SM473: Introduction to Mathematical Finance - Spring 2012

Assistant Professor S. Pankavich

About the course: We will spend the majority of the semester learning about a certain class of financial instruments (options, derivatives, securities) and the mathematical theory behind their existence, implementation, and value. It should be noted, however, that this is first and foremost a capstone course. Hence, the central topic may at times be merely a backdrop for a wider class of mathematical and educational goals. Other than the study of mathematical finance, the predominant themes of the course are:

1. **The improvement and mastery of mathematical reading, writing, speaking, and presentation skills**

   Each student will be required to participate in a great deal of reading outside of class time, detailed writing of solutions to complex problems, and informative presentations to the class throughout the semester. Additionally, a final project, in the deliverable form of a paper and presentation (possibly to members of the Mathematics department), will be required at the end of the course.

2. **The recollection and usage of all previous tools and skills learned throughout the student's mathematical career**

   This course serves as the culminating class of students' mathematical training and education. It is meant to provide students the opportunity to demonstrate all that they have learned within their time as a mathematics major. For our course this includes the topics

   - Probability (SM239)
   - Mathematical Modeling (SM233)
   - Simulation and Computational Mathematics (SM233/SM365)
   - Proofs (SM291)
   - Discrete Mathematics (SM242/SM342)
   - Mathematical Analysis (SM331)

   This list is not exhaustive, as topics from other courses (as basic as Calculus and as advanced as Statistics or Differential Equations) may arise with our study of mathematical finance. However, the list is fundamental, meaning that you are expected to have a competent grasp of these topics at the beginning of the course.

3. **The completion of intellectual and professional education**

   One of the tangential aims of this course is to acclimate the student to a professional and actively independent environment. Instead of passively sitting while a professor lectures on material, the majority of course topics will be presented by students. Effectively, this allows for the development of professional conduct within a "meeting" environment rather than a "classroom" environment and guides students toward independent education in the future.

Book: *Stochastic Calculus for Finance I: The Binomial Asset Pricing Model Concise* by Steven E. Shreve, Springer © 2004.
Our ultimate goal is to complete all of the chapters within this book.

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Extra Instruction: I am often available directly before and after class. Extra instruction hours would be held in my office, however, in a Capstone course I believe that most questions can be dealt with during class time. Outside of class, the fastest way to get a brief answer to a question is to ask by email.

Grading: The numerical components of your grade will be combined with the following weightings: 30% homework, 40% class presentations, 30% final project. The course grades and midterm grades will be assigned and weighted according to these sums.

Homeworks: A series of homework assignments will be due throughout the semester. Some of the assignments will be problems from your book, and some will be problems that I will describe in class. Please pay careful attention to due dates as late homework will not be accepted.

Honor: You may collaborate with other students concerning IDEAS to problems on homework. However, you may not copy any portion of another student's written work. Any solution that you submit must be written by you, and you alone. Keep in mind that the goal is for any piece of work you submit to be a solution that you could complete alone, once you have understood the collaboratively created solution. Collaboration will always be forbidden should we have any quizzes or exams.

From the Academic Dean: Section leaders are responsible for alerting the department office in Chauvenet 300 in case the instructor is absent. While waiting for a substitute instructor, the section leader should lead the class in productive study. Under no circumstances should midshipmen dismiss themselves from a regularly scheduled class.

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