

COURSE OUTLINE FOR FINANCIAL MODELLING 9590

1. Course information

Course name and number

FM 9590

*Stochastic processes with applications
in finance and actuarial science*

Academic term

Fall 2020 (Sep - Dec 2020)

Location

Online via OWL

List of prerequisites

A minimum mark of 60% in FM 3520A/B or FM 3613A/B or consent of instructor.

N.B.

Unless you have either the prerequisites 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.

Technical requirements for the course

Stable internet connection, computer with working microphone and/or webcam, Microsoft Word and Excel.

2. Instructor's information

Instructor: Dr. Rogemar S. Mamon

Contact Info: rmamon@stats.uwo.ca

Important

Students must use their Western (@uwo.ca) email addresses when contacting the instructor. Email messages from non-UWO account will NOT be read.

*The subject of your email should have the format: **FM 9590 (insert "at most 4 words about your query")**; failure to do so will cause a delayed response.* The instructor will endeavour to respond to email messages within 48 hours.

Office hours

Zoom format. One to two hours per week. Links will be provided in the OWL site. Time/day(s) – TBD

3. Course syllabus and key sessional dates

Course description: This course introduces the elements of stochastic calculus. The applications cover the analysis of fixed-income instruments and the stochastic modelling of financial and actuarial risk factors.

This course will be offered in an asynchronous-learning mode. [A pre-recorded video lecture will be posted twice a week \(Wednesday and Friday by 8AM\).](#)

Topics to be covered

❖ Pertinent mathematical background in the development of stochastic integration with respect to Brownian motion. This includes the Gaussian process, variation of paths, stochastic integrals, Itô differentiation rule, Girsanov theorem (without proof), Feynman-Kac formula and Euler discretisation scheme for simulation.

Relevant chapters: TBA

❖ Martingale pricing results. Self-financing and replicating strategies. Equivalent martingale probability measure. Arbitrage theory. Market completeness.

Relevant chapters: TBA

❖ The theory of bond pricing. Analysis of diffusion-based term structure models such as the Vasicek, Cox-Ross-Ingersoll and Hull-White models. Exponential-affine class of interest rate models and other extensions. The forward rate approach of Heath, Jarrow and Morton. The forward measure. Relating the short-rate approach to the forward-rate approach.

Relevant chapters: TBA

NOTE: *The relevant readings above are tentative, and they may be subject to modification. Any changes will be posted on the course website.*

Reminder of key sessional dates

Sep 9 Classes begin

Sep 17 Last day to add a full course or first-term half course (for undergrad students). For grad students, check the Graduate Coordinator.

Oct 12 Thanksgiving

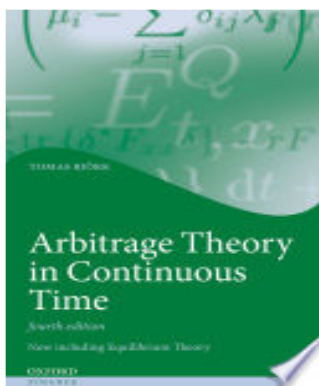
Nov 2-8 Fall Reading Week

Nov 12 Last day to withdraw from a first-term half course without academic penalty (undergrad). For grad, check the Grad Coordinator.

Dec 9	Last day of classes in Fall Term
Dec 10	Study Days
Dec 11-22	December-2020 examination period

4. Reference

Tomas Björk (2020). *Arbitrage Theory in Continuous Time*. 4th edition. Oxford University Press, Oxford.



5. Related course materials

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. Students are responsible for checking OWL on a regular basis.

All course materials will be posted on the OWL website: <http://owl.uwo.ca>.

If students need assistance, they can seek support from 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.

6. Methods of evaluation

The overall course grade will be calculated as listed below:

Take-home exam 1	(Wed, 07 Oct 2020)	15%
Take-home exam 2	(Wed, 18 Nov 2020)	15%
Final Exam	(Fri, 11 Dec 2020)	70%

Missed exams/tests

If you have a conflict, please contact me as soon as possible (and **prior** to the test). There will be no make-up tests. For those who legitimately miss a test/exam and provide the required supporting documentation, the standard practice will be that the weight of the missed test will be reassigned to the final exam.

7. Accommodation and accessibility

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 Academic Accommodation for Students with Disabilities policy can be found at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf

Religious accommodation

Students should consult the University's list of recognised religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar:

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

If a student fails to write a scheduled Special Examination in the case of a missed final exam with a valid excuse, 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 may be reduced by the credit of the course(s) for which the final examination has been deferred. See Academic Calendar for details (under [Special Examinations](#)).

8. Academic policies

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

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, 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.

Remote learning sessions for this course may be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are NOT permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

Any **non-programmable calculators are permitted** during the exam; note that mobile phones and other electronic communication devices are **strictly prohibited**.

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.

Tests and examinations in this course may be conducted using the remote proctoring service, such as Proctortrack. 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**.

Alternatively, tests and examinations in this course may be conducted using Zoom. You will be required to keep your camera on for the entire session, hold up your student card for identification purposes, and share your screen with the invigilator if asked to do so at any time during the exam.

More information about these remote proctoring services is available in the Online Proctoring Guidelines at the following link: <https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf>

Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at the following link: <https://www.proctortrack.com/tech-requirements/>
<https://support.zoom.us/hc/en-us>

9. Support services

You may also wish to contact Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>. Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.