	Module Description/Course Syllabi
	Study Programme: Bachelor of Mathematics Faculty of Mathematics and Natural Sciences Universitas Andalas

1. *Course number and name*

MAT61242 Introduction to Financial Mathematics

2. *Credits and contact hours/Number of ECTS credits allocated*

3 sks / 4,53 ECTS

3. *Instructors and course coordinator*

Dr. Mahdhivan Syafwan

4. *Text book, title, author, and year*

1. Sheldon M. Ross, An Elementary Introduction to Financial Mathematics, Cambridge University Press, 2011

5. *Recommended reading and other learning resources/tools*

2. Kuntjoro Adji Sidarto, Muhammad Syamsuddin and Novriana Sumarti, Financial Mathematics, ITB Press, 2019
3. Novriana Sumarti, Sharia Financial Mathematics, ITB Press, 2019

6. *Specific course information*

A. Brief description of the content of the course (catalog description)

This course is an introduction to the study of financial mathematics to build the ability to determine basic financial transactions from stocks and options. Basic topics in probability theory are reviewed at the initial meeting. The second topic is Brownian and geometric Brownian motion, which is used to construct a return simulation model for stock prices. The next topics are interest rate and present values analysis, determining contract prices through arbitrage, arbitrage theorem,

and the Black-Scholes formula, an essential formula in financial mathematics. Next, the basic concepts of sharia finance and profit-sharing modeling in small capital investments are discussed. Apart from routine (personal) assignments, this lecture also provides big assignments where students will be divided into groups and given various financial cases to be presented and discussed.

B. Prerequisites or co-requisites

- MAT61151 Data Analysis
- MAT62151 Mathematical Statistics I
- MAT62143 Introduction to Partial Differential Equations
- MAT62142 Numerical Methods

C. Indicate whether a compulsory or elective course in the program

Elective

D. Level of course unit (according to EQF: first cycle Bachelor, second cycle Master)

First Cycle Bachelor

E. Year of study when the course unit is delivered (if applicable)

3rd Year

F. Semester when the course unit is delivered

Odd Semester

G. Mode of delivery (face-to-face, distance learning)

Face to face

7. *Intended Learning Outcomes*

ILO-2 Have in-depth knowledge of basic mathematical concepts.
PI-1: Able to explain basic mathematical concepts.
PI-2: Able to provide examples that are relevant to basic mathematical concepts.
PI-3: Able to determine solutions to simple problems using basic mathematical concepts.

ILO-4 Able to use basic mathematical concepts and techniques in solving simple mathematical problems.
PI-1: Able to choose appropriate basic mathematical concepts and techniques in solving simple mathematical problems.
PI-2: Able to illustrate simple mathematical problems based on appropriate basic mathematical concepts and techniques.
PI-3: Able to solve simple mathematical problems using appropriate basic mathematical concepts and techniques.

ILO-5 Able to prove formally and correctly a simple mathematical statement using the facts and methods learned.
PI-3: Able to present proof of simple mathematical statements rigorously (sequentially and thoroughly).
PI-4: Able to conclude or interpret the results of the proof of simple mathematical statements.

ILO-6 Have data and technology literacy skills and can apply them in solving simple mathematical problems or other relevant fields.
PI-2: Able to use data and technology and apply them to solve simple mathematical statements or other areas.
PI-3: Able to process data using available technology in simple mathematical problems or other fields.
PI-4: Able to conclude and interpret data processing results for simple mathematical problems or other fields.
PI-5: Able to design an algorithm to solve simple mathematical problems or other fields.

ILO-7 Able to communicate effectively, especially in the field of mathematics, with diverse communities.
PI-1: Able to convey ideas or study results orally, especially in the field of mathematics.
PI-2: Able to present ideas or study results in writing, especially in the field of mathematics.
PI-3: Able to respond to feedback given.

ILO-8 Able to work in a team.
PI-1: Able to actively participate in a team with full responsibility.
PI-2: Able to respond well to any feedback in the team.
PI-3: Able to complete tasks according to the set schedule.
PI-4: Able to adapt in a team.

8. *Course Learning Outcomes*

1. Understand and use the concept of probability theory in the context of simple financial problems (ILO-2: PI-1, PI-2, PI-3)

2. Understand and use the concept of Brownian motion/geometric Brownian motion in solving problems related to relevant stock price probability (ILO-4: PI-1, PI-2, PI-3)

3. Solving the problem of changes in investment value within a certain period of time which involves calculating the interest rate and present value (ILO-4: PI-1, PI-2, PI-3)

4. Explain the concept and properties of financial derivative products: options (call/put) and shares (ILO-4: PI-1, PI-2, PI-3)

5. Understand the arbitrage process that allows for a sure-win strategy (ILO-5: PI-1, PI-2, PI-3)

6. Determine and analyze put and call option prices with a simple model using Matlab programming (ILO-6: PI-2, PI-3, PI-4, PI-5, ILO-7: PI-1, PI-2, PI-3, ILO-8: PI-1, PI-2, PI-3, PI-4)

7. Understand the derivation and completion of the Black-Scholes formula and its application in calculating option prices (ILO-4: PI-1, PI-2, PI-3, ILO-5: PI-3, PI-4, ILO-6: PI-2, PI-3)

8. Understand the basic concepts of sharia finance and apply its application to financial transaction problems(ILO-4: PI-1, PI-2, PI-3, ILO-6: PI-2, PI-3, ILO-7: PI-1, PI-2, PI-3, ILO-8: PI -1, PI-2, PI-3, PI-4)

9. Understand and apply profit sharing modeling in small capital investments (ILO-4:PI-1, PI-2, PI-3, ILO-6:PI-2, PI-3, ILO-7: PI-1, PI-2, PI-3, ILO-8: PI-1, PI-2, PI-3, PI-4)

9. *Brief list of topics to be covered*

1. Probability and Normal Random Variables
2. Geometric Brownian Motion
3. Interest Rate and Present Value Analysis
4. Options Pricing
5. Black-Scholes formula
6. Basic Concepts of Sharia Finance
7. Profit Sharing Modeling in Small Capital Investments

10. Learning and teaching methods
Directed Learning, Teacher Centered Learning

11. Language of instruction
Bahasa and English

12. Assessment methods and criteria

Summative Assessment :
  1) Routine Assignment/Activeness : 20%
  2) Big Assignment (Group)   : 30%
  3) Quiz   : 5%
  4) Midterm Exam (UTS)   : 20%
  5) Final Exam (UAS)   : 25%
Formative Assessment: