

**MATH 6385-01, Lec 12153**

**Continuous-Time Models in Finance**

**Spring, 2019**

- Instructor: Edward P. C. Kao
- Time: TTH 2:30 – 4:00 pm
- Class Room: C 105
- Office: 629-PGH (713) 743-3456, website: [www.math.uh.edu/~edkao](http://www.math.uh.edu/~edkao)  
[edkao@math.uh.edu](mailto:edkao@math.uh.edu)
- Office Hours: TTH 1:00 - 2:15 p.m., or by appointment
- Course Objective: The course is an introduction to continuous-time models in finance. We first cover tools for pricing contingency claims. They include stochastic calculus, Brownian motion, change of measures, and martingale representation theorem. We then apply these ideas in pricing financial derivatives whose underlying assets are equities, foreign exchanges, and fixed income securities. In addition, we will study models involving jump diffusion and mean reversion and the use of levy processes in finance.
- Grading Guide:
- |          |     |
|----------|-----|
| Homework | 20% |
| Midterm  | 30% |
| Final    | 50% |
- Final Exam: **2:00 pm - 5:00 pm, Tuesday, May 7, 2019**  
(per UH Final Exam Schedule)
- Required Texts: *Arbitrage Theory in Continuous Time*, 3<sup>rd</sup> edition, by Tomas Bjork, Oxford University Press, 2009. (Primary)
- Homework: Homework will be given every Thursday and returned on the following Thursday. No late submission. Hard copy only.

Week	Dates	Topics	Chaps in Bjork
1	1/15, 1/17	Stochastic Integrals, Ito formulas	4
2	1/22, 1/24	Stochastic Differential Equations, Ito's Lemma	5
3	1/29, 1/31	Forward and Backward Kolmogorov Equations	5
4	2/5, 2/7	Portfolio Dynamics	6
5	2/12, 2/14	Black-Scholes-Merton PDE and Formulas	7
6	2/19, 2/21	Futures and Forwards, Completeness, Hedging	8, 9
7	2/26, 2/28	Hedging, Martingale Approach to Arbitrage Theory	9, 10
8	3/5 3/7	Mathematics of Martingale Approach <b>Midterm Exam</b>	11
9	3/12, 3/14	<b>Spring Holidays (no classes)</b>	
10	3/19, 3/21	Black-Scholes from a Martingale Point of View	12
11	3/26, 3/28	Multidimensional Models: Classical Approach	13
12	4/2, 4/4	Multidimensional Models: Martingale Approach	14
13	4/9, 4/11	Incomplete Markets	15
14	4/16, 4/18	Currency derivatives	17
15	4/23, 4/25	American Options	21