MA 427G / FIN 427G - 001

Financial Mathematics
3 credit hours
Spring 2020

Meeting times and location: TBA

Instructor Information

Instructor: Dr. Adib Bagh
Office Building & Room Number: B&E 223F
Phone Number: (859) 257-3057
Email: adib.bagh@uky.edu
Office Hours: TBA

Course Description

This course introduces financial mathematical models using discrete and continuous stochastic processes. Students will learn to construct and analyze models used in pricing financial options and futures, and other financial contracts. The students will also learn how to construct an optimal portfolio of stocks given various criteria.

Course Prerequisites.

MA/STA 320 or STA 524 or consent of instructor

Student Learning Outcomes

After completing this course, students will be able to:
1) formulate and analyze models to price financial contracts (e.g. options, forwards, and futures);
2) construct an optimal portfolio of financial assets.

Required Materials

An Undergraduate Introduction to Financial Mathematics, by J. Robert Buchanan, 3rd edition, World Scientific.

Activities and Assignments

Course Assignments and Exams

- HW sets (8 @ 5 points each)
- Two midterms (100 points each)
- Project (for graduate students only, 100 points)
- Final (120 points)

Summary Description of Course Assignments

The problems in HW sets will correspond to various sections in the textbook. Students are encouraged to work on the HW sets in groups but they are expected to turn in their solutions individually.

Expectations for graduate students beyond the expectations for undergraduates

Students taking this course for graduate credit will be expected to complete a project by the end of the class. The project must involve applying techniques covered in this class to a non-trivial

real-world problem (e.g. pricing a new financial instrument or constructing an optimal portfolio using real or properly simulated data). The project must be typed as a report and must, at a minimum, include:

        1- an introduction with a clear statement of problem;
        2- sources of data;
        3- discussion of methods used to solve the problem;
        4- summary of solution/results;
        5- a references list (including online references).

The project will be due the last day of classes. The project will be assigned in the first week of April. A student may choose to work on a different project. However, the general idea for the alternative project must be approved by the course instructor no later than the end of the first week of April. The project will be worth 100 points.

Course Grading

For undergraduate students, the grade will be based on 8 HW sets (10 pts each), two midterms (100 points each, and a final (120pts).

Grading scale for undergraduates	90 – 100% = A
	80 – 89% = B
	70 – 79% = C
	60 – 69% = D
	Below 60% = E

For graduate students, the grade will be based on 8 HW sets (5pts each), two midterms (100 pts each), a project (100 pts), and a final (120 points).

Grading Scale for graduate students	90 - 100% = A
(no D for Grad Students)	80 – 89% = B
	70 – 79% = C
	Below 70%= E

Mid-term Grade

There will be two midterm exams during the regular class time, and each midterm exam is worth 100 points. Midterm exams 1 and 2 are scheduled in the sixth and eleventh week of the semester, respectively. Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar.

Tentative Course Schedule

Week	Topic
1	Review of probability theory.
2	Theory of interest.
3 & 4	The theory of Arbitrage.
5 & 6	Random walks and Brownian motion.
7	Forwards and Futures.
8 & 9	Options.
10 & 11	The Black-Scholes equations: derivation and applications.
12	Asset pricing Models.

13 & 14   Portfolio management.

Final Exam Information
The Final Exam (120 points) will be scheduled during finals week by the registrar's office.

Attendance Policy
Attendance is mandatory. Be on time and remain until dismissed. Do not leave in the middle of class. Whenever possible, please notify your instructor of absences prior to class. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences:
(a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to _t as reasonable cause for nonattendance by the professor. You may be asked to verify absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request appropriate verification when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence. If you anticipate an absence for a major religious holiday please notify your instructor (in writing) of anticipated absences due to your observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859) 257-3737, http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php
You are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

Expectations
Classroom behavior: Electronic devices such as mobile phones, laptops and tablets should be put away or used only as part of class activities during lectures. Mobile phones, laptops, and computers may not be used during exams.

Make-up policies: Per Senate Rule 5.2.4.2, if you are missing any graded work due to an excused absence you are responsible for informing the Instructor about your excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The instructor will give you an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred. In particular, if you have university excused absences or have university scheduled class conflicts with uniform examinations you may arrange with their instructor to take the exam at an alternate time. Generally, these make-up exams will be scheduled on the day of or on the day after the regularly scheduled exam. Work-related conflicts are neither university excused absences nor university-scheduled absences.

Attendance: Please see attendance policy above.

Accommodations Due To Disability
If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. Visit the DRC website, email the DRC, contact them by phone at (859) 257-2754, or

visit their office on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407.

Excused Absences (Senate Rule 5.2.4.2)

Senate Rules 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) significant illness, (b) death of a family member, (c) trips for members of student organizations sponsored by an educational unit, trips for University classes, and trips for participation in intercollegiate athletic events, (d) major religious holidays, (e) interviews for graduate/professional school or full-time employment post-graduation, and (f) other circumstances found to fit "reasonable cause for nonattendance" by the instructor of record. Students should notify the professor of absences prior to class when possible.

If a course syllabus requires specific interactions (e.g., with the instructor or other students), in situations where a student's total EXCUSED absences exceed 1/5 (or 20%) of the required interactions for the course, the student shall have the right to request and receive a "W," or the Instructor of Record may award an "I" for the course if the student declines a "W." (Senate Rules 5.2.4.2.1)

(If an attendance/interaction policy is not stated in the course syllabus or the policy does not include a penalty to the student, the Instructor cannot penalize the student for any unexcused absences.)

Verification of Absences (Senate Rules 5.2.4.2.A, B, C, and E)

Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.4.2* states that faculty have the right to request appropriate verification when students claim an excused absence due to: significant illness; death in the household, trips for classes, trips sponsored by an educational unit and trips for participation related to intercollegiate athletic events; and interviews for full-time job opportunities after graduation and interviews for graduate and professional school. (Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.)

Religious Observances (Senate Rule 5.2.4.2.D)

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays. Please check the course syllabus for the notification requirement. If no requirement is specified, two weeks prior to the absence is reasonable and should not be given any later. Information regarding major religious holidays may be obtained through the Ombud's website or calling 859-257-3737.

Make-Up Work (Senate Rule 5.2.4.2)

Students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The instructor must give the student an opportunity to make up the work and/or the exams missed due to the excused absence, and shall do so, if feasible, during the semester in which the absence occurred. The instructor shall provide the student with an opportunity to

make up the graded work and may not simply calculate the student's grade on the basis of the other course requirements, unless the student agrees in writing.