Hong KongBaptistUniversity
Faculty of Science
Department of Mathematics

Title (Units): MATH3750 Mathematical Finance (3,3,0)

Course Aims: This course introduces topics from replication of trading strategies, arbitrage, completeness, martingale representation theorem, fundamental theorem of finance, stochastic differential equations, and Black - Scholes formula of option pricing.

Prerequisite: MATH1112 Mathematical Analysis II, STAT1131 Statistical Methods and Theory I

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Course Intended Learning Outcomes (CILOs):
Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
1	Understand the existing, as well as proposed new, mathematical models of financial processes and instruments.
2	Develop a fundamental knowledge and skills required for mathematical finance.
3	Perform simple trading and implement investment strategies.
4	Develop analytical and critical thinking and applying that to solve real-world financial problems

Teaching & Learning Activities (TLAs)

CILO	TLAs will include the following:
1-4	Lectures with rigorous mathematical discussions and concrete examples. The lecturer will constantly ask questions in class to make sure that the majority of students are following the teaching materials
1-4	Assignments to monitor both students' learning and mastering of the taught materials. In addition, common mistakes will also be addressed and analyzed

Assessment:

No.	Assessment Methods	Weighting	CILO Addressed	Remarks
1	Continuous Assessment	30%	1-4	Assessments are designed to measure how well the students' recognizing of the theory, techniques, and applications of mathematical finance. The test is conducted to monitor the students' recognizing of the theory, techniques and skills taught in the class. This may involve, but not limited to, in class discussions of rigorous technical problems and their solutions.
2	Final Examination	70%	1-4	Final Examination questions are designed to see how far students have achieved their intended learning outcomes. Students should have a thorough recognizing of the knowledge and apply them correctly in different context to do well in the exam.

Course Intended Learning Outcomes and Weighting:

Content	CILO No.	Teaching (in hours)
1. Review of the stochastic integral	1	5
2. Stochastic differential equations	1	6
3. Arbitrage pricing	1-4	10
4. Black-Scholes hedging (completeness, Delta-hedging, and incompleteness)	1-4	10
5. Continuous time models for Foreign Exchange	1,3,4	7
6. Discrete models (binomial)	1,4	4

Textbook: Tomas Bjork, *Arbitrage Theory in Continuous Time*, Oxford University Press, 2009.

Stanley R. Pliska, *Introduction to Mathematical Finance: Discrete Time Models*,Wiley, 1997.

References: Martin Baxter and Andrew Rennie, *Financial Calculus: An Introduction to Derivative Pricing*, Cambridge University Press, 1996.

Paul Wilmott, Sam Howinson, and Jeff Dewynne, *The Mathematics of Financial Derivatives: A Student Introduction*, Cambridge University Press, 1995.

John Hull, *Options, Futures, and Other Derivatives*, 9th edition, Prentice Hall, 2014.

Damien Lamberton and Bernard Lapeyre, *Introduction to Stochastic Calculus Applied to Finance*,2th edition, Chapman and Hall/CRC, 2007.

Les Clewlow and Chris Strickland, *Implementing Derivative Models*, Wiley, 1998.

Course Content in Outline:

	Topic	Hours
I.	Review of the stochastic integral	5
II.	Stochastic differential equations	6
III.	Arbitrage pricing	10
IV.	Black-Scholes hedging (completeness, Delta-hedging, and incompleteness)	10
V.	Continuous time models for Foreign Exchange	7
VI.	Discrete models (binomial)	4