COURSE OUTLINE

1. **Course:** MATH 581, Stochastic Calculus for Finance - Fall 2020

   Lecture 01: TR 09:30 - 10:45 - Online

   **Instructor:** Associate Professor Ayse Sezer  
   Email: adsezer@ucalgary.ca  
   Phone: 403 284-2918  
   Office: MS 532  
   Hours: Tuesday 11:00am-12:00pm Thursday 11:00am-12:00pm

   **Online Delivery Details:**

   This course is being offered online in real-time via scheduled meeting times, you are required to be online at the same time.

   Lectures are held via Zoom. Assignments are to be written, scanned and submitted to the D2L DropBox. Midterm and Final exams are delivered via D2L.

   Midterm is a timed exam designed to be completed during the duration of the class time, i.e. 75 minutes. Students have the option to start the test at a time that best suits their situation within a 24-hour time period.

   Final exam is a timed exam designed to be completed in 3 hours. Students have the option to start the test at a time that best suits their situation within a 24-hour time period.

   All exams are set up in D2L to include an additional time extension of 50% of the test/assessment duration to allow for any technology issues that may arise.

   **Course Site:**

   D2L: MATH 581 L01-(Fall 2020)-Stochastic Calculus for Finance

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

2. **Requisites:**

   See section 3.5.C in the Faculty of Science section of the online Calendar.

   **Prerequisite(s):**
   Mathematics 383; and 6 units of Mathematics in the Field of Mathematics at the 400 level or above.

   **Antirequisite(s):**
   Credit for Mathematics 581 and Applied Mathematics 681 will not be allowed. Also known as: (formerly Applied Mathematics 581)

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:

<table>
<thead>
<tr>
<th>Component(s)</th>
<th>Weighting %</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments (4)</td>
<td>30%</td>
<td>TBA</td>
</tr>
<tr>
<td>Midterm (1)</td>
<td>30%</td>
<td>Nov 3, 2020</td>
</tr>
<tr>
<td>Final exam</td>
<td>40%</td>
<td>TBA</td>
</tr>
</tbody>
</table>

   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.

<table>
<thead>
<tr>
<th>Minimum % Required</th>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>93 %</td>
<td>88 %</td>
<td>83 %</td>
<td>78 %</td>
<td>73 %</td>
<td>68 %</td>
<td>63 %</td>
<td>58 %</td>
<td>53 %</td>
<td>48 %</td>
<td>43 %</td>
<td></td>
</tr>
</tbody>
</table>

This course has a registrar scheduled final exam.

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:**

Required Textbook(s):


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:**

Open book and notes are allowed. Communication to other individuals is not allowed.

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.
a. **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.

b. **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**:

a. **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.

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 ([svsa@ucalgary.ca](mailto:svsa@ucalgary.ca)) or phone at 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](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 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 Email: suvpaca@ucalgary.ca, SU Faculty Rep., Phone: 403-220-3913 Email: scienterep@su.ucalgary.ca, Student Ombudsman, Email: 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.
Course Outcomes:

- Define Brownian motion and analyze its behavior using basic probability and stochastic process theory
- Construct Ito’s integral and stochastic differential equations (SDE) based on Brownian motion
- Develop Ito’s formula, and use it as a tool to analyze the stochastic dynamics of functions of Brownian motion
- Formulate and analyze the most important elements of a financial model using Ito calculus
- State the fundamental theorems of asset pricing and recreate the key steps in their derivations; use these theorems to distinguish important features of a financial model
- Derive the risk neutral evaluation formula and use it to calculate the prices of contingent claims on financial assets modeled as Ito processes
- Survey a list of advanced topics (American options, stochastic interest rate models, commodity markets, risk management, Poisson processes, jump diffusion and Levy processes) and summarize the key points.