Department of Mathematics & Statistics
Concordia University

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MACF 402 (MAST 729/881), Sec. A
Mathematical & Computational Finance II
Fall 2018

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Instructor:	Dr. F. Godin, Office: LB 921-05 (SGW), Phone: (514) 848-2424, Ext. 3494 Email: frederic.godin@concordia.ca
Office Hours:	Tuesdays, 13:30-14:30 and Thursdays, 15:00-16:00.
Class Schedule:	Tuesdays and Thursdays, 16:15-17:30.
Text:	**There is no required text. Lecture notes can be supplemented and reinforced with material, available on reserve or electronically through the library website, listed in the reading/reference list to be provided.**
CIA Accreditation:	Combined grades of at least B in both the MACF 401 and MACF 402 courses enable the student to apply for a UAP exemption for the MFE exam, see http://www.cia-ica.ca/membership/uap/information-for-students
Outline:	This course focuses on computational aspects, implementation, continuous-time models, and advanced topics in Mathematical and Computational Finance. We shall attempt to cover the following topics:

- Brownian motion and stochastic calculus: elements of continuous time finance, the Black-Scholes model, short-rate models, and bond prices
- Monte-Carlo methods: Monte-Carlo for Option Valuation, Monte-Carlo for Greeks, variance reduction techniques; antithetic variates in option valuation, control variates in option valuation, Longstaff-Schwartz method for American option valuation;
- Finite-difference techniques: heat equation, discretization, stability and convergence, Crank-Nicolson;
- Volatility: implied volatility, historical volatility, volatility surfaces, stochastic volatility;
- Hedging: discrete hedging, continuous hedging, Monte-Carlo methods;
- Exotic derivatives: barrier options, lookback options, Bermudan options, Asian options;
- Risk management: loss probabilities and value at risk, credit risk
- Other topics (time permitting)

Course Evaluation:	Weighted average of Assignments (20%), Midterm Examination (35%), and the Final Examination (45%). Some assignment problems will require programming algorithms.

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.

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]*