7. apply them to data estimation

Syllabus. Experiments, counting techniques, probability axioms; random variables, expectation, univariate and multivariate distribution theory, measures of association, conditional probability, expectation and distribution, Bayes' theorem, sequences of random variables, Chebyshev's inequality, Law of Large Numbers, and Central Limit Theorem.

Course Outline. Sections are from lecture notes.

1. Combinatorics (Section 1, Week 1)
2. Probability Axioms (Section 2, Week 2)
3. Discrete Random Variables (Sections 3-4, Weeks 3-5)
4. Continuous Random Variables (Section 5, Weeks 6-7)
5. Conditional Expectation and Distribution (Section 10, Week 10)
6. Probabilistic Inequalities and the Law of Large Numbers (Section 9, Week 11)
7. Central Limit Theorem (Section 6, Week 12)
8. Moment Generating Functions (Section 8, Weeks 13-14)

Homework Assignments. Each week, starting from week 2, except the midterm week, Thanksgiving week and the last week, there is a homework assignment (8-12 problems) consisting of problems from the lecture notes. This homework will be posted to UNR Canvas on Tuesday, collected on the next Tuesday at the end of the class, and returned to you the following Tuesday, if available. Homework 1 will be posted on Tuesday, September 4, and collected on Tuesday, September 11. Homework 11 (the last one) will be posted no later

than Tuesday, November 27, and collected next Tuesday, December 4. Late homework will not be accepted.

Weekly Quizzes. At the end of each Thursday lecture the week after the homework is assigned, there will be a quiz for 20 minutes, which contains two problems similar to the ones in the assignment which you submitted this Tuesday, two days ago; or problems in this assignment with changed numbers or other minor details. The quiz will be graded by the professor and returned to you on the next Tuesday lecture. Each quiz is closed book: no note sheet and no calculator is allowed. Quiz 1 (on Homework 1) is on Thursday, September 13. and the last Quiz 11 (on Homework 11) is on Thursday, December 6.

Midterm Exam. October 25, Thu, 1500–1615, in the classroom. You can have a standard note sheet: 8.5x11 inches, handwritten, two-sided. You do not need to submit it after the exam. Calculators are allowed. The exam is cumulative: Covers all content of the course. There are 5 problems similar to homework assignments and quizzes.

Final Exam. December 19, Wed, 1430–1630, in the classroom. You can have a standard note sheet: 8.5x11 inches, handwritten, two-sided. You do not need to submit it after the exam. Calculators are allowed. The exam is cumulative: Covers all content of the course. There are 10 problems similar to homework assignments and quizzes.

Grading Scheme. You are allowed to drop the lowest quiz and the lowest homework.

- 3% each homework
- 3% each quiz
- 15% midterm
- 25% Final Exam

Class Grade. This class is not a competitive environment. I wish every one of you succeeds. Therefore, your grade depends on your own total score, calculated as above. As an example, getting your total score above 90% guarantees you an A, regardless of what the rest of the class did. Relative comparison of students ("the curve") will be used to push grades up, not down.

- A: top 10% of class or total score above 90%
- A-: next 10% or total score above 85%
- B+: next 10% or total score above 80%
- B: next 10% or total score above 76%
- B-: next 10% or total score above 72%
- C+: total score above 68%
- C: total score above 64%
- C-: total score above 60%
- D: total score below 60%

Make-Up Work. For observance of religious holidays or participation in UNR-sponsored activities, arrangements must be made at least 2 days in advance for quizzes and the midterm. You will be required to provide documentation for your absence. Then we can arrange for the make-up quiz. Make-up finals will not be given. Late homework will not be accepted.

Recommendation Letters. If you are applying to Master, PhD, or other graduate programs, and if you got an A or A- in this class, I can write you a recommendation letter. I can also proofread your statement and CV. Please send me your photo, CV, statement, and a list of schools your are applying to, together with exact names of programs, and application deadlines. If you apply for a job outside a university, a C or above is enough for a letter.

Requests and Complaints. Please do not hesitate to speak with the professor directly. If this did not help, speak to the Department Chair Tin Yau Tam or Undergraduate Advisors.

Academic Success Services. Your student fees cover usage of the Math Center, Tutoring Center, Writing and Speaking Center. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

Academic Dishonesty. The University Academic Standards Policy defines academic dishonesty, and mandates specific sanctions for violations. See the University Academic Standards Policy 6502. You can discuss homework assignments or seek outside help, but quizzes and the final exam are strictly closed-book and individual work (except note sheet when permitted).

Disability and Accessibility. Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center as soon as possible to arrange for appropriate accommodations. This course may leverage 3rd party web/multimedia content. If you experience issues accessing this content, please notify me.

Recording. Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Students' comments during class may be recorded.

Equity. The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information on immigration, contact the Equal Opportunity and Title IX Office.