STAT 302 - Introduction to Probability
University of British Columbia - Winter 2023/2024 - Term 2
Section 201/202

Instructor
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Course Description
Basic notions of probability, random variables, expectation and conditional expectation, discrete and continuous probability distributions, limit theorems.
Note: STAT 302 is equivalent to MATH 302. Literacy in mathematical proofs is an important component of the course.

Prerequisites
One of MATH 200, 217, 226, 253 or 254.

Audience
Undergraduates majoring in Mathematics or Statistics, and students from other disciplines seeking an exposition of the basic elements of probability theory and an introduction to probabilistic modelling.

Reference Textbook
A First Course in Probability (10th ed. or +) by Sheldon Ross, Prentice Hall, 2019. Most earlier editions are acceptable. Strictly speaking, the reference textbook is not required, though it may be helpful for providing alternative explanations and additional practice problems.

Syllabus
The syllabus below is a tentative schedule. The topics covered and the order in which they will be presented in this course may change. Chapter numbers indicated inside parentheses correspond to chapters in the reference textbook.

1. Definition and rules of probability (Chapter 2).
2. Combinatorial Analysis: permutation and combination (Chapter 1).
3. Conditional probability, conditional independence (Chapter 3).
4. Random variables, distributions, and their expected values and variances. Well-known discrete distributions (Chapter 4).
5. Well-known continuous distributions, functions of random variables (Chapters 5).
6. Bivariate and multivariate probability distribution: Joint, marginal and conditional distributions, multinomial distribution, moment generating functions (Chapters 6)
7. Property of expectations, covariance and correlations, conditional expectations, moment generating functions (Chapter 7).
8. Probability inequalities. Limit theorems: Convergence in probability, convergence in distribution, the Central Limit Theorem (Chapter 8).

Assessment
Two midterms 30%, final exam 50%, mini-quizzes 7%, assignments 7%, in-class iClicker questions 6% (half participation, half correct answers).

IMPORTANT! To pass the course it is normally necessary to obtain at least 50% based on the midterms and final examination, i.e., 40 or more out of the maximum of 80 percentage points. Otherwise the exam grade is normally reported. If the 50% exam threshold is satisfied, the grade reported is weighted based on all assessment components above.

Policy regarding missing the final exam
Students who miss the final exam must report to their Faculty Advising office within 72 hours of the missed exam and must supply supporting documentation. Only your Faculty Advising office can grant deferred standing in a course. You must also notify your instructor prior to (if possible) or immediately after the missed exam. Your instructor will let you know when you are expected to write your deferred exam. Deferred exams will ONLY be provided to students who have applied for and received deferred standing from their Faculty. Please note that if you are granted deferred standing for the STAT 302 final exam in April, you will be expected to write your deferred exam with the Summer sitting of the course in June. In such a case, make sure that you download the class notes from Canvas immediately, because you will not have access to them after April.

Midterms
There are two midterms each weighing 15%, on **Feb 15 and 16**, and **March 27 and 28** during lecture hours, with location to be announced. A student must write their midterm during the lecture time slot in which they are registered. Exam will start at the beginning of class, so please make sure you are on time. Midterms will be based on all course materials, including graded assignments, other ungraded problems assigned from time to time, mini-quizzes, lectures, and activities held in lectures. There will be no make-up midterms. If you miss a midterm for a (documented when appropriate) valid reason, please provide a self-declared academic concession form (found on canvas) with the Instructor as soon as possible. The weight of the missed midterm will be shifted to the final exam. Please make your student ID available at the midterms and final exam.

In-class iClickers
We use iClicker cloud to encourage attendance, draw your attention during lectures, and to gauge your understanding of the course material. iClicker questions will be spread throughout the lectures. There is a generous buffer for absence from lectures and incorrect responses to in-class questions (thus rewarding participation over correct answers) before much effect on your iClicker score. And therefore, it is not necessary to inform the instructors if you will miss a few lectures due to illness, family emergency, and so on.

Assignments

There will be 4 graded online assignments. The purpose of the online assignments is to give you immediate feedback about your understanding of the material recently covered in the course. The limitation of online grading implies that the majority of questions are fairly basic. An assignment may include portions hosted on WeBWoRK and on Canvas – please be careful and read the assignment description carefully. Please note that **no late assignments will be accepted**.

   Additional practice questions will also be posted on Canvas. They will NOT be collected or marked. Brief answers will be provided. If you cannot get started with a question or are stuck at some point in the solution, please see one of the teaching team during tutorial hours. We are here to help you complete the problem; it does not help if we do the problem for you. See us as often as you need to keep making progress. Ask classmates for help on Piazza. One purpose of all assignments is to prepare you for exams, where similar questions will appear. The suggested questions are not part of assessment but are an essential aid to gain a deep understanding of the course material.

Mini-quizzes

There will be 10 in-person mini-quizzes, held in-class every week except for the first teaching week and weeks with midterm exams.The purpose of the mini-quizzes is to serve as low-stake exam simulation and to help students keep on-top of the course material. If you are not satisfied with a mini-quiz grade on your first try, you will have another chance to improve your grade by attending your assigned tutorial session the week following a quiz. The maximum additional marks rewarded will be 90% of the score not obtained on your first try. Therefore it is important to study and prepare well for the quizzes if you want to achieve full marks on mini-quizzes. A schedule of the mini-quizzes is provided in the class-by-class schedule on Canvas.

Tutorial sessions

Tutorial sessions are optional, but should be attended if you wish to improve your score on the mini-quizzes. In each session, the TA will solve excercise problems to demonstrate the correct reasoning process and how to properly write your solution. You will have your chance to ask any questions regarding course material. In the tutorial hour, students may also request a re-test of previous week's mini-quiz.

   Due to the large number of students registered in this course, we must assign each student a designated tutorial time-slot in order to stay below capacity of a room in accordance with fire regulations. Please complete "STAT302 2023W2 Tutorial Scheduling Poll" ASAP to help with scheduling.

Piazza for class discussions and help with IT issues

The class Piazza page can be accessed from Canvas. It is a great way to get help with course material but one can't expect immediate help – don't leave your questions to the last minute. We expect other students to answer questions that can be reasonably answered by another student. Explaining concepts to others is a great way of testing your

own understanding! The teaching team will step in if a comment is incorrect, or to elaborate/supplement student answers, or if the question or a comment goes beyond the course. Rather than emailing questions to the teaching team, I encourage you to post your questions on Piazza. Also, we wish to remind the students that the teaching team works during normal business hours. Do not post personal information at piazza.

Links to UBC academic policies
- UBC policies for Academic concessions
  `https://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0`
- UBC policies related to exam issues
  `https://science.ubc.ca/students/advising/exams`
- UBC policy with regards to Academic Misconduct:
  `https://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,0`

We acknowledge that UBC Vancouver is located on the traditional, ancestral, and unceded territory of the Musqueam people is an important way to remind learners that UBC and the people who study, work, live, and play within the institution have responsibilities that emerge from past and ongoing relationships with Indigenous host nations.