

**MAST 221**  
Applied Probability  
*Fall 2020*

**Instructor:** Dr. M. Singh  
Email: [murari.singh@concordia.ca](mailto:murari.singh@concordia.ca)

**Preface:** Due to exceptional circumstances, this course will be taught and all assessments will be done completely ONLINE. Given the subject matter and nature of this course, at least one of the exams, including the midterm and/or the final exam will be given online through the Concordia Online Exams (COLE) platform with online proctoring. For more details see the ADDENDUM at the end of this course outline.

**Office Hours:** Tuesdays, 11:00–12:30 PM. Online via a zoom link (see Moodle page).

**Text:** *John E. Freund's Mathematical Statistics with Applications*, 8th Edition, by I. Miller and M. Miller, Pearson Education, Inc. (2014).  
The digital and print versions of the textbook will be available at:  
<https://www.bkstr.com/concordiastore/home>  
**Note:** Students should order textbooks as early as possible, especially for print versions in case books are backordered or there are any shipping delays.

**Assignments:** There will be 5 or 6 assignments. Assignments are compulsory and contribute 10% to your final grade. Working regularly on the assignments is essential for success in this course. Students are expected to submit electronic assignments as a single PDF file through **Moodle**. **Late assignments will not be accepted.**

**Calculators:** Only calculators approved by the Department, such as **Sharp EL 531** or the **Casio FX 300MS**, are permitted for the class test and final examination. See <https://www.concordia.ca/artsci/math-stats/services.html#calculators> for details.

**Midterm Test:** There **will be one** midterm test, **based on the material of weeks 1-7, which will contribute up to 20% to your final grade (see the Grading Scheme below)**. This test/quiz will be held on **Wednesday, 28 October 2020** online and proctored on COLE platform (See Addendum). The test will be held for 75 minutes during online lecture time. This test will be a closed book exam.

**NOTE:** It is the Department's policy that tests missed for any reason, **including illness**, cannot be made up. If you miss the midterm test **because of illness (medical note required)** the final exam will count for 90% of your final grade, and the assignments will count for the remaining 10%.

**Final Exam:** **The final examination will be 2 hours long. 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.** The **exam**, on the date specified by the exam office, will be a closed book online exam proctored by COLE and/or Moodle platform (See Addendum).

**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.**

**Grading Scheme:** The final grade will be based on the higher of (a) or (b) below:

- a) 10% for the assignments,  
30% for the midterm test,  
60% for the final exam
  
- b) 10% for the assignments,  
15% for the midterm test,  
75% for the final exam

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.

**Course Design:**     Course Design will be discussed in the beginning of the class.

Weeks	Chapters
1 & 2	Course Design Overview  <b>Chapter 2: Probability</b> Introduction Sample Spaces Events The Probability of an Event Some Rules of Probability Conditional Probability Independent Events Bayes’ Theorem
3 & 4	<b>Chapter 3: Probability Distributions and Probability Densities</b> Random Variables Probability Distributions Continuous Random Variables Probability Density Functions Multivariate Distributions Marginal Distributions Conditional Distributions
5, 6 & 7	<b>Chapter 4: Mathematical Expectation</b> Introduction The Expected Value of a Random Variable Moments & Cumulants Chebyshev’s Theorem Moment Generating Functions Product Moments Moments of Linear Combinations of Random Variables Conditional Expectations and Conditional Variances  <div style="text-align: center;"><b>Mid-Term Test</b></div>
8, 9 & 10	<b>Chapter 5: Special Probability Distributions</b> Introduction The Discrete Uniform Distribution The Bernoulli Distribution The Binomial Distribution The Negative Binomial Distribution and Geometric Distribution The Hypergeometric Distribution The Poisson Distribution The Multinomial Distribution

11, 12 & 13	<b>Chapter 6: Special Probability Densities</b> Introduction The Uniform Distribution The Gamma, Exponential and Chi-square Distributions The Beta Distribution The Normal Distribution The Normal Approximation to the Binomial Distribution The Normal Approximation to the Poisson Distribution  <b>Review</b>
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#### **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: [concordia.ca/students/academic-integrity](http://concordia.ca/students/academic-integrity)." [Undergraduate Calendar, Sec 17.10.2].

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](#).

**Disclaimer:** In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in the course is subject to change.

**Addendum:** This course will be taught and all assessments will be completely online. A midterm and/or a final online exam will be provided through the Concordia Online Exams (COLE) platform with online proctoring (also known as auto-proctoring). More information about the COLE system may be found at the [COLE website](#).

Please note the following respect to online proctored exams:

- That the exam will take place during the exam period at the designated date and time set by the professor (midterm) or the Exams office (final). All exam times will be set to Eastern Standard/Daylight Time.
- That your image, voice and screen activity will be recorded throughout the duration of the exam.
- That you must show your Concordia University Identification card to validate your identity. Alternative government issued photo identification will be accepted, though it is not recommended. Only identification in English or French will be accepted.
- That any recording made will only be viewed by authorized university personnel (no external entity has authorization to review the recording).

- That you will be responsible for ensuring appropriate, properly functioning technology (webcam, a microphone, appropriate browser and an ability to download any necessary software, as well as a reliable internet connection with a minimum of a 3G connection).
- That you are very **strongly recommended** to enter the virtual test site found at the [COLE website](#) and become familiar with the software that will be used for your exam before starting the exam.
- That you will need a quiet place within which to take the exam. Earplugs or noise-cancelling headphones that are not connected to a device may also be used to allow you to focus for the duration of the exam.

Students who are unable to write an exam because they are unable to meet the above conditions and requirements are advised that they will need to drop the course. More information can be provided on the next offering of this course by consulting the Department. Students are advised that the drop deadline (DNE) for this course is September 21, 2020.

Students who require additional accommodations for their exams due to a documented disability should contact the Access Centre for Students with Disabilities as soon as possible ([acsinfo@concordia.ca](mailto:acsinfo@concordia.ca)).

If you face issues during the exam, you should inform your professor of those issues immediately. Please note that there are in-exam supports you should spend time getting to know. Visit the [COLE website](#) for more information.