

# Mathematics of Finance

## Math 423

Section 001, T TH 10:10am - 11:30am, 120 DENN

Dr. Ahmet Duran

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### Office Hours

T TH 1:10pm-2:30pm and by appointment

### Description

Introduction to the mathematical models used in finance and economics, risk-free assets, risky assets, dynamics of stock prices, binomial and trinomial tree models, discrete time market models, continuous-time stochastic processes, Brownian motion, investment strategies, martingale property, fundamental theorem of asset pricing, portfolio management, capital asset pricing model, forward and futures contracts, general properties of options, option pricing, Cox-Ross-Rubinstein formula, early exercise feature (American options), Itô's lemma, Black-Scholes formula, Black-Scholes differential equation, options on stocks paying dividend, financial engineering, hedging option positions, hedging business risk, variable interest rates, and stochastic interest rates.

### Prerequisites

- Required: Linear algebra (Math 217) and basic probability (Math 425)
- Recommended: A course in programming (EECS 183)

### Text

- Required: *Mathematics for Finance: An introduction to financial engineering*, Capinski and Zastawniak, Published by Springer, ISBN: 9781852333300
- Recommended: *Options, Futures and Other Derivatives*, Hull, Published by Prentice Hall, ISBN: 9780136015864 (6th or 7th will work, but 7th has been reported to bookstores)

### Additional References

- Bodie, Kane and Marcus: *Investments*
- Cornuejols and Tutuncu: *Optimization Methods in Finance: Mathematics, Finance and Risk*
- Roman: *Introduction to the Mathematics of Finance*
- Shreve: *Stochastic Calculus for Finance Vol. I & II*
- Wilmott, Howison and Dewynne: *The Mathematics of Financial Derivatives*

### Course Website

You can visit the course website via [www.umich.edu/~durana](http://www.umich.edu/~durana) and <http://ctools.umich.edu>. I will post announcements, homework assignments, messages,

and other course resources on the course webpage regularly. You may access to answer files for homework, quiz and exam via only <https://ctools.umich.edu>.

### Grading Policy and Important Dates

- You will be expected to read each section before it is discussed in class.
- I will assign homework problems in class (and on the course webpage) regularly; I will collect homework at the beginning of class meeting. I will drop your lowest homework grade. No late homework will be accepted.
- I will collect two computer assignments.
- We will have four quizzes. I do not give make up quizzes, but I will drop your lowest quiz grade.
- **We will have one midterm exam at 7:00pm - 8:30pm on Tuesday, 3/3/09.** I do not give makeup exams.
- Our final exam is cumulative.
- All exams are closed-book, proctored tests.
- You will not be allowed any index card for exams. Several long formulas will be provided with exams.
- Your final grade will be determined according to the following weights:
 

Quiz + Homework + Computer Assignment	30%
Midterm Exam	30%
Final Exam	40%

### Syllabus

I plan to cover Chapters 1-10 of the text; if time permits, we may also cover Chapter 11 or other additional topics. A **tentative** course schedule appears below. If you miss a lecture, you should be sure to get the notes from a classmate.

### Tentative Schedule for Math 423-001

T	TH
	1/8/09 Ch. 1
Ch. 2 1/13/09	1/15/09 Ch. 3 <b>Quiz 1</b>
Ch. 3 1/20/09	1/22/09 Ch. 4 <b>HW 1</b>
Ch. 4 1/27/09	1/29/09 3.3 (CZ), Ch. 12 (Hull) <b>Quiz 2</b>
Ch. 5 2/3/09	2/5/09 Ch. 5 <b>HW 2</b>

Ch. 5	2/10/09	Ch. 6	2/12/09
		<b>Quiz 3</b>	
Ch. 6	2/17/09	Review, Q&A	2/19/09
Winter Study Break	2/24/09	Winter Study Break	2/26/09
<b>EXAM 1</b>	3/3/09	Ch. 7	3/5/09
Ch. 7	3/10/09	Ch. 8	3/12/09
		<b>Computer Assignment 1</b>	
Ch. 8 (CZ), 15.3 (Hull)	3/17/09	Ch. 8 (CZ), 15.3 (Hull)	3/19/09
		<b>Quiz 4</b>	
Ch. 9	3/24/09	Ch. 9	3/26/09
		<b>HW 3</b>	
Ch. 9	3/31/09	Ch. 10	4/2/09
		<b>HW4</b>	
Ch. 10	4/7/09	Ch. 10	4/9/09
		<b>Computer Assignment 2</b>	
Ch. 11	4/14/09	Ch. 11	4/16/09
Review, Q&A	4/21/09		

**FINAL EXAM: Thursday, April 23, 10:30 am – 12:30 pm**