

## Course info

**Instructor:**

Matias Salibian Barrera

Office: Earth Sciences Building 3114

Email: [matias@stat.ubc.ca](mailto:matias@stat.ubc.ca)

**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. You are assumed to have read all course Canvas announcements and to be 100% familiar with the content of this syllabus. You cannot claim ignorance.

**Office hours:**

TBA

**Course webpage:**

WWW: <https://ubc-stat.github.io/stat-302/>

See also Canvas

**Lectures:**

Mon/Fri 10:30am - 12:00pm. See Canvas for locations

**Prerequisite:**

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

**Note:** STAT 302 is equivalent to MATH 302. Proofs and formal mathematical reasoning and argumentation are an important component of the course.

**“Structured Office Hours” / “Tutorials”:** A number of weekly office hours from each member of the teaching team will be announced on Canvas. These “structured office hours” are opportunities for you to work on selected problems with the guidance of a TA (similar to tutorial sessions).

## Course description

Basic notions of probability, random variables, expectation and conditional expectation, discrete and continuous probability distributions, limit theorems.

### Tentative topics

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).

### Learning outcomes

At the end of the course, you will be able to:

- Calculate probabilities using combinatorics techniques to count outcomes of interest
- Use the properties of conditional probabilities and Bayes’ Theorem to calculate probabilities of events of interest
- Use known discrete and continuous distributions to compute probabilities, expected values and variances
- Use bivariate and multivariate distributions to compute probabilities involving two or more random variables, calculate correlations, expectations, and conditional expectations

expectations, and conditional expectations.

- Derive moment generating functions and use them to characterize distributions.
- Use probability inequalities (e.g. Jensen's, Markov's, Chernov's) to calculate bounds and other approximations to probabilities and expected values.

## Textbooks

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- A First Course in Probability, 10th ed., by Sheldon Ross, Prentice Hall.
- Chapters 1 to 4 of [Probability and Statistics: The Science of Uncertainty](#), Michael J. Evans and Jeffrey S. Rosenthal.

## Course assessment opportunities

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### Effort-based component

- Quizzes: [0, 10]
- WebWork: [0, 10]
- Homework assignments: [0, 60]

Total:  $\min(55, \text{Quizzes} + \text{WebWork} + \text{Homework})$

### Quizzes

On line quizzes. You will have 16 hours to complete each of them.

### WebWork

Six problem sets on WebWork. You will have a few weeks to complete them. Not all problem sets have the same number of questions. Your grade will be the proportion of correct answers over all available problems. These are partially formative assessments, you will have 3 attempts for each question.

### Homework assignments

There will be 4 assignments. Each assignment is worth up to 15 points. They are due by 2300 on the deadline.

Assignments are typically lightly marked. But they are not easy.

After receiving a mark and feedback, if you score less than 12, you may make corrections to bring your total to 12. This means, if you fix everything that you did wrong, you get 12. Not 15. The revision must be submitted within 1 week of getting your mark. Only 1 revision per assignment. The TA decision is final. Note that the TAs will only regrade parts you missed, but if you somehow make it worse, they can deduct more points.

### Policy on collaboration on assignments

Discussing assignments with your classmates is allowed and encouraged, but it is important that every student get practice working on these problems. This means that **all the work you turn in must be your own**. The general policy on homework collaboration is:

1. You must first make a serious effort to solve the problem.
2. If you are stuck after doing so, you may ask for help from another student. You may discuss strategies to solve the problem, but you may not look at their code, nor may they spell out the solution to you step-by-step.
3. Once you have gotten help, you must write your own solution individually. You must disclose, in your GitHub pull request, the names of anyone from whom you got help.
4. This also applies in reverse: if someone approaches you for help, you must not provide it unless they have already attempted to solve the problem, and you may not share your code or spell out the solution step-by-step.

#### Warning

Adherence to the above policy means that identical answers, or nearly identical answers, cannot occur. Thus, such occurrences are violations of the Course's [Academic honesty policy](#).

These rules also apply to getting help from other people such as friends not in the course (try the problem first, discuss strategies, not step-by-step solutions, acknowledge those from whom you received help).

You may not use homework help websites, ChatGPT, Stack Overflow, and so on under any circumstances. The purpose here is to learn. Good faith efforts toward learning are rewarded.

You can always, of course, ask us for help. **Public questions on Piazza** are allowed and encouraged.

## Your score on HW, Quizzes, WebWork

The total you can accumulate across these 3 components is 55 points. But you can get there however you want. The total available is 80 points. The rest is up to you. But with choice, comes responsibility.

Rules:

- Nothing dropped.
- No extensions, no make ups, no weight transfers. Do not insist.
- If you miss a Quiz, a HW or a WebWork deadline, then you miss it.
- Make up for missed work somewhere else.

We're not going to police any of this. You don't need to let me know.

Choose your own adventure. Note that the biggest barrier to doing well is skipping class, office hours, and not doing coursework conscientiously.

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## Midterm exam

- Midterm exam: [0, 20]

Grade:  $\min(10, \text{Midterm})$

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The midterm is essentially an early warning system for how you are doing in this class. It will not be easy. If you do well, you probably do not need to change your work habits for STAT 302. If you do not do well, then it may be a good idea to ask us for help on what you can do to better keep up with the class.

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## Final exam

35 points

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The Final is hard. By definition, it cannot be effort-based. It is intended to separate those who really understand the material from those who don't.

The goal of this grading scheme is that those who work hard and have a reasonable understanding of the material can do well. Those who really master the concepts discussed in class will get 90+.

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## Policy regarding missed midterm

There will be no make-up Midterm Exam. No exceptions will be considered. Do not insist.

If you have valid grounds for an academic concession regarding a Midterm 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. You can find more information about what constitutes valid grounds for an academic concession and UBC's policy [here](#)

Students who miss a Midterm Exam:

1. Should notify the instructor prior to (if possible) or immediately after the midterm; 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.

## Academic Concessions

These are handled according to UBC policy. Please see:

- [UBC student services](#)
- [UBC Vancouver Academic Calendar](#)
- [Faculty of Science Concessions](#)

## Health issues and considerations - Take care of yourself

Course work at this level can be intense, and I encourage you to take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. I struggle with these issues too, and I try hard to set aside time for things that make me happy (cooking, playing/listening to music, exercise, going for walks).

All of us benefit from support during times of struggle. If you are having any problems or concerns, do not hesitate to speak with me. There are also many resources available on campus that can provide help and support. Asking for support sooner rather than later is almost always a good idea.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, I strongly encourage you to seek support. UBC Counseling Services is here to help: call 604 822 3811 or visit their [website](#). Consider also reaching out to a friend, faculty member, or family member you trust to help get you the support you need.

### Note

Please talk with me if you have any concerns, or ask me if you are worried about falling behind.

## University policies

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, spiritual 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](#).

## Academic honesty and standards

### UBC Vancouver Statement

Academic honesty is essential to the continued functioning of the University of British Columbia as an institution of higher learning and research. All UBC students are expected to behave as honest and responsible members of an academic community. Breach of those expectations or failure to follow the appropriate policies, principles, rules, and guidelines of the University with respect to academic honesty may result in disciplinary action.

For the full statement, please see the [2022/23 Vancouver Academic Calendar](#)

Cheating, in my experience, occurs because students don't understand the material, so the result is usually a failing grade even before I impose any penalty and report the incident to the Dean's office. I carefully structure exams and assignments to make it so that I can catch these issues. And we do. You should do your own work, and use the TAs and me as resources. If you are struggling, reach out, we are here to help.

### Caution

If I suspect cheating, your case will be forwarded to the Dean's office. You will be informed in writing that I have started the process.

- [Discipline for Academic Misconduct](#)
- [Academic Misconduct](#)
- [Faculty of Science on Academic Integrity](#)

### Generative AI

Tools to help you code more quickly are rapidly becoming more prevalent. I use them regularly myself. The point of this course is not to "complete assignments" but to learn coding (and other things). With that goal in mind, I recommend you avoid the use of Generative AI. It is unlikely to contribute directly to your understanding of the material. Furthermore, I have experimented with certain tools on the assignments for this course and have found the results underwhelming.

The material in this course is best learned through trial and error. Avoiding this mechanism (with generative AI or by copying your friend) is a short-term solution at best. I have tried to structure this course to discourage these types of short cuts, and minimize the pressure you may feel to take them.

## Missed final exam

Students who miss the final exam must report to their Faculty advising office, 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 exam.

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.

Deferred exams will ONLY be provided to students who have applied for and received deferred standing from their Faculty.

Check list if you miss the final exam:

1. Report to your Faculty Advising Office within 48 hours, and supply supporting documentation;
2. Faculty of Science students please refer to <https://science.ubc.ca/students/advising/concession/deferredstanding>;
3. 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;

## Reference letters

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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

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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](#)
- [Academic Concessions](#)
- [Academic Honesty and Standards](#)
- [Attendance](#)
- [Student Conduct and Discipline](#)
- [Viewing Marked Work](#)