

**Carleton University**  
**School of Mathematics and Statistics**  
**STAT 2507 B, D - Introduction to Statistical Modeling I**

**Term:** Fall 2022

**Instructor:** Agnes Benhin

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**Office Hours:** **Section B:** Tuesdays, 3:00pm to 4:00pm (via BigBlueButton on BrightSpace)  
**Section D:** Mondays, 12:00pm to 1:00pm (5218 HP)

**Prerequisites:** Ontario Grade 12 university preparation Mathematics or equivalent  
(If you are not sure about your prerequisites, please see me or the Undergraduate Advisor Mr. Gary Bazdel in 4302C HP).

**Text:** "Introduction to Probability & Statistics", 4<sup>th</sup> edition (or 12<sup>th</sup> ed.), by William Mendenhall, Robert J. Beaver and Barbara Beaver.

**Lectures:** **Section B:** Tuesdays and Thursdays: 18:05 – 19:25, using BigBlueButton (via BrightSpace)  
**Section D:** Mondays and Wednesdays: 14:35 – 15:55, Azrieli Theatre **Room: 302**

**Lab:** **Section B:**

Lab1: B1 – Tuesday, 19:35 - 20:25, Lab2: B2 - Tuesday, 20:35 - 21:25,  
Lab3: B3 - Thursday, 19:35 - 20:25, Lab4: B4 - Thursday, 20:35 - 21:25,  
Lab5: B5 - Tuesday, 16:35 - 17:25, Lab6: B6 - Monday, 16:35 - 17:25,  
Lab7: B7 - Thursday, 16:35 - 17:25, Lab8: B8 - Thursday, 15:35 - 16:25,  
(all the labs will be at Herzberg Labs, Room 4385 )

**Section D:**

Lab1: D1 – Thursday, 14:35 - 15:25, Lab2: D2 - Tuesday, 08:35 - 09:25,  
Lab3: D3 - Tuesday, 11:35 - 12:25, Lab4: D4 - Friday, 11:35 - 12:25,  
Lab5: D5 - Thursday, 08:35 - 09:25, Lab6: D6 - Friday, 10:35 - 11:25,  
Lab7: D7 - Friday, 16:35 - 17:25, Lab8: D8 - Wednesday, 09:35 - 10:25,  
(all the labs will be at Herzberg Labs, Room 4385 )

- statistical software used: SPSS. The use of any other applications including Excel is not permitted.

**Grades:** The course will be made up of 2 parts: Term Work (50%) and Final Examination (50%).

- Term Work: 2 midterms .....20% each  
5 assignments .....1% each  
5 tutorials ..... 1% each

Midterms will be held on Fridays, **October 14<sup>th</sup>**, (6:00pm to 7:30pm) and **November 25<sup>th</sup>**, (6:00pm to 7:30pm)

*The higher of the two tests will be worth 25% and the lower of the two tests will be worth 15%.*

- **Final Examination:** Consists of a three-hour closed book examination of the whole course covered during the term. In the case of the Deferred Final Examination, the final exam will be written in the Winter term of 2023 and it replaces only the final examination mark of the course grade.

***Following applies to all the tutorials, tests, assignments and final exam:***

**Calculators:** You may use any non-programmable and non-graphing calculator.

**Statistical Tables:** You are only permitted to use the statistical tables provided by the instructor. You can not use any other tables.

**Course Outline:** *This outline is subject to change depending on the progress of the course.*

**Week 1:** **Chapter 1 (and 0):** (1.1 – 1.5)

What is statistics? Population and sample. Elements of statistical problems. Data sets, Describing data sets by graphs, histograms, stem-and-leaf plots.

**Week 2:** **Chapters 2 & 3:** (2.1 – 2.7, 3.1 – 3.4)

Mathematical notation. Mean, median, mode. Standard deviation, variance. Chebyshev's theorem, Empirical rule. Percentiles, quartiles, z-scores. Box plots. Bivariate data.

**Week 3:** **Chapter 4:** (4.1 – 4.3, 4.5 – 4.6)

Events, sample space, combination of events, probability of an event. Addition rule, Multiplicative rule. Conditional probability and independence.

**Week 4:** **Chapters 4 :** (4.4, 4.7 – 4.8)

Counting rules. Bayes rule. Probability distribution of a discrete random variable. Expectation and variance.

**Week 5:** **Chapter 5:** (5.1 – 5.4)

Binomial, Poisson, and Hypergeometric distributions.

**Week 6:** **Chapter 6:** (6.1 – 6.4)

Continuous distributions, normal distribution. Normal approximation to the Binomial.

**Week 7:** **Chapter 7:** (7.1 – 7.6)

Random sampling. Sampling distributions. Central Limit Theorem. Sample mean and sample proportion. Sum and difference of independent random variables.

**Week 8:** **Chapters 8 & 10:** (8.1 – 8.4, 10.1 – 10.3)

Estimation. Large sample. Population mean. Large-sample confidence intervals for the population mean. Student's t-distribution and small sample confidence intervals. Parameter of a Binomial.

**Week 9:** **Chapters 8 & 10:** (8.5 – 8.6, 8.8, 10.4)

Choosing sample size. Difference between means. Large- and small-sample confidence intervals for difference between means. Large-sample confidence intervals for difference between two binomial proportions.

**Week 10:** **Chapters 9 & 10:** (9.1 – 9.3, 10.3)

Test of hypothesis, large- and small-sample tests, p-values. Type- I & II errors.

**Week 11:** **Chapters 9 & 10:** (9.4 – 9.7, 10.4 – 10.5)

Large- and small-sample inference for difference between two means. Difference between two proportions. Paired t-test.

**Week 12:** **Chapter 10:** (10.6 – 10.7)

More on hypothesis testing. Inference on variance.

**Review of Final Exams:** If you wish to review your exam please email the instructor to set up a convenient time to review the exam. If the instructor is unavailable, contact the associate director to set up an appointment to review your exam. Exams are only available for 3 weeks after the exam has been written. If you wish to review your exam after the three weeks, you must formally request to view your exam from the Registrar office. For more information of this process go to <http://www.carleton.ca/registrar/>

**Academic Accommodations:** Should you need special arrangements during the term in order to meet your academic obligations due to disability, pregnancy or religious obligations, please let me know in writing within the first two weeks of class. You may visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://carleton.ca/equity/accommodation>

**Mathematics and Statistics Learning Assistance Program (MS-LAP):** Math & Stats Learning Assistance Program (MS-LAP) supports first year mathematics and statistics courses. This free of charge program helps students in achieving their goals. It provides learning support and solutions to homework questions through assistance videos.

**These services are available on BrightSpace.**

MS-LAP gives students tools to succeed while explaining step-by-step particular problem strategies and associated theory. The program is for anyone who wants to deepen their understanding at their own pace, and in the comfort and privacy of their home.

### Important Notes:

- 1. Missed Assignments and Tutorials:** You may miss up to 3 of these 10 assessments for legitimate reasons (e.g. illness, death of a family member, etc.). The weight of these missed assessments will automatically be shifted to the final exam, and so there is no need to contact the instructor. **DO NOT MISS AN ASSESSMENT UNLESS YOU ABSOLUTELY HAVE TO**, as any assessments missed past 3 will be an automatic zero.
- 2. Missed Test:** Students who need to miss a test submission for a valid reason must complete [self-declaration](#) form within 3 business days of the test. Students who correctly follow this procedure will have the weight of the missed assessment added to the weight of the final exam. Failure to follow this procedure will result in a grade of 0% on the missed assessment.
- 3. Students are required to obtain a minimum score of 40% on the final exam.** Students who fail to do so will automatically be assigned a grade of **F** in the course. (Exceptions to this rule may be made at the discretion of the instructors).
- 4.** In assigning course letter grades, final numerical grades are viewed as continuous and grades are not automatically rounded up. A student must definitively earn the lower numerical limit of a letter grade category to receive that letter grade.
- 5.** You must use your Carleton email account for all email communications. I am unable to respond to non-Carleton emails due to the Freedom of Information and Protection of Privacy Act.
- 6.** Concerns about grading on assignments or tests must be brought to my attention within three business day of these items being available for review.

### Intellectual Property Notice:

Classroom teaching and learning activities, including lectures, discussions, presentations, tests, exams, by instructors, guest presenters, and students, are copy protected and remain the intellectual property of the instructor or respective author(s). All course materials, including PowerPoint/pdf presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s). A student who publicly posts or sells an instructor's work, without the instructor's express consent, may be charged with misconduct under Carleton's Academic Integrity Policy and/or Code of Conduct, and may also face adverse legal consequences for infringement of intellectual property rights.

**Academic Integrity:**

Students are required to be familiar with the Academic Integrity Policy at Carleton University.

The complete policy is available at: [Academic-Integrity-Policy-2021.pdf \(carleton.ca\)](#).

Students who violate the standards of academic integrity relating to any coursework will be required to meet with the Associate Dean of Science.

**Fall Break: October 24<sup>th</sup> – October 28<sup>th</sup> .**

- Last day to withdraw from the course is **November 15<sup>th</sup>**.
- Students with a disability who require academic accommodations, please feel free to discuss it with me. Students must also contact the Paul Menton Centre to complete the required forms by **November 11<sup>th</sup>**.

*The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation.*

*The following is the tentative schedule for the assignments and tutorials.*

<b>Assignment</b>	<b>Available</b>	<b>Due</b>
Tutorial 1	Week of Monday Sept 12th	In tutorial
Assignment 1	Sunday, Sept 11 <sup>th</sup>	1 <sup>st</sup> class of week of Monday Sept 19 <sup>th</sup>
Tutorial 2	Week of Monday Sept 26th	In tutorial
Assignment 2	Sunday, Sept 25 <sup>th</sup>	1 <sup>st</sup> class of week of Monday Oct 3 <sup>rd</sup>
Tutorial 3	Week of Monday Oct 17th	In tutorial
Assignment 3	Sunday, Oct 16th	1 <sup>st</sup> class of week of Monday Oct 31 <sup>st</sup>
Tutorial 4	Week of Monday Nov 7th	In tutorial
Assignment 4	Sunday, November 6 <sup>th</sup>	1 <sup>st</sup> class of week of Monday Nov 14 <sup>th</sup>
Tutorial 5	Week of Monday Nov 28th	In tutorial
Assignment 5	Sunday, November 27th	1 <sup>st</sup> class of week of Monday Dec 5 <sup>th</sup>

**Note:**

- **assignments will be handed in in-person (section B submits on BrightSpace)**
- **tutorials will be completed in-person during the tutorials and submitted online through Brightspace**
- **midterms/final exam are written in-person**