



## COURSE OUTLINE

### 1. **Course:** MATH 383, Introduction to Mathematical Finance - Fall 2020

Lecture 01: MWF 10:00 - 10:50 - Online

| <b>Instructor</b> | <b>Email</b>            | <b>Phone</b> | <b>Office</b> | <b>Hours</b>              |
|-------------------|-------------------------|--------------|---------------|---------------------------|
| Dr Jinniao Qiu    | jinniao.qiu@ucalgary.ca | 403 210-8474 | MS 580        | By appointment (via Zoom) |

#### **Course Structure:**

The majority of the course content will be delivered via pre-recorded video lectures which will be posted on D2L. Each week, students will watch the videos referring to associated sections on the textbook at their own pace following the schedule of topics.

The students should pause the videos and take notes as they would. After watching the videos, students are expected to work on the suggested Practice Problems.

Live meetings will give students an opportunity to ask questions, discuss the material with the instructor, the teaching assistant, and their peers, and engage with more challenging (test-level) practice problems.

#### **Online Delivery Details:**

Some aspects of this course are being offered in real-time via scheduled meeting times. For those aspects you are required to be online at the same time.

#### **Live Sessions:**

There will be two live 50-minute sessions per week with the course instructor and the teaching assistant (T.A.) on Zoom.

- Review, discussions and drop-in Question & Answer (hosted by instructor, during classes on Mondays)
- Problem-Solving (hosted by T.A., during classes on Wednesdays)

Neither of the two live sessions will be recorded; but, the notes will be posted on D2L.

Zoom meetings may be accessed from D2L by clicking on ``communication-->zoom". Regularly check D2L for updated information on what activities are scheduled for each class.

#### **Course Site:**

D2L: MATH 383 L01-(Fall 2020)-Introduction to Mathematical Finance

**Note:** Students must use their U of C account for all course correspondence.

#### **Technology Requirements:**

To participate fully, students need to have reliable access to technology, as follows:

- A computer with a supported operating system, as well as the latest security, and malware updates; A current and updated web browser;
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled; Stable internet connection;
- Webcam/Camera (built-in or external)

In addition, the students must be able to scan/photograph written work and convert the images to PDF files.

- For iPhone / iPad try the \*free\* Adobe Scan Digital PDF Scanner <https://tinyurl.com/tlhhkj3>
- On Google Play try the \*free\* Adobe Scan Digital PDF Scanner <https://tinyurl.com/v7csw88>

Alternative to scanning, the students may create PDF files of their written work by:

- writing with tablet app and saving to a PDF file

### 2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

**Prerequisite(s):**

Statistics 321. Also known as: (formerly Applied Mathematics 481)

**3. Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

| Component(s)            | Weighting % | Date               |
|-------------------------|-------------|--------------------|
| Assignments (7)         | 35%         |                    |
| Midterm Test (in Class) | 25%         | Friday, October 23 |
| Final Examination       | 40%         | To be scheduled    |

The midterm exam is designed to be completed within 40 minutes. You will be given 1 hr to complete it to avoid any possible inconveniences.

The final exam will be designed to be completed in 2 hours. You will be given 3 hours to avoid any possible inconveniences.

Time will be adjusted for SAS students according to their accommodation letter. Other students requiring accommodations for exceptional circumstances will need to arrange these with the instructor no less than 7 days before the exam.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

|                           | A+   | A    | A-   | B+  | B   | B-   | C+   | C   | C-  | D+   | D    |
|---------------------------|------|------|------|-----|-----|------|------|-----|-----|------|------|
| <b>Minimum % Required</b> | 95 % | 90 % | 85 % | 80% | 75% | 70 % | 65 % | 60% | 55% | 50 % | 45 % |

**A passing grade in the final exam (45%) is required if the student is to pass the course as a whole (grade of C-or better).**

**4. Missed Components Of Term Work:**

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

**5. Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

**6. Course Materials:**

Recommended Textbook(s):

Marek Capiński, Tomasz Zastawniak, *Mathematics for Finance*: Springer-Verlag London.

**Unless otherwise noted by the instructor, all D2L/course webpage materials including lecture notes, lab worksheets and solutions, will be removed from the course site on January 10, 2021.**

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

## 7. Examination Policy:

**The midterm and final examinations will be closed-book, but a formula sheet is allowed.** Basic scientific calculators may be used. But no devices capable of wireless communication or internet access (including, but not limited to, phones, smartwatches, tablets, laptops, headphones, and any Bluetooth-enabled devices) will be permitted.

IMPORTANT: It is the student's responsibility to ensure that they have adequate computer and internet access to write the exams. Students will be required to begin their exams promptly at the start of their scheduled class on the day of the exam. If a student encounters any technical issues starting an exam, they **MUST** document the issue by taking a photo, screenshot, or video, and they must contact the instructor immediately so that either additional time can be provided to access the exam or alternative arrangements made. Students claiming to experience such difficulties who do not contact their instructor providing evidence of technical difficulties within 15 minutes of the scheduled start of the exam will not be allowed to write the exam and will receive a grade of zero (0) on the exam. If a student's exam is suspended during the exam (lost internet connection, internet browser crashes, etc.), they **MUST** provide evidence (photo/ screenshot/video) and contact the instructor immediately. Students will then be granted re-entry to suspended exams if they began the exam on time, provided evidence of the suspension, and still have time remaining to complete their exam.

Students should also read the Calendar, [Section G](#), on Examinations.

## 8. Approved Mandatory And Optional Course Supplemental Fees:

There are no mandatory or optional course supplemental fees for this course.

## 9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also [Section E.2](#) of the University Calendar.

## 10. Human Studies Statement:

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

## 11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar
- Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

## 12. Other Important Information For Students:

- Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when

needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).

- b. **SU Wellness Center:** For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email ([syva@ucalgary.ca](mailto:syva@ucalgary.ca)) or phone at [403-220-2208](tel:403-220-2208). The complete University of Calgary policy on sexual violence can be viewed at (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>)
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**
- e. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Mathematics & Statistics, Mark Bauer by email [bauerm@ucalgary.ca](mailto:bauerm@ucalgary.ca) or phone 403-220-4189. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- g. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca). SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca). [Student Ombudsman](#), Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca).
- h. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- i. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.

#### Course Outcomes:

- Describe the main ideas, concepts, notions and models in mathematical finance, and define a simple market model
- Identify the difference between risk-free and risky assets
- Define the risk-free assets as different forms of interest rates or bonds, including simple, periodic and compounded continuously interest rates
- Construct discrete time binomial market model as the simplest model for a risky asset/stock

- Distinguish various kinds of financial derivatives, such as forwards, futures, options, and their properties, and get insight into the pricing of financial derivatives, including forward, futures, options
- Explain how to use Cox-Ross-Rubinstein formula for option pricing in binomial model's setting for a stock price
- Define geometric Brownian motion as continuous time model for a stock price
- Apply Black-Scholes formula for option pricing in a geometric Brownian motion setting for a stock price
- Get insight into the financial engineering in risk management
- Define different kinds of risk parameters, such as delta, gamma, kappa, vega, rho, theta, and understand of their use in financial engineering to manage the risk

Electronically Approved - Sep 05 2020 13:05

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**Department Approval**

Electronically Approved - Sep 07 2020 21:51

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**Associate Dean's Approval**