금융수학 1

강의계획서

학부과정

서울대학교, 2020년 봄학기

교과목 금융수학1 (Financial mathematics 1)
교과목번호: 3341.451
수업시간: 화,목 17:00-18:15
강의실: 24-207

담당교수 박형빈
연구실: 27-311, 전자우편: hyungbin@snu.ac.kr
Office hour: 화목 4:00-5:00 pm, 6:30-7:00 pm or by appointment

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수업 목표

이 과목은 금융수학의 중요 개념을 이해하기 위한 개론이다. Binomial model을 시작으로, 배경 지식으로써의 Stochastic calculus를 다룬 후, 블랙-숄즈 모델에서 arbitrage pricing 이론을 배운다

Prerequisite

선이수교과목 : 확률미분방정식 1

참고도서

(I) Binomial models, discrete-time models

- Damien Lamberton and Bernard Lapeyre. *Introduction to Stochastic Calculus Applied to Finance.* 2nd ed., CRC Press

(II) Model-free properties of options

- Marek Capinski and Tomasz Zastawniak. *Mathematics for Finance: An Introduction to Financial Engineering,* Chapter 5, Spinger

(III) Stochastic calculus

- Bernt Oksendal. *Stochastic Differential Equations.* 2007. (ISBN-13: 978-3540047582)
- S. R. S. Varadhan. *Stochastic Processes.* Courant Lecture Notes
- Fabrice Baudoin. *Diffusion Processes and Stochastic Calculus,* EMS

– I mainly used the above books for our course contents. For more advanced topics, the following books are also very good.

- Hui-Hsiung Huo. *Introduction to Stochastic Integration.* Springer
- Samuel Cohen and Robert Elliott. *Stochastic Calculus and Applications.* Birkhauser

(IV) Black-Scholes models

- Tomas Bjork. *Arbitrage Theory in Continuous Time,* 3rd edition. Oxford Finance Series, 2009 (ISBN-13: 978-0199574742)
- Bruno Bouchard and Jean-Francois Chassagneux. *Fundamentals and advanced techniques in derivatives hedging.* Springer, 2016. (ISBN-13: 978-3319389882)
- Steele. *Stochastic calculus and financial applications*
- Steven Shreve. *Stochastic Calculus for Finance II.* 2004. (ISBN-13: 978-0387401010)

Contents

Week 1) Introduction

Week 2) Binomial models

Week 3) General discrete time models

Week 4) Model-free properties of options

Week 5) Basic concepts of probability

Week 6) Brownian motion and stochastic integrals

Week 7) Review, midterm exam I

Week 8) Stochastic differential equations I

Week 9) Stochastic differential equations II

Week 10) Black-Scholes model I

Week 11) Black-Scholes model II

Week 12) Review, midterm exam II

Week 13) The martingale approach to arbitrage theory I

Week 14) The martingale approach to arbitrage theory II

Week 15) Parity relations and delta hedging

Week 16) Review, final exam

Homework 매주 혹은 격주 마다 과제가 있음.

Evaluation

1. Exam (60%)
   - Midterm 1(20%)
   - Midterm 2 (20%)
   - Final (20%)
2. Homework (40%): 8-10 homework assignments
3. Project (20%): optional, not recommended

Final Grades Final grades are based on points.

- $90\% \leq A \leq 100\%$
- $75\% \leq B < 90\%$
- $55\% \leq C < 75\%$
- $25\% \leq D < 55\%$
- $F < 25\%$