Course Specifications

Course Title:	**Financial Mathematics**
Course Code:	**23044335-3**
Program:	**Bachelor of Mathematics**
Department:	**Mathematics Department**
College:	**Jamoum University College**
Institution:	**Umm Al-Qura University**

Table of Contents

A. Course Identification

1. Credit hours: 3 credit hours

2. Course type

a. University ☐ College ☐ Department ☑ Others ☐

b. Required ☑ Elective ☐

3. Level/year at which this course is offered: 8th level

4. Pre-requisites for this course (if any): Mathematical Statistics

5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	45
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	45
Other Learning Hours*		
1	Study	70
2	Assignments	15
3	Library	0
4	Projects/Research Essays/Theses	0
5	Others (specify)	20
	Total	105

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

2. Course Main Objective
Provide the students with knowledge of a range of mathematical and computational techniques that are required for a wide range of quantitative positions in the financial

sector and to develop student appreciation of the major issues involved in rigorous advances in the area of financial mathematics.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Understand the mathematical foundations of quantitative finance	
1.2	understand the standard and advanced quantitative methodologies and techniques of importance to a range of careers in investment banks and other financial institutions.	
1.3	Appreciation of emerging theory and techniques in the area of financial mathematics.	
1...		
2	**Skills :**	
2.1	Create and evaluate potential models for the price of shares.	
2.2	Construct, evaluate and analyze models for investments and securities.	
2.3	Design, build, investigate and evaluate forward contract using arbitrage-free pricing methods.	
2.4	Develop connections within branches of Financial Mathematics and between Probability and other disciplines	
2.5	Solve problems using a range of formats and approaches in basic science	
2.6	show the ability to work independently and within groups.	
3	**Competence:**	
3.1	Apply scientific models and tools effectively.	
3.2	Use the internet to write reports about basic Financial Mathematics principles.	
3.3	Apply knowledge gained during the course using computer applications	
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Review of Probability Theory and Random Variable	3
2	Interest: Simple and compound interest. Effective and nominal interest rates. Force of interest. Interest paid monthly.	6
3	Options and option pricing	6
4	The Arbitrage Theorem, Pricing Contracts via Arbitrage	6
5	Deferred and varying annuities, annuities payable continuously.	6
6	Loans, loan structure and equal payments. Discounted cash flow: Generalized cash flow model.	6
7	The Black–Scholes Formula	6
8	Measurement of investment performance.	6
Total		45

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Understand the mathematical foundations of quantitative finance	Lectures Tutorials Discussion Problem Solving	Exams Home work.
1.2	understand the standard and advanced quantitative methodologies and techniques of importance to a range of careers in investment banks and other financial institutions.		
1.3	Appreciation of emerging theory and techniques in the area of financial mathematics.		
2.0	**Skills**		
2.1	Create and evaluate potential models for the price of shares.	Lectures Tutorials Solve Problem Brain Storming	Exams Quizzes. Homework. Discussion
2.2	Construct, evaluate and analyze models for investments and securities.		
2.3	Design, build, investigate and evaluate forward contract using arbitrage-free pricing methods.		
2.4	Develop connections within branches of Financial Mathematics and between Probability and other disciplines	Cooperative education Competitive education	Home work. Reports. Quizzes. Discussion
2.5	Solve problems using a range of formats and approaches in basic science		
2.6	show the ability to work independently and within groups.		
3.0	**Competence**		
3.1	Apply scientific models and tools effectively.	Lectures tutorials brain storming	Home work. Reports. Discussion
3.2	Use the internet to write reports about basic Financial Mathematics principles.		
3.3	Apply knowledge gained during the course using computer applications		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Test (1)	6th week	20%
2	Midterm Test (2)	12th week	20%
3	Homework + Reports + Quizzes	During	10%

#	Assessment task*	Week Due	Percentage of Total Assessment Score
		the semester	
4	Final Examination	End of semester	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

1.1. Office hours per week in the lecturer schedule (6 hours per week).

2.2. Contact with students by e-mail, SMS, and e-learning facilities

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	3.1. Kannoo Ravindran, The Mathematics of Financial Models: Solving Real-World Problems with Quantitative Methods, Wiley Finance, 2014 4.2. Aleˇs Cernˊy, Mathematical Techniques in Finance: Tools for Incomplete Markets, Princeton University Press, Second Edition, 2009
Essential References Materials	1. Sheldon M. Ross, An Elementary Introduction to Mathematical Finance Options and Other Topics, Cambridge University Press 2002, Second Edition
Electronic Materials	❖ http://www.freetechbooks.com ❖ http://tutorial.math.lamar.edu/sitemap.aspx ❖ http://mathforum.org/advanced/numerical.htm/
Other Learning Materials	Microsoft Excel

2. Facilities Required

Item	Resources

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	-The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of student not exceed on 30 in the classroom - Library
Technology Resources (AV, data show, Smart Board, software, etc.)	-Hall is equipped with a computer. - Provide overhead projectors and related items -Smart board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	none

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	