FM3520A (Financial Modelling)
2024-2025 Course Outline

1. Course Information

Course Number: FM3520A
Course Name: Financial Modelling
Academic Term: Fall of 2022
Lecture hours: Mon, Wed, Fri @ 12:30-1:30pm
Lecture room: WSC240

Prerequisites: The prerequisites for this course are:
1) A minimum mark of 60% in **one of** FM2557A/B or BUS4413A/B.
2) A minimum mark of 60% in SS2857A/B.

Anti-requisites: The former SS3520A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in the course, you may be removed from the course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from the course for failing to have the necessary prerequisites.

University Accreditation Program:
This course is part of the University Accreditation Program meeting certain requirements by the Canadian Institute of Actuaries. Please see Section 7 below for further information.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Lars Stentoft	lars.stentoft@uwo.ca	WSC 278	519-661-2111 ext.85311	TBD
Siming Tang	stang378@uwo.ca			TBD

You are welcome to communicate with your instructor by email, but email communication should only be used to provide information or to ask a question that requires a brief response. For more lengthy discussions and for discussions on lectures/course material please see your instructor during their scheduled office hours or by appointment. If you do email them, you must use your UWO account, as these are often the only emails read (as emails sent from other addresses often get spammed) and include in the course name in the subject field.

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, replication, risk-neutral valuation, and the fundamental theorems of asset pricing; The binomial pricing model; The Black-Scholes option valuation methodology; Option Greeks and risk management; Value-at-risk (VaR) and Conditional VaR; Monte-Carlo simulation applied to price derivatives and to conduct risk analysis.
Note: We will work in a discrete time setting throughout this course – finance modelling 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.
- Identify situations where the values of European and American options are the same.
- Calculate the value of European and American options using the binomial model.
- Explain and demonstrate how to control risk using the method of Delta-hedging.
- Understanding pricing via risk-neutral valuation and replicating securities using binomial trees.
- Interpret option sensitivities, i.e., the Greeks.
- Understand the fundamental theorems 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.

Key Sessional Dates:
Classes begin: September 5, 2024 (Note that September 30th is a non-instructional day)
Fall Reading Week: October 12 – October 20, 2024
Classes end: December 6, 2024
Exam period: December 9 – 22, 2024

Contingency plan for an in-person class pivoting to 100% online learning
Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

4. Course Materials

Recommended textbook:
John Hull (2022), *Options, Futures, and other Derivatives* (11^{th} Edition), Pearson Prentice Hall. Tentative list of chapters: 1-3, 5, 10-14, 17-19, 21-22, 26-27, and 31.

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

Other editions of either of these textbooks may be used but, in such cases, it is the students' own responsibility to map the relevant chapters.

All course material will be posted on OWL: https://westernu.brightspace.com/. 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 Brightspace 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

Tests: There will be three in-class 1 hour (50 minutes) long tests (closed book, combined multiple choice and open-ended questions) counting for 15% of the final grade each. Each test covers the material from the beginning of the term or since the last test and these are tentatively scheduled as follows:
First test (material covered in weeks 1-3): Wednesday, September 27.
Second test (material covered in weeks 4-6): Friday, October 28.
Third test (material covered in weeks 7-10): Friday, November 18.

Final Exam: One final exam, 3 hours long, (closed book, combined multiple choice and open-ended questions) counting for 55% of the total grade. The final exam will be scheduled by the Registrar's Office. The final exam covers all the material from the beginning of the term.

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

General information about missed coursework
Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person. The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage https://registrar.uwo.ca/academics/academic_considerations/. All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the final exam is excluded from this. When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation**, the request cannot be recalled and reapplied. This privilege is forfeited.

Evaluation Scheme for Missed Assessments
Students will be evaluated on the basis of the three one-hour tests and the 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 who legitimately miss a test as per the policies outlined below, the weight of that test will be reassigned to the final exam. If your reason is not deemed valid, you will receive a mark of 0.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially for those who miss multiple final exams within one examination period.

6. Additional Statements

Religious Accommodation
When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays at https://www.edi.uwo.ca.

Accommodation Policies
Students with disabilities should work with Accessible Education (formerly SSD), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

Academic policies
The website for Registrar Services is http://www.registrar.uwo.ca.

In accordance with https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Scholastic offences are taken seriously, and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Support Services
Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mentalhealth) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at:
https://www.uwo.ca/health/student_support/survivor_support/get-help.html.
To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at (519) 661-2147 if you have any questions regarding accommodations.

7. University Accreditation Program – Canadian Institute of Actuaries (CIA)

Honours Specialization in Actuarial Science
If you graduate from Western with an HSP in Actuarial Science, this course will be one of the courses that you will take in your program that will allow you to be exempt from the preliminary exams of the Society of Actuaries (SOA). If your plan is to become a fully qualified actuary working in Canada, then all you would need to do is graduate from your HSP in actuarial science to be eligible for the CIA Capstone Exam. Taking and passing this exam, along with completing two online modules and a practice education course, would make you eligible to become an ACIA (Associate of the Canadian Institute of Actuaries).

Major in Actuarial Science
If you graduate from Western with a major in Actuarial Science, the CIA accreditation program will not apply to you. If your plan is to become a fully qualified actuary, then you will need to continue to write and pass the preliminary exams of the SOA.

Please see the following link for full details:
https://www.cia-ica.ca/starting-your-journey/actuarial-education-in-canada/

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**.

Please see the following link for full details:
https://www.cia-ica.ca/publications/223159e/