



STAT*3110 Introductory Mathematical Statistics II

Winter 2023

Department of Mathematics and Statistics

Credit Weight: 0.50

Course Details

Calendar Description

Topics covered in this course include: Estimation, unbiasedness, Cramer-Rao inequality, consistency, sufficiency, method of moments, maximum likelihood estimation; hypothesis testing, Neyman-Pearson lemma, likelihood ratio test, uniformly most powerful test; linear regression and correlation; non-parametric methods.

Pre-Requisite(s): STAT*3100 Introductory Mathematical Statistical I.

Co-Requisite(s): none

Method of Delivery: Face-to-Face

Meeting Information: Face-to-Face (in-person)

Days: Monday, Wednesday and Friday

Time: 2:30PM - 3:20PM

Room: ROZH, 105

Final Exam

There is no final exam in this course.

Instructional Support

Instructor

Dr. Nagham Mohammad

Email: naghamm@uoguelph.ca

Office Hours: Please note that further details will be posted in the **Announcements**.

Teaching Assistant

Chong Gan

Email: ganc@uoguelph.ca

Learning Resources

Required Textbook

Title: John E. Freund's Mathematical Statistics with Applications,

Author(s): Miller & Miller.

Edition / Year: 8th Ed.

Publisher: Pearson Education Canada

Print format – 9780134995373

180-Day eBook – 9780134291673

Perpetual eBook - 9781119416531

Supplementary Materials (Instructor's Slides)

This course includes supplementary materials, including instructor fillable PowerPoint slides. These materials are meant to supplement the required readings and course content, and to provide study materials for the assignments and Tests. You can print the PowerPoint slides and bring them with you in class. To access these materials, select **Content** on the navbar to locate **Supplementary Materials** in the table of contents panel.

**THE LECTURE SLIDES ARE FOR INDEPENDENT USE ONLY AND
ARE NOT TO BE RE-DISTRIBUTED IN ANY FORM WITHOUT MY
WRITTEN PERMISSION**

Course Website

[CourseLink](#) (powered by D2L's Brightspace) is the course website and will act as your classroom. It is recommended that you log in to your course website every day to check for announcements, access course materials, and review the weekly schedule and assignment requirements.

<https://courselink.uoguelph.ca>

Learning Outcomes

Course Learning Outcomes

The objective of this course is to provide students with a solid foundation in mathematical statistics, continuing from STAT*3100. Students who have successfully completed this course will be expected to:

1. Find the distribution function of a general r 'th order statistic, minimum statistics and maximum statistics.
2. Find a point estimate based on method of moments, maximum likelihood estimation and Bayesian estimation,
3. Evaluate the performance of a given point estimate based using the 4 criteria: unbiasedness, efficiency, consistency and sufficiency,
4. Find the Cramer Rao lower bound of the variance for unbiased estimators,
5. Determine whether a point estimate is a uniformly minimum variance unbiased estimate (UMVUE),
6. Find confidence intervals for scale and location parameters,
7. Understand basic idea and concepts in hypothesis test, formulate a hypothesis test,
8. Understand the fundamental theory of Neyman-Pearson Lemma, its applications and extensions,
9. Understand the concept of likelihood ratio test,
10. Sketch the power function of a test and from there, compute the type I error and the power,
11. Construct a hypothesis test involving means, variance, and proportions,
12. Perform a χ^2 test and goodness-of-fit test, and know the connection between them.

Out-of-Class Workload:

As in any university course much of your learning in this course will take place outside of class time. Each week you have 3 hours of lectures. Therefore, you should plan to spend 3-6 hours each week in out-of-class learning. This learning consists mostly of making sure, you understand the concepts and steps that were used in class to solve problems and then solving problems from the **practice problems that I prepared** to you and the **assigned textbook problems** on your own.

Missed Lectures:

If you miss lectures then you are responsible for finding out what you missed. Your instructor will not **reteach missed material**.

Assessment Descriptions

A brief description of each assessment is provided below.

Grading Scheme:

Every student is treated the same way according to the grading scheme below. We cannot modify final grades to give you an extra percent or modify the style of the Tests from in-person to online – this would be unfair to the other students.

There are 2 grading schemes in order to minimize the impact of a poor performance on either of the 2 midterms. The scheme that gives you the best mark will be used **automatically**.

Table 1: Grading Schemes

Scheme 1	Scheme 2
3 Assignments: 35%	3 Assignments: 30%
Test 1: 30%	Best Test: 50%
Test 2: 35%	Worst Test: 20%
NO Final Exam	NO Final Exam
TOTAL 100%	TOTAL 100%

Assignment Policies:

- There will be Three (3) assignments during this course.
- The three assignments will count equally towards 30% of your grade (1/3 = 10% each).

Table 2: Course Assessments (Tentative)

Assessment Item	Release Date	Due Date Time: 8:00am
Assignment (1)	Wednesday, Jan. 25 th	Wednesday, Feb. 1 st
Assignment (2)	Wednesday, March 8 th	Wednesday March 15 th
Assignment (3)	Wednesday, March 29 th	Wednesday, April 5 th

- No late assignments will be accepted, and **late or missed assignments** will automatically receive a **grade of 0**.
- **NO penalty to late assignments will be permitted (please do not ask us to do so). You will get Zero for late submission.**
- **If you have extremely serious issues (with supportive documents) that cause you to miss the due date of an assignment, talk to me in-person or email me within 48 hours before the due date.**
- While you are encouraged to discuss approaches to assignment questions with other students, your submitted assignment must be your own work. Copying any part of another student's work is considered academic misconduct. (Please read the section on academic misconduct at the end of this document and in the undergraduate calendar.)
- Assignments will be posted on Courselink.
- Assignments will be submitted, marked (by TAs), and returned through Gradescope.

Gradescope

Gradescope is an online testing and assessment software that may be used in this course. Visit the Gradescope website to review the [Get Started videos](#) and [Student Help Centre](#).

https://www.gradescope.com/get_started#student-submission

<https://help.gradescope.com/category/cyk4ij2dwi-student-workflow>

Test Policies:

- There will be two in-person (**NOT ONLINE**) 50-minutes Tests during this course worth 70% of your final grade.
- Material to be covered will be announced closer to the Test date on the CourseLink.

Table 3: Tests Dates

Test 1	Wednesday, Feb. 15 th	2:30 pm- 3:20 pm.
Test 2	Wednesday, March 29 th	2:30 pm- 3:20 pm.

- Students must present a valid Student ID card to write all tests.

Missed Midterm Tests:

If you miss a midterm test due to illness or extenuating circumstances you must contact your instructor within 48 hours of the missed test.

- 1) **There is no alternate test date for Test 1.** If you miss Test 1 due to illness/extenuating circumstances, the weight from that test will be carried to the second midterm.
- 2) If you miss Test 2 due to illness/extenuating circumstances, then you will write a make-up test.
- 3) If you miss Test 1 and Test 2 due to illness/extenuating circumstances, then you will write a cumulative make-up test.

Remarking of Tests: If you have a question regarding the marking of a test you must first check the posted solutions. If you still have a question, then you should follow the procedure posted on the CourseLink. **You have 3 days to appeal a test grade.**

Computing: We will be using the R statistical language. You are not required to be familiar with the software upon entering the course. There are several online tutorials available on the CRAN website to help you in this regard (<http://cran.r-project.org/>). The most recent version of R is also freely available from this site. However, I would provide you with my **prepared introduction to R** and provide further guidance, as needed.

Guide to using R: Dalgaard, P. 2008. Introductory Statistics with R, Second Edition. New York, Springer. (pdfs available for free download through University of Guelph library).

Calculator Policy: For the tests, only a non-programmable, non-graphical **are allowed.**

CourseLink Support

University of Guelph

Day Hall, Room 211

Email: courselink@uoguelph.ca

Tel: 519-824-4120 ext. 56939

Toll-Free (CAN/USA): 1-866-275-1478

Walk-In Hours (Eastern Time):

Monday thru Friday: 8:30 am–4:30 pm

Phone/Email Hours (Eastern Time):

Monday thru Friday: 8:30 am–8:30 pm

Saturday: 10:00 am–4:00 pm

Sunday: 12:00 pm–6:00 pm

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](#).

Drop Date

Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

University Policies

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.

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for academic consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Academic Misconduct

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.

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.

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 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. More information: www.uoguelph.ca/sas

Course Evaluation Information (Student Feedback Questionnaires (SFQs))

Please see

<https://uoguelphca.sharepoint.com/sites/ccs/SitePages/services/course-evaluation.aspx>

Copyright Notice

Content within this course is copyright protected. Third party copyrighted materials (such as book chapters and articles) have either been licensed for use in this course, or have been copied under an exception or limitation in Canadian Copyright law.

The fair dealing exemption in Canada's Copyright Act permits students to reproduce short excerpts from copyright-protected materials for purposes such as research, education, private study, criticism and review, with proper attribution. Any other copying, communicating, or distribution of any content provided in this course, except as permitted by law, may be an infringement of copyright if done without proper license or the consent of the copyright owner. Examples of infringing uses of copyrighted works would include uploading materials to a commercial third-party web site, or making paper or electronic reproductions of all, or a substantial part, of works such as textbooks for commercial purposes.

Students who upload to CourseLink copyrighted materials such as book chapters, journal articles, or materials taken from the Internet, must ensure that they comply with Canadian Copyright law or with the terms of the University's electronic resource licenses.

For more information about students' rights and obligations with respect to copyrighted works, review [Fair Dealing Guidance for Students](#).

http://www.lib.uoguelph.ca/sites/default/files/fair_dealing_policy_0.pdf

Plagiarism Detection Software

Students should be aware that faculty have the right to use software to aid in the detection of plagiarism or copying and to examine students orally on submitted work. For students found guilty of academic misconduct, serious penalties, up to and including suspension or expulsion from the University can be imposed.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate 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.

Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via Courselink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

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).

COVID-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, that these guidelines may be updated as required in response to evolving University, Public Health or government directives.

Mental Health Services

One out of every five students in Canada experiences some sort of mental health issue at some point in their academic career. If you find yourself facing a mental health crisis, or just need to talk to someone, please consider taking advantage of one of the following resources available to University of Guelph students:

Counselling Services:

Visit the Counselling Services website (<https://wellness.uoguelph.ca/counselling>) to get information on resources available to you, both online and in-person. You can also visit them at Health Services (J.T. Powell Building, ext. 53244) where they offer individual and group counselling sessions by appointment or walk-in.

Student Support Network: is located in the Wellness & Education Promotion Centre in the J.T. Powell Building and offers confidential, peer-based, drop-in support.

Good2Talk: ([1-866-925-5454](tel:1-866-925-5454)) is a free, 24/7 student hotline that provides professional counselling and referrals for mental health, addictions and well-being.

Here 24/7: ([1-844-437-3247](tel:1-844-437-3247)) specializes in assessment, referral and appointment booking and is available 24/7 for crisis support.

You are not alone and you will not be judged for asking for help.