

STAT 302- Introduction to Probability

University of British Columbia - Winter 2022/2023 - Term 1

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**. Proofs and formal mathematical reasoning and argumentation are 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.

Textbook

A First Course in Probability (9th or 10th ed.) by Sheldon Ross, Prentice Hall.

Instructor

Matias Salibian Barrera. Contact information will be available on Canvas.

Approach to teaching

I approach teaching this course with the firm belief that all students can learn well and succeed, and my focus is on providing you with the materials, activities, and supports needed for you to do so. The readings and activities in this course can be challenging, but I am striving to make this course a collaborative environment in which we work together to learn with and from each other, and there will be plenty of opportunities for help and advice from peers and from the teaching team. Please reach out to us during office hours or via Canvas; we are here to help you succeed.

Drop-in Office Hours

A number of weekly drop-in office hours from each member of the teaching team will be announced on Canvas.

Drop-in Office Hours Expectations

During these hours, please have a clear topic to discuss so that the time is meaningful and effective. In my experience this time is best used if you first make a serious attempt at solving any question, problem or exercise you may want to discuss. You can expect us to provide guidance, explanations and feedback.

Peer Interaction

Your peers are excellent resources. Don't hesitate to use our course Piazza discussion board to reach out to your peers for help. Be respectful, patient and kind. We will monitor the forum and jump in if needed.

Commitment to equity and inclusion

I am committed to supporting an inclusive learning environment, and I am continually learning how best to do so. If you have concerns that I or someone else may not be upholding this commitment, I invite you to either talk with me if you feel comfortable, or share your thoughts on an anonymous feedback survey on Canvas (look for the "Anonymous equity and inclusion feedback form" under "Quizzes"). If there are derogatory, harassing or hateful statements made during class discussions I will intervene to help prevent further harm and uphold a respectful and inclusive class environment.

Course Evaluation

- Quizzes (5%): There will be a minimum of 9 quizzes (administered on WebWork). Only the best 7 grades will be counted. The schedule and topics for the quizzes will be available on Canvas. All quizzes will be equally weighted, regardless of the number of questions or items in each of them. These are formative assessments (<https://www.cmu.edu/teaching/assessment/basics/formative-summative.html>).
- WebWork assignments (10%): There will be 6 WebWork assignments. They will all be counted equally. The schedule will be available on Canvas. You will have several attempts to complete each of them before their individual deadlines. All assignments will be equally weighted, regardless of the number of questions or items in each of them. These are formative assessments (<https://www.cmu.edu/teaching/assessment/basics/formative-summative.html>).
- Assignments (10%): There will be 4 paper-based assignments. They will all be counted. The schedule will be available on Canvas. Only a random subset of the questions will be graded. All assignments will be equally weighted, regardless of the number of questions or items in each of them. The overall assignments grade will be the average of your best 3 grades. These are summative assessments (<https://www.cmu.edu/teaching/assessment/basics/formative-summative.html>).
- Midterm Exams (35%): There will be two Midterm exams. The schedule will be available on Canvas. Your midterm grade will be the higher of these two grades. These are summative assessments (<https://www.cmu.edu/teaching/assessment/basics/formative-summative.html>).
- Final Exam (40%): The Final Exam will be administered on WebWork and include all the material covered in all the components of the course. This is a summative assessment (<https://www.cmu.edu/teaching/assessment/basics/formative-summative.html>).

Policy regarding missed exams, quizzes and assignments

There will be **no make-up Midterm Exams, Quizzes or WebWork assignments. No exceptions** will be considered. Missed Quizzes and WebWork assignments will receive a grade of zero. If you have **valid grounds** for an **academic concession** regarding a **Midterm** or **Final**

Exam, one may be granted if you **apply** for it. Otherwise you will receive a grade of zero. Please follow the **instructions below** to **apply** for an **academic concession** if you miss a **Midterm, Quiz** or **Final Exam**. You can find more information about **what constitutes valid grounds for an academic concession** at <https://science.ubc.ca/students/advising/concession>

Students who miss a **Midterm Exam or Quiz**:

1. Should notify the instructor prior to (if possible) or immediately after the midterm or Quiz; and
2. **Must, within 48 hours of the missed Midterm Exam**, fill out and **submit** to the course instructor a “**Student Declaration of Academic Concession**” form (available on the Canvas page of the course). Failure to do this will result in a grade of zero in the Midterm Exam.

Students who miss the **Final Exam**:

1. Must report to their Faculty Advising Office within 48 hours of the missed Final Exam and must supply supporting documentation;
2. Faculty of Science students please refer to <https://science.ubc.ca/students/advising/concession/deferredstanding>;
3. Must notify your instructor prior to (if possible) or immediately after the Final Exam;
4. Deferred exams will **ONLY** be provided to students who have applied for and received Deferred Standing from their Faculty Advising Office;
5. If you are granted Deferred Standing you will be expected to write your Deferred Exam with the next offering of STAT 302. Note that you may not have access to the Canvas website after the Term in which you were registered in this course ends.

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.

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

Communication

All communications from the instruction team will be done **via Canvas Announcements**. Canvas is also the preferred method for you to communicate with us.

Please adjust your Canvas settings in order to receive all Announcements and Conversation messages promptly. It is **your responsibility** to remain **informed** about **all course-related issues and news** (e.g. updates to the course schedule, changes to assignments or quizzes, deadline changes, etc.) as **posted on** the course's **Canvas** page. You are assumed to have read all course Canvas announcements and to be 100% familiar with the content of this syllabus.

Piazza & Office Hours

Students are encouraged to attend **Office Hours** for help with questions about the course material. There is also a **Piazza forum** for the course (access instructions and link will be available on Canvas), which is primarily meant **for students to help each other** by sharing and discussing questions about course material. Although the **Piazza** forum **will be monitored**, our interventions will mostly be limited to enforcing **appropriate use** of the discussion board, and helping with ongoing discussions.

Covid Safety in the Classroom

- **Masks:** We recommend the use of masks while sitting in class. This is both for your own protection, and for the safety and comfort of everyone else in the class. It is important that all of us feel as comfortable as possible while sharing an indoor space. Please do not eat in class. If you need to drink water, please keep your mask on between sips.
- **Vaccination:** If you have not yet had a chance to get vaccinated against Covid-19, vaccines are available to you, free, and on campus (<http://www.vch.ca/covid-19/covid-19-vaccine>). The higher the rate of vaccination in our community overall, the lower the chance of spreading this virus. Please arrange to get vaccinated if you have not already done so.

Your personal health

- If you're sick, it's important that you stay home – regardless of what you think you may have (e.g., cold, flu, other).
- Do not come to class if you do not feel 100% yourself. Your precautions will help reduce risk and keep everyone safer.
- This course comprises in-person activities: this is the most effective way to engage with the course material, and a critical part of your learning experience.

These sessions will not be recorded. The reason for this decision is that what **I say** in class is not different from what you find in the textbook, so there is not much pedagogical value in watching me write definitions, or derive a formula. The value of our classes is in the discussion, questions and answers, and your participation during them. The actual formulas, definitions, slides, etc. are all available on Canvas and the textbook.

If you have to miss a class for whatever reason, here are the ways that you can catch up on missed sessions:

- Make a connection early in the term to another student or a group of students in the class. You can help each other by sharing notes. If you don't yet know anyone in the class, post on the discussion forum to connect with other students.
- Consult the class resources on Canvas (slides, readings, etc.)
- Use the online discussion forum for help.
- If you are sick on a Midterm Exam day, please see the "Policy regarding exams" section above.
- If you are sick on the Final Exam day you must apply for deferred standing (an academic concession) through Science Advising no later than 48 hours after the missed final exam/assignment. Students who are granted deferred standing write the final exam/assignment at a later date. Learn more and find the application online: <https://science.ubc.ca/students/advising/concession>. For additional information about academic concessions, see the UBC policy here: <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0> Please also refer to the "Policy regarding exams" section above.

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

Discipline for Academic Misconduct

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,0>

Academic Misconduct

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,959>

Faculty of Science - A Letter to Students Regarding Academic Integrity

<https://science.ubc.ca/students/blog/letter-students-academic-integrity-oct2020>

Reference letters

I am rarely able to write informative reference letters (which are the only helpful ones) for students in this class. I know this may be disappointing, but I can only write letters for students that I know very well. Useful reference letters discuss skills and characteristics that are not reflected on your resume or transcript (e.g. motivation, imagination, curiosity, team working skills, etc.) If you are planning to apply to a graduate program, I suggest you get involved in a summer research project and / or work as TA for one of our courses. For more information, please visit <https://www.stat.ubc.ca/summer-undergraduate-research-assistants> and <https://www.stat.ubc.ca/teaching-assistants-graduate-and-undergraduate>.

UBC policies and resources to support student success

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available here: <https://senate.ubc.ca/policies-resources-support-student-success>

More UBC resources for student success

Academic and learning resources

<https://students.ubc.ca/enrolment/academic-learning-resources>

Academic Concessions

<https://students.ubc.ca/enrolment/academic-learning-resources/academic-concessions>

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0>

Academic Honesty and Standards

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,286,0,0>

Attendance

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,36,0,0>

Grading Practices

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,42,0,0>

Student Conduct and Discipline

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,0,0>

Viewing Marked Work

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,41,93,0>