

MAP 4640.0001 – Financial Mathematics Fall 2019

Days & times: Tue, Thu 3:30-4:50 in MSB 109
Professor: Jason Swanson (jason.swanson@ucf.edu)
Office: MSB 202E
Office hours: 1:25pm-3:30pm Tue, Thu
Course webpage: <http://math.swansonsite.com/19w4640>
Textbook: *Stochastic Calculus for Finance I*, by Steven E. Shreve

Course description: Binomial no-arbitrage pricing model, Martingales, Markov processes, capital asset pricing model, stopping times, American derivative securities, random walks, interest rates, fixed-income derivatives, futures. Prerequisites: MAP 4113

Course objectives: This course aims to introduce the fundamentals of discrete-time stochastic processes, including Markov chains, martingales, and random walks. With these fundamentals, the course will treat the binomial asset pricing model, often considered the paradigm of financial practice. Ultimately, this course will serve as a foundation for further study of stochastic calculus and finance.

We will achieve our course goals by covering the above listed textbook in its entirety. More specifically, the course begins with a brief review of basic probability theory and the introduction of the binomial no-arbitrage pricing model. We then introduce more advanced topics such as martingales, Markov processes, and change-of-measure. With these topics in hand, we are able to treat the capital asset pricing model. We then discuss stopping times and their connection to American derivative securities, before finally covering the random walk. Additional topics include the binomial model for interest rates, fixed-income derivatives, forward measures, and futures.

Student learning outcomes: Understanding of the fundamentals of discrete-time stochastic processes, including Markov chains, martingales, and random walks. Ability to solve problems related to the binomial asset pricing model and associated topics.

Grading: There will be two in-class tests and a comprehensive final exam. The tests are tentatively scheduled for October 8 and November 5. Each test is worth 25%. The final exam is worth 35% and is scheduled for Thursday, December 5, 2019, from 1:00 pm to 3:50 pm, in MSB 109. Homework will be worth 15%. There will be no make-up tests. If a test is missed for a legitimate reason (to be determined by the instructor; you must provide valid documentation in advance), then the final exam will be counted twice, as a missed test and as a final. The required threshold for an A is 90%; for a B, 80%; for a C, 70%; and for a D, 60%. Below 60% is an F.

Proof writing requirements: All proofs must be either typeset, written in pencil, or written with black or blue ink. Proofs must be double-spaced. You must use 8.5" × 11" paper with clean, even edges. The paper itself must be new. (Do not, for example, use the back side of scratch paper.) Your assignment must be stapled once in the top left corner. Every proof must be preceded by the declarative sentence you are proving. Proofs must comply with the usual conventions of professional mathematical writing. These include, but are not limited to, the use of paragraphs, complete sentences, correct grammar and punctuation, no isolated mathematical symbols, and no

logical shorthand. Credit may not be given for work which does not conform to all of the above requirements.

Attendance and communication: If you must miss a class, it is your responsibility to find out all information from the class you missed, including any announcements that were made. You are responsible for checking your UCF email every day. All electronic communication to me must be done via email.

Appointment policy: Office hour appointments can be made only during the office hours listed above. Appointments take priority over walk-ins. To ensure being seen during office hours, appointments are highly recommended.

Make-up policy: You will be allowed to turn in make-up work for university-sponsored events, religious observances, or legal obligations. In these instances, you must provide valid and complete documentation in advance. It is at the professor's discretion to determine whether your reasons warrant make-up work.

Academic Integrity Statement: Students should familiarize themselves with UCF's Rules of Conduct at

<http://osc.sdes.ucf.edu/process/roc>

According to Section 1, "Academic Misconduct," students are prohibited from engaging in Unauthorized assistance: Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating. Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but rather was obtained through someone else's efforts and used as part of an examination, course assignment, or project. Commercial Use of Academic Material: Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc. Falsifying or misrepresenting the student's own academic work. Plagiarism: Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own. Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor. Helping another violate academic behavior standards.

For more information about Academic Integrity, students may consult The Center for Academic Integrity

<http://www.academicintegrity.org/icai/assets/FVProject.pdf>

For more information about plagiarism and misuse of sources, see "Defining and Avoiding Plagiarism: The WPA Statement on Best Practices"

<http://wpacouncil.org/node/9>

Responses to Academic Dishonesty, Plagiarism, or Cheating: Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, The Golden Rule

<http://goldenrule.sdes.ucf.edu/docs/goldenrule.pdf>

UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and when necessary respond to academic misconduct. Penalties can include a failing grade in an assignment or in the course, suspension or expulsion from the university, and/or a "Z Designation" on a student's official transcript indicating academic dishonesty, where the final grade for this course will be preceded by the letter Z. For more information about the Z Designation, see <http://goldenrule.sdes.ucf.edu/zgrade>

Course Accessibility Statement: The University of Central Florida is committed to providing access and inclusion for all persons with disabilities. Students with disabilities who need disability-related access in this course should contact the professor as soon as possible. Students should also connect with Student Accessibility Services (SAS) <http://sas.sdes.ucf.edu/> (Ferrell Commons 185, sas@ucf.edu, phone: 407-823-2371). Through Student Accessibility Services, a Course Accessibility Letter may be created and sent to professors, which informs faculty of potential access and accommodations that might be reasonable. Determining reasonable access and accommodations requires consideration of the course design, course learning objectives and the individual academic and course barriers experienced by the student.

Campus Safety Statement: Emergencies on campus are rare, but if one should arise during class, everyone needs to work together. Students should be aware of their surroundings and familiar with some basic safety and security concepts.

In case of an emergency, dial 911 for assistance.

Every UCF classroom contains an emergency procedure guide posted on a wall near the door.

Students should make a note of the guide's physical location and review the online version at http://emergency.ucf.edu/emergency_guide.html

Students should know the evacuation routes from each of their classrooms and have a plan for finding safety in case of an emergency.

If there is a medical emergency during class, students may need to access a first-aid kit or AED (Automated External Defibrillator). To learn where those are located, see <http://www.ehs.ucf.edu/AEDlocations-UCF> To stay informed about emergency situations, students can sign up to receive UCF text alerts by going to my.ucf.edu and logging in. Click on "Student Self Service" located on the left side of the screen in the toolbar, scroll down to the blue "Personal Information" heading on the Student Center screen, click on "UCF Alert", fill out the information, including e-mail address, cell phone number, and cell phone provider, click "Apply" to save the changes, and then click "OK." Students with special needs related to emergency situations should speak with their instructors outside of class. To learn about how to manage an active-shooter situation on campus or elsewhere, consider viewing this video (<https://youtu.be/NIKYajEx4pk>).

Deployed Active Duty Military Students: A deployed active duty military student who feels the need for a special accommodation due to that unique status should contact their instructor to discuss the circumstances.