

FM3613B Course Outline. Winter 2023.

1. Course Information

Course Information

Course Name: Mathematics of Financial Options (FM 3613B)

Lecture Hours: Monday, Wednesday, Friday, 2:30 – 3:30 PM, in-person Room WSC240.

List of Prerequisites

SS2503A/B Applied Mathematics 2402A or the former Differential Equations 2402A; or Statistical Sciences 2503A/B (or the former Applied Mathematics 2503A/B). Applied Mathematics 2402A or the former Differential Equations 2402A; or Statistical Sciences 2503A/B (or the former Applied Mathematics 2503A/B).

List of Antirequisites

The former Applied Mathematics 3613A/B

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this 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 a course for failing to have the necessary prerequisites.

2. Instructor Information

Instructors	Email	Office	Office Hours
Dr. Marcos Escobar-Anel	Marcos.escobar@uwo.ca	WSC282	In-person, Wednesday 9-11 am.
TA: TBA			

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. Course Syllabus, Schedule, Delivery Mode

An introduction to modern financial mathematics using a differential equations approach. Stochastic differential equations and their related partial differential equations. The Fokker-Planck and Kolmogorov PDEs. No-arbitrage pricing, the Black-Scholes equation and its solutions. American options. Exotic options.

Learning Outcomes. Upon successful completion of this course, students will be able to:

- Intuition about uncertainty and risk.

- The classical approach to decision making under uncertainty.
- Repaying loans over time.
- Bond pricing with default: using difference equations.
- Tranching and collateralized debt obligations.
- Mean-variance portfolio optimization.
- Capital Asset Pricing Model.
- Basic Stochastic Calculus.
- Black-Scholes equation.

Table of Contents and Schedule:

Week	Dates	Topic	Instructor
1	Jan 9 - 13	Probability, Risk and Uncertainty.	M. Escobar-Anel
2	Jan 16 - 20	Repaying loans over time.	M. Escobar-Anel
3	Jan 23 - 27	Bond Pricing with Default.	M. Escobar-Anel
4	Jan 30 – Feb 3	CDO and Tranching. (Test 1)	M. Escobar-Anel
5	Feb 6 - 10	CDO and Tranching.	M. Escobar-Anel
6	Feb 13 -17	Mean Variance Portfolio.	M. Escobar-Anel
7	Feb 20 - 24	Reading Week	N/A
8	Feb 27 – Mar 3	Mean Variance Portfolio. (Test 2)	M. Escobar-Anel
9	Mar 6 - 10	Capital Asset Pricing Model.	M. Escobar-Anel
10	Mar 13 - 17	Basic Stochastic Calculus.	M. Escobar-Anel
11	Mar 20 – 24	Basic Stochastic Calculus. (Test 3)	M. Escobar-Anel
12	Mar 27 – 31	Black-Scholes Formula.	M. Escobar-Anel
13	Ap 3 - 7	Black-Scholes Formula.	M. Escobar-Anel

Classes begin: January 9, 2023

Reading Week: February 18 – 26, 2023

Classes end: April 10, 2023

Exam period: April 13 – 30, 2023

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, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Textbook (required): Quantitative Finance: A Simulation-Based Introduction Using Excel. Matt Davison. 978-1439871683

Supplemental: Instructor's course notes.

Students should check OWL (<http://owl.uwo.ca>) 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.

All course material will be posted to OWL: <http://owl.uwo.ca>. Any changes will be indicated on the OWL site and discussed with the class.

If students need assistance, 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

The overall course grade will be calculated as listed below:

Midterm Exam 1:	15 % (week of 30/Jan)
Midterm Exam 2:	15 % (week of 27/Feb)
Midterm Exam 3:	15 % (week of 20/ March)
Final Exam	55 %

Midterm Tests:

There will be 3 tests during class, closed book, each containing two parts (multiple choice and short answer). Students will have 50 minutes to complete the test. Chapters and topics for the tests will be announced in advance through OWL.

Final Exam:

The final exam will be a three-hour cumulative examination. It will be scheduled by the Registrar's office (Examination period April 13 - 30, 2023).

Accommodated Evaluations

- NO makeup test for Midterms. If you miss a test (with a valid reason), the weight of the test(s) will be moved to the remaining exams.
- If the make-up for the final is missed, the student will receive an INC and complete the task the next time the course is offered.

Rounding of Marks Statement

Across the Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. **Final grades** on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark "bumping" will be denied.

6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth 10% or more of the overall course grade:

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

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).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

7. Accommodation and Accessibility

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>.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, 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.

8. Academic Policies

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,

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.

Students are allowed to use a non-programmable calculator on quizzes, midterms, and the final exam.

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.

In the event of health lock-down Tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

9. 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.

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>.