3. Course Syllabus, Schedule, Delivery Mode

Course Description: This course is a first course in modern financial mathematics and on pricing and hedging derivatives securities. Specific topics covered include: General properties of financial options, binomial pricing model, replication, risk-neutral valuation, and the fundamental theorem of asset pricing; The Black-Scholes option valuation methodology; Option Greeks and risk management; Value-at-risk (VaR) and Conditional VaR; Monte-Carlo simulation to conduct risk analysis. We will work in a discrete time setting throughout this course - finance in continuous time is covered in FM4521/9521.

Course Objectives: After completing this course, students understand the fundamental economic and mathematical aspects of financial markets in a discrete-time setting. and will be able to:
- Use put-call parity to determine the relationship between prices of European put and call options and to identify arbitrage opportunities.
- Calculate the value of European and American options using the binomial model.
- Identify situations where the values of European and American options are the same.
- Interpret option sensitivities, i.e., the Greeks.
- Explain and demonstrate how to control risk using the method of Delta-hedging.
- Pricing via risk-neutral valuation and replicating securities using binomial trees.
- Understand the fundamental theorem of asset pricing.
- Compute the Value-at-Risk for assets and portfolios of assets.
- Work with and apply discrete-time interest rate models and understand concepts like duration, convexity, and immunization.
- Construct a Black-Derman-Toy binomial model matching a given time-zero yield curve and a set of volatilities and use this for pricing derivatives.
- Apply Monte-Carlo simulation to price derivatives and compute risk measures.

University Accreditation Program:
This course is accredited under the Canadian Institute of Actuaries (CIA) University Accreditation Program (UAP) for the 2021-22 academic year. This course with a minimum mark of 80%, along with Financial Modelling 2555A and 2557B (minimum mark of 75% in both), can give you an exemption for the IFM exam. Please see the following link for full details:
http://www.cia-ica.ca/membership/university-accreditation-program---home

In addition to the uni ersit 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.

Contingency plan for an in-person class pivoting to 100% online learning
In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online in synchronously mode (i.e., at the times indicated in the timetable). The grading scheme will not change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Required textbook:
Robert L. McDonald (2013), **Derivatives Markets** (3rd Edition), Pearson Education, ISBN: 978-0-32154-308-0. Tentative list of chapters: 9-14, 18-21, and 23-25.

Other recommended textbooks:
John Hull (2015), **Options, Futures, and other Derivatives** (9th Edition), Pearson Prentice Hall, ISBN: 978-0-13-345631-9. Tentative list of chapters: 1, 2, 5, 10-13, 22, and 31.

Jaksa Cvitanic and Fernando Zapatero (2004), **Introduction to the Economics and Mathematics of Financial Markets**, MIT Press, ISBN: 978-0-262-03320-6. Tentative list of chapters 1, 3, and 5-8.

All course material will be posted to OWL: http://owl.uwo.ca. Students are responsible for checking the course OWL site on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

Test: There will be three in-class 1 hour (50 minutes) long tests (closed book, multiple choice with open-ended questions) counting for 15% of the final grade each. These tests are tentatively scheduled as follows:
First test: Monday, September 27.
Second test: Monday, October 25.
Third test: Monday, November 22.
Each test covers the material since the beginning of the term or since the last test.

Final Exam: One final exam, 3 hours long, (closed book, multiple choice with open-ended questions) counting for   of the total grade The final e am   ill be scheduled b   the Registrar s Office.
The final exam covers all material since the beginning of the term.

No electronic devises may be in your possession during tests or the final exam except for a simple non-programmable scientific calculator.

Evaluation: Students will be evaluated on the basis of the three one-hour tests and a final exam. The final mark will be based on a weight of 15% per test and 55% for the final exam. There will be no make-up tests. For those that do legitimately miss a test and provide the required supporting documentation, the standard practice will be that the weight of the test will be reassigned to the final exam. If your reason is not deemed valid, then you will receive a mark of 0.

6. Student Absences

Academic Consideration for Student Absences
Students who experience an extenuating circumstance (illness, injury or other extenuating

7.