Department of Mathematics & Statistics
Concordia University

STAT 347
Sample Survey Theory & Applications
Fall 2025

Instructor: Dr. A. Sen
Email: arusharka.sen@concordia.ca

Class Schedule: Wednesdays and Fridays, 13:15-14:30, in CL-239 (SGW).
Mid-term break: October 11 – 17, 2025.

Office Hours: Thursdays, 16:00-17:30, in person (subject to change); questions by email anytime; **please send email from your email account, not from Moodle.**

Text: *Nonparametric Statistical Inference*, 4th Edition, by J. D. Gibbons and S. Chakraborti. [***E-book available for free download at Concordia library website***.]

Reference: *Introduction to the Theory of Nonparametric Statistics*, by R. H. Randles and D.A.Wolfe (Wiley, 1979).

Objective: This course is an introduction to the basic techniques of nonparametric inference – mainly hypothesis-testing procedures. We shall study the classical methods, exact as well as approximate (i.e., large sample), in this field – theoretically and numerically.

Assignments: There will be 4 assignments. They will be posted on Moodle; once posted, they will be due in about 2 weeks, to be uploaded on Moodle. Assignments contribute **10%** to your final grade. Working regularly on the assignments is essential for success in this course. **No make-up assignments.**

Calculators: Only calculators approved by the Department (with a sticker attached as proof of approval) are permitted for the class test and final examination. For a list of approved calculators see https://www.concordia.ca/artsci/math-stats/services.html#calculators

Midterm Test: There will be one **midterm test,** based on the material covered in Weeks 1-5, which will contribute up to **25%** to your final grade (see the **Grading Scheme** below). The midterm test will be held **Friday, 24 October 2025, in class.** This exam, as well as the final, will be closed-book exams.

Final Exam: The final examination will be three hours long and will cover all the material in the course. In order to obtain a good grade, the student **MUST** show that she/he has a THOROUGH understanding of the subject and is good at problem solving.

PLEASE NOTE: Students are responsible for finding out the date and time of the final exams once the schedule is posted by the Examinations Office. Conflicts or problems with the scheduling of the final exam must be reported directly to **the Examinations Office**, **not to your instructor**. It is the Department's policy and the Examinations Office's policy that **students are to be available until the end of the final exam period. Conflicts due to travel plans will not be accommodated.**

Final Grade: Final score will be the larger of a) and b):

a) Assignments (10%) + Mid-term test (**Friday, 24 October 2025**) 25%) + Final examination (65%)
b) Assignments (10%) + Final examination (90%)

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

IMPORTANT: **PLEASE NOTE THAT THERE IS NO '100% FINAL EXAM' OPTION IN THIS COURSE, AND THERE WILL BE NO MAKE-UP MIDTERM.**

Chapter	Topics to be covered (tentative)
2	Order Statistics; The Quantile Function; The Empirical Distribution Function; Statistical Properties of Order Statistics. Probability-Integral Transformation; Joint Distribution of Order Statistics; Asymptotic Distribution of Order Statistics; Tolerance Limits for Distributions and Coverages.
3	Introduction to Tests of Randomness; Tests Based on the Total Number of Runs; Tests Based on the Length of the Longest Run; Runs Up and Down.
4	Introduction to tests of Goodness of Fit; The Chi-Square Goodness-of-Fit Test; The Kolmogorov-Smirnov One-Sample Statistic; Applications of the Kolmogorov-Smirnov One-Sample Statistics. Visual Analysis of Goodness of Fit.
5	Confidence Interval for a Population Quantile; Hypothesis Testing for a Population Quantile; The Sign Test and Confidence Interval for the Median. Rank-Order Statistics; The Wilcoxon Signed-Rank Test and Confidence Interval

6, 8, 9	The Wald-Wolfowitz Runs Test; The Kolmogorov-Smirnov Two-Sample Test; The Median Test. The Mann-Whitney U-Test and The Wilcoxon Rank-Sum Test. The Mood Test.
11	Definition of Measures of Association in a Bivariate Population; Kendall's Tau Coefficient; Spearman's Coefficient of Rank Correlation.

Student Services
You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: https://www.concordia.ca/students/services.html

Academic Integrity and the Academic Code of Conduct
This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: https://www.concordia.ca/conduct/academic-integrity.html" *[Undergraduate Calendar, Sec 17.10.2]*

Behaviour
All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property
Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances
In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.