Department of Mathematics & Statistics
Concordia University

MAST 397

Topics in Mathematics and Statistics

Fall 2020

Instructor: Dr. F. Godin
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Note: **All lectures and office hours will be held online. The mid-term and final examination will also be held online (via Moodle).**

Office Hours: Please contact the instructor by email; online appointments through Zoom can be arranged.

Class Schedule: Officially: Tuesdays and Thursdays, 13:15-14:30. However, the class is fully online, and lectures are pre-recorded and available on Moodle (no live lecture is given). Therefore, the official class schedule only has an impact for the scheduling of the mid-term exam.

Optional References:
Derivatives Markets (Third Edition), 2013, by McDonald, R.L., Pearson Education.
Corporate Finance (Fourth Edition), 2017, by Berk, J. and DeMarzo, P., Pearson.
Portfolio Theory and Risk Management, 2014, by Capinski, M. and Kopp, E., Cambridge University Press.
SOA Study Note: IFM-21-18: Measures of Investment Risk, Monte Carlo Simulation, and Empirical Evidence on the Efficient Markets Hypothesis.
SOA Study Note: IFM-22-18: Actuarial Applications of Options and Other Financial Derivatives

Outline: This course is an introduction to several topics related to quantitative finance:

- **Financial derivatives:** derivatives specification and cash flows, static no-arbitrage relationships, futures contract.
- **Binomial option pricing models**: risk-neutral pricing, replicating portfolio.
- **Black-Scholes option pricing model**: lognormal model, Black-Scholes formula, historical volatility.
- **Derivatives risk management**: Greeks, hedging.

- **Mean-variance portfolio theory:** mean-variance setting, efficient frontier, capital market line.
- **Asset pricing models**: CAPM, factor models.
- **Investment Risks:** risk measures.
- **Behavioral Finance:** efficient market hypothesis (EMH), anomalies, behavioral biases.

Evaluation: The course mark will be determined by a mid-term exam (30% weight), a final exam (50% weight) and assignments (20% weight).

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.

CIA Accreditation: This course is accredited by the Canadian Institute of Actuaries (CIA) under the University Accreditation Program (UAP). A grade of B+ or better in this course is needed to apply to the CIA for the exemption of Exam IFM. Please note that due to exceptional circumstances associated with online teaching this semester, the B+ threshold could be revised by the CIA after final grades are audited.

In addition to the university's internal policies on conduct, including academic misconduct, candidates pursuing credits for writing professional examinations shall also be subject to the Code of Conduct and Ethics for Candidates in the CIA Education System and the associated Policy on Conduct and Ethics for Candidates in the CIA Education System. For more information, please visit Obtaining UAP Credits and the CIA FAQ.

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]

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.