Department of Mathematics & Statistics
Concordia University

MAST 223
Introduction to Stochastic Methods of Operations Research
Winter 2019

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Office Hours: Wednesdays, 16:00-17:30.

Text: *Operations Research: Applications and Algorithms,* 4th Edition, by W. L. Winston.

Calculators: The only calculators approved by the Department allowed in the class test and final examination for this course are the **Sharp EL 531** and the **Casio FX 300MS.**

Test: There will be one midterm test during the course. Missed test cannot be made up.

Final Exam: There are no exemptions from this three-hour exam.

Final Grade: The final grade will be based on the higher of **(a) or (b):**

a) 15% for the assignments, 25% for the midterm test, and 60% for the final exam.
b) 15% for the assignments, 15% for the midterm test, and 70% 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.**

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 ***(to be confirmed by a valid medical note),*** the final exam can count for 85% of your final grade.

Notes:

a. The midterm test will take place in class on Thursday, March 7, 2019.
b. Midterm test will cover up to week 7 inclusively.
c. The final examination will cover everything taught in the course.
d. Assignments will be handed bi-weekly and collected in class.
e. Late assignments will not be accepted.

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." *[Undergraduate Calendar, Sec 17.10.2]*

Weeks	Chapters
1	**Chapter 12: Review of Probability** Basic Rules of Probability. Bayes' Rule. Random Variables, Mean, Variance, and Covariance. The Normal Distribution. Z-Transforms.
2 & 3	**Chapter 15: Deterministic Inventory Models** Introduction to Basic Inventory Models. Basic Economic Order Quantity Model. Computing the Optimal Order Quantity. The Continuous Rate EOQ Model. The EOQ Model with Back Orders Allowed. When to Use EOQ Models. Multiple Product EOQ Models.
4 & 5	**Chapter 16: Probabilistic Inventory Models** Single-Period Decision Models. The Concept of Marginal Analysis. The News Vendor Problem: Discrete Demand. The News Vendor Problem: Continuous Demand. Other One-Period Models. The EOQ with Uncertain Demand. Periodic Review Policy. Exchange Curves.
6 & 7	**Chapter 17: Markov Chains** Introduction to Stochastic Process. Introduction to Markov Chain. n-step Transition Probabilities. Classification of States in a Markov Chain. **Mid-Term Test**
8	**Chapter 17: Markov Chains** Steady-State Probabilities. Mean First Passage Times. Absorbing Chains. Work-Force Planning Models.

9, 10 & 11	**Chapter 20: Queuing Theory** Introduction. Modeling Arrival and Service Processes. Birth-Death Processes. The M/M/1/GD/∞/∞ Queuing System. The M/M/1/GD/c/∞ Queuing System. The M/M/s/GD/∞/∞ Queuing System. The M/G/∞/GD/∞/∞ and GI/G/∞ /GD/∞/∞ Models. The M/G/1/GD/∞/∞ Queuing System. Finite Source Models. Exponential Queues in Series and Open Queuing Networks. The M/G/s/GD/s/∞ System. Checking Inter-arrival Times & Service Times.
12 & 13	**Chapter 21: Simulation & Review** Introduction. Discrete Event Simulation. Monte Carlo Simulation. Simulation with Continuous Random Variables. Stochastic Simulation.