
University of Guelph
Statistical Inference - STAT*4340
Winter 2025 (January 6 - April 21)
Course Outline

1. Course General Information

Course Title: STAT*4340: Statistical Inference.

Course Description: This course reviews and extends the theory of estimation introduced in STAT*3110. Topics including point estimation, interval estimation, hypothesis testing and decision theory will be presented from both the frequentist and likelihood-based perspectives. Foundational issues concerning the frequentist and Bayesian paradigms will also be discussed.

Prerequisites: STAT*3110, STAT*3240 - Must be completed prior to taking this course.

Credit Weight: 0.5 credit

Academic Department: Mathematics & Statistics.

2. Course Resources

- **Textbook :** *Statistical Inference. Casella, G. and Berger, R. 2nd Edition* (\$51 - \$274.95) on Amazon.
- **Courselink:** Course information and resources will be available on Courselink. Students are encouraged to check the website regularly for updated information and announcements.

3. Course Content

1. Specific Learning Outcomes

By the end of this course, students should be able to:

- Implement various methods of point estimation for parametric models; likelihood, Bayes and method of moments; understand their strengths and limitations; understand concepts such as bias, variance and mean-squared error.

- Utilize various methods of interval estimation: such as, pivotal methods or inversion of tests in the frequentist context, likelihood intervals in the likelihood context, and posterior credible intervals in the Bayesian context. Experiment with simple bootstrap intervals using R.
- Understand various approaches to testing hypotheses, be able to critique each of these approaches.
- Implement the Bayesian approach and compare and contrast with the likelihood and frequency approach for simple models; learn the basics of the decision-theoretic approach.
- Understand basic principles of statistical inference, likelihood, sufficiency and conditionality; ask questions critically about the concept of statistical evidence.

2. Lecture Content

- Principles of Data Reduction.
- Point Estimation
- Hypothesis Testing
- Interval Estimation.
- Decision Theory.

The schedule above is tentative, and subject to minor changes. As the class is scheduled to be in-person, the expectation is that students will be attending the live lectures to obtain notes, listen to course announcements, and ask relevant questions.

3. Assignments and Tests - Important Dates

The final grade will be calculated as follows:

Assignment 1: Due on February 2 at 11:59 pm	7%
Assignment 2: Due on February 28 at 11:59 pm	7%
Assignment 3: Due on March 23 at 11:59 pm	8%
Assignment 4: Due on April 9 at 11:59 pm	8%
Midterm: March 6, from 8:30 am to 9:50 am	30%
Final Exam: April 17, 8:30 am - 10:30 am	40%

- **Midterm will be held in class during the regular lecture hours. The final exam room will be announced on Courselink.**
- **Note that the final exam will be in person and will not be administered online under any circumstances. Its location will be announced a week before it takes place.**
- No classes are scheduled during **Winter Break**. This break begins at the end of Friday, February, 14, 2025 classes and ends on February 23, 2025. Winter classes will resume on Monday, February 24, 2025.

- **Friday, April 4:** Classes conclude.
- **Friday, April 4:** Last day to drop W25 one-semester course.
- **Monday, April 7:** Examinations commence.

4. Course Policies

Communication Policies:

- Emails must be sent from your University of Guelph email account, and include STAT*4340 in your subject line, and include your name and student ID number in all correspondence.
- Emails/requests worded disrespectfully will not be considered/answered.
- I will try to respond to emails within 3 business days (8:30 am - 4:30 pm). Please note that I do not answer emails during weekends.

Term Tests Policies:

- **Term tests are scheduled during class time, and therefore no student should have a conflict with a test. If a conflict does exist, it is your responsibility to resolve it.**
- Students who miss a test for medical illness must contact me within 3 business days of the missed test. In the case of absence due to medical illness, you may be required to complete an alternative assessment in a format of my discretion. If you cannot write a test for mental health reasons or are seeking accommodation on compassionate grounds, you must speak with your Program Counsellor (and include them in all communication with me) before any accommodations will be considered.
- The final exam (date, time and location) is scheduled by the Registrar's Office. Students who miss the final exam due to a valid, documented reason must contact their program counsellor for advice on University regulations regarding final exams. These procedures are based on University policy, and are not under the control of the course instructor.
- The format of the term tests and the final exam will be posted at a later date. Students are permitted to use a formula sheet during the test.
- Students are NOT permitted to post test questions to discussion boards (including the course discussion board, the SLC discussion boards, or chat groups on Facebook, Google, etc.), nor are students allowed to post test questions to websites such as Chegg in an attempt to solicit answers. These websites will be monitored for such activities, and students who violate these permissions may face an academic integrity investigation.

Regrade and Accommodation Request Policies:

- **Regrade requests must be submitted within 3 business days of a test being returned, after which regrade requests may no longer be submitted, and the test grade is considered final.** Prior to submitting such a request, you should read carefully the test/assignment solution posted on Courselink. **Note that in the event that a student submits a test or assignment for regrading, I reserve the right to regrade the entire test/assignment, not just the question under consideration.**
- **Requests for accommodation due to illness, personal circumstances, etc. should be made within 3 business days of the due date / test date.** Accommodation will be provided at my discretion and should not be assumed. **In the event that an accommodation is not granted, students will be expected to complete the test.**

Course Policy on Group Work:

- Students are encouraged to work together to discuss course content, share ideas, and ask/answer questions. However, all term tests and the final exam are to be completed independently, and without collaboration with other individuals, regardless of whether they are registered in the course.
- Any unauthorized collaboration, completing another student's work, or having another student complete your work, will constitute academic misconduct.

5. University Policies

Academic Integrity:

- The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.
- Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

- The Academic Misconduct Policy is outlined in the Undergraduate Calendar.

Accessibility:

- The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.
- When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.
- Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 10 days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website

Accommodation of Religious Obligation:

- If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.
- See the Academic calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations

Copies of Out-of-class Assignments:

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Drop Date:

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all undergraduate students except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in the Undergraduate Calendar - Dropping Courses.

Email Communication:

As per university regulations, all students are required to check their “uoguelph.ca” e-mail account regularly: e-mail is the official route of communication between the University and its students.

Health and Wellbeing:

- The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness.
- If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator who can help develop a plan to manage and support your mental health or check out our mental well-being resources.
- The Student Wellness team are here to help and welcome the opportunity to connect with you.

Illness:

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

Recording of Materials:

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources:

The Academic Calendars are the source of information about the University of Guelph’s procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

When You Cannot Meet a Course Requirement:

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration.