

## FM3520A (Financial Modelling) 2021-2022 Course Outline

### 1. Course Information

**Course Number:** FM3520A

**Course Name:** Financial Modelling

**Academic Term:** Fall of 2021

**Lecture hours:** Mon, Wed, Fri @ 3:30-4:30pm

**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.

**Co-requisites:** None.

**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.

### 2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Lars Stentoft	<a href="mailto:lars.stentoft@uwo.ca">lars.stentoft@uwo.ca</a>	WSC 278	519-661-2111 ext.85311	TBD
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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).

### 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 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**.

**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* (3<sup>rd</sup> 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* (9<sup>th</sup> 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 55% of the total grade. The final exam will be scheduled by the Registrar's Office.

The final exam covers all material since the beginning of the term.

No electronic devices 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 circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

- (i) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:
  - an absence must be no more than 48 hours
  - the assessments must be worth no more than 30% of the student's final grade
  - no more than two SRAs may be submitted during the Fall/Winter term
- (ii) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.
- (iii) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_illness.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf)

and for the Student Medical Certificate (SMC), see:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

### 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 consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

### Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

## 7. Accommodation, Accessibility and other Academic Policies

### Accommodation Policies

Students with disabilities 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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

[https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](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](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

## 8. 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/>.

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.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual 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.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.