



Program Specification

— (Postgraduate)

Program Name: **Master of Science in Financial Mathematics**

Program Code (as per the Saudi Standard Classification of Educational Levels and Specializations): **05420303**

Qualification Level: **7**

Department: **Mathematics**

College: **Science**

Institution: **King Khalid University**

Program Specification: **New** **updated***

Last Review Date: **22/08/2023**

*Attach the previous version of the Program Specification.



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A. Program Identification and General Information:

1. Program's Main Location:

King Khalid University, Qara Campus

2. Branches Offering the Program (if any):

3. System of Study:

Coursework & Thesis

Coursework

4. Mode of Study:

On Campus

Distance Education

Other(specify)

5. Partnerships with other parties (if any) and the nature of each:

6. Professions/jobs for which students are qualified:

- accounting analyst
- actuary
- bank examiner
- business analyst
- commodities manager/broker
- cost estimator/analyst
- credit analyst
- data analyst
- financial analyst/manager
- investment analyst
- loan/mortgage officer
- management controller
- market research analyst
- mergers and acquisitions manager
- risk management analyst
- securities analyst/broker
- systems administrator
- treasury manager

7. Relevant occupational/ Professional sectors:

- Ministry of Finance.
- The Saudi Arabian Monetary Agency (SAMA).
- The Capital Market Authority (Tadawul).
- Banks and financial financing companies.
- Accounting, auditing, and consulting firms: banks, insurance companies, and major companies.
- Corporate finance departments for large industrial and commercial groups, design offices.
- Finance consulting offices.
- Research and development offices in the field of financial engineering.

8. Major Tracks/Pathways (if any):

Major track/pathway	Credit hours (For each track)	Professions/jobs (For each track)
None	None	None

9. Total credit hours: (45)



B. Mission, Goals, and Program Learning Outcomes

1. Program Mission:

Enhance the use of mathematical and statistical methods in formulating the best business and economic strategies, to help companies, build appropriate financial strategies, to predict the financial risks related to the assets

2. Program Goals:

- Promote applied research particularly that is related to requirements of the kingdom in finance industry.
- Produce world-class graduates with a broad-based and global outlook able to work both within the kingdom and beyond.
- Provide students with the theoretical knowledge and practical methods and skills needed to begin or enhance careers as quantitative analysts in the financial industry.
- Train graduates with an adequate understanding of the financial markets, creating, evaluating, and using appropriate models and able to work in:
 - Portfolio management and security analysis
 - Hedge funds
 - Risk management
 - Trading of securities and derivatives trading
 - Corporate finance and corporate restructurings
 - Venture capital and private equity

Raise the efficiency of those enrolled in financial positions in the public and private sectors by developing their skills in using mathematical methods in solving problems within the business and finance sectors.

3. Program Learning Outcomes:*

Knowledge and Understanding:

K1	State mathematical models of financial cases.
K2	Identify well-defined features of quantifiable systems.
K3	Memorize mathematics and mathematical methods to the pricing and hedging of financial derivative securities.
K4	Distinguish between a good (or well-founded) mathematical financial model and a bad or (poorly founded) model.

Skills:

S1	Apply knowledge of mathematics and mathematical methods to the pricing and hedging of financial derivative securities.
S2	Formulate a mathematical model of a quantifiable system.
S3	Use mathematics to solve a mathematical model or problem related to finance. In particular, an ability to extract quantitative data and information from a mathematical model.
S4	Identify, select, plan for (including resource planning), use and evaluate IT applications and strategies to enhance the achievement of aims and desired outcomes
S5	Communicate effectively. An ability to communicate concepts and methods of applied mathematics, and their relation to problems in finance.

Values, Autonomy, and Responsibility:

V1	Work effectively, both independently and as part of an interdisciplinary group.
V2	Take full responsibility for initiating, identifying, amending, and achieving aims and desired outcomes, using new skills/ techniques as required.





V3 Able to articulate awareness of and demonstrate personal characteristics that positively impact the workplace and reflect integrity and professional and academic values when dealing with various issues.

** Add a table for each track (if any)

C. Curriculum:

1. Curriculum Structure:

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
Course	Required	12	33	73.33
	Elective	3	9	20
Graduation Project (if any)		1	3	6.66
Thesis (if any)		--	--	--
Field Experience (if any)		--	--	--
Others (.....)		--	--	--
Total		16	45	100

* Add a separated table for each track (if any).

2. Program Courses:

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
Level 1	MATH6501	Introduction to Finance	Required	--	2	Program
	MATH6502	Macro Finance	Required	--	2	Program
	MATH6503	Stochastic Calculus	Required	--	3	Program
	MATH6504	Numerical Analysis	Required	--	3	Program
	MATH6505	Optimization Methods	Required	--	3	Program
Level 2	MATH6506	Financial Derivatives	Required	--	3	Program
	MATH6507	Numerical Integration of Stochastic Differential Equations	Required	--	3	Program
	MATH6508	PDE and Numerical Approximations	Required	--	3	Program
	MATH6509	Financial Econometrics	Required	--	3	Program
	MATH****	Optional Course 1	Elective		3	
Level 3	MATH6510	Real Options and Applications	Required	--	2	Program
	MATH6511	Advanced Topics in Financial Derivatives	Required	--	3	Program
	MATH6512	Computational Finance	Required	--	3	Program
	MATH****	Optional Course 2	Elective	--	3	Program
Level 4	MATH****	Optional course 3	Elective	--	3	Program
	MATH6573 or MATH6574	Graduation project or Entrepreneurial Project	Required	--	3	Program

* Include additional levels (for three semesters option or if needed).

** Add a table for the courses of each track (if any)





3. Course Specifications:

Insert hyperlink for all course specifications using NCAA template (T-104)

➤	MATH6501	Introduction to Finance
➤	MATH6502	Macro Finance
➤	MATH6503	Stochastic Calculus
➤	MATH6504	Numerical Analysis
➤	MATH6504	Optimization Methods
➤	MATH6506	Financial Derivatives
➤	MATH6507	Numerical Integration of Stochastic Differential Equations
➤	MATH6508	PDE and Numerical Approximations
➤	MATH6509	Financial Econometrics
➤	MATH6510	Real Options and Applications
➤	MATH6511	Advanced Topics in Financial Derivatives
➤	MATH6512	Computational Finance
➤	MATH6573	Graduation project
➤	MATH6574	Entrepreneurial Project
➤	MATH6513	Credit Risk Modeling
➤	MATH6514	Mathematical Interest Theory
➤	MATH6515	Investments
➤	MATH6516	Financial Applications of Blockchains
➤	MATH6517	Financial Big Data
➤	MATH6518	Applied data Analysis
➤	MATH6519	Data Sciences for Business

4. Program learning Outcomes Mapping Matrix:

Align the program learning outcomes with program courses, according to the following desired levels of performance (I = Introduced P = Practiced M = Mastered).

Course code & No.	Program Learning Outcomes											
	Knowledge and understanding				Skills					Values, Autonomy, and Responsibility		
	K1	K2	K3	K4	S1	S2	S3	S4	S5	V1	V2	V3
MATH6501	I	I	I	I	I	I	I	I	I	I	I	I
MATH6502	I	I	I	I	I	I	I	I	I	I	I	I
MATH6503	I	I	I	I	I	I	I	I	I	I	I	I
MATH6504	I	I	I	I	I	I	I	I	I	I	I	I
MATH6505	I	I	I	I	I	I	I	I	I	I	I	I
MATH6506	I	I	I	I	I	I	I	I	I	I	I	I
MATH6507	I	I	I	I	I	I	I	I	I	I	I	I
MATH6508	I	I	I	I	I	I	I	I	I	I	I	I
MATH6509	P	P	P	I	P	P	P	P	P	I	P	P
MATH6510	P	P	P	P	P	P	P	P	P	P	M	M
MATH6511	P	P	P	P	P	P	M	P	P	P	M	M
MATH6512	P	P	P	P	P	P	P	P	P	P	M	M
MATH6573	M	M	M	M	M	M	M	M	M	M	M	M
MATH6574	M	M	M	M	M	M	M	M	M	M	M	M
MATH6513	I	I	I	P	P	P	M	P	P	P	M	M
MATH6514	I	I	I	P	P	P	M	P	P	P	M	M





Course code & No.	Program Learning Outcomes											
	Knowledge and understanding				Skills					Values, Autonomy, and Responsibility		
	K1	K2	K3	K4	S1	S2	S3	S4	S5	V1	V2	V3
MATH6515	I	I	I	P	P	P	M	P	P	P	M	M
MATH6516	I	I	I	P	P	P	M	P	P	P	M	M
MATH6517	I	I	I	P	P	P	M	P	P	P	M	M
MATH6518	I	I	I	P	P	P	M	P	P	P	M	M
MATH6519	I	I	I	P	P	P	M	P	P	P	M	M

* Add a separated table for each track (if any).

5. Teaching and learning strategies applied to achieve program learning outcomes:

Describe teaching and learning strategies, to achieve the program learning outcomes in all areas.

- Disseminate up-to-date knowledge via:
lectures, up-to-date textbooks, hand-outs, develop skills in using library and other learning resources, use of the Internet.
- Develop the capability to use ideas and information via:
case studies, practical, projects, demonstrations, group working, simulations (e.g., computer based), problem-solving, discussion and debate, essay-writing.
- Develop the students' ability to test ideas and evidence via:
seminar and tutorials, supervision, presentations, essays, feedback on written work, literature reviewing, exam papers, critical assessment, peer assessment, self-assessment.
- Develop the student's ability to generate ideas and evidence via:
research projects, workshops on techniques of creative problem solving, group working, lateral thinking, brainstorming, Mind-mapping, problem solving
- Facilitate the personal development of students via:
feedback, experiential learning, learning logs, structured experiences in groups, self-assessment, profiling.
- Develop the capacity of students to plan and manage own learning via:
projects, workshops, mentors, independent study, dissertations, work placement, portfolio development

6. Assessment Methods for program learning outcomes:

Describe assessment methods (Direct and Indirect) that can be used to measure the achievement of program learning outcomes in all areas.

The program should devise a plan for assessing Program Learning Outcomes (all learning outcomes should be assessed at least once in the program's cycle).

Reports, seminar and tutorials, supervision, presentations, essays, feedback on written work and homework, exam papers, critical assessment, peer assessment, self-assessment

D. Thesis and Its Requirements (if any):

1. Registration of the thesis:

(Requirements/conditions and procedures for registration of the thesis as well as controls, responsibilities and procedures of scientific guidance)





Not Applicable

2. Scientific Supervision:

(The regulations of the selection of the scientific supervisor and his/her responsibilities, as well as the procedures/ mechanisms of the scientific supervision and follow-up)

Not Applicable

3. Thesis Defense/Examination:

(The regulations for selection of the defense/examination committee and the requirements to proceed for thesis defense, the procedures for defense and approval of the thesis, and criteria for evaluation of the thesis)

Not Applicable

E. Student Admission and Support:

1. Student Admission Requirements:

The department of Mathematics is committed to the **Standard List of Postgraduate Studies at the Saudi Universities** and its **Executive Regulations at King Khalid University**. And especially, **Article 15 for the entrance exam**, and **Article 18 for the complementary courses**.

Particularly, the department requires:

- A bachelor's degree in science or engineering or business.
- Basic background in calculus, probability theory, statistics, linear algebra, and differential equations. If needed candidate is advised to take complementary course in any course of these basic background. This will be determined by a departmental committee based on each candidate circumstances.
- Intermediate level in English verified through one of the following

Test	Required level
TOEFL-PBT	400-403
TOEFL-CBT	97
TOEFL-IBT	32
STEP	52
IELTS	3.5

2. Guidance and Orientation Programs for New Students:

(Include only the exceptional needs offered to the students of the program that differ from those provided at the institutional level).

- Forming a committee to welcome new students and explaining the operation of the department and the college.
- Appointing an academic advisor in the department.
- Declaration of office hours for each faculty member.
- Availability of full information about the department and its members and ways to contact them, especially electronically through Blackboard.
- The department's guide is available on the website of the Department.

KKU guides:

- Student's guides
https://www.kku.edu.sa/sites/default/files/2020-10/Student_Guide.pdf
- Student's rights and duties guides
https://www.kku.edu.sa/sites/default/files/general_files/pdf/Administration/guide.pdf
- FAQ
<https://faq.kku.edu.sa>



- The executive rules for the study regulations and exams
https://dar.kku.edu.sa/sites/dar.kku.edu.sa/files/general_files/files/laeha.pdf
- Electronical services guide
<https://bit.ly/3dodwuA>
- Ethical framework
<https://www.kku.edu.sa/portfolio/5264>

3. Student Counseling Services:

(Academic, professional, psychological and social)

(Include only the exceptional needs offered to the students of the program that differ from those provided at the institutional level)

- Assign a program coordinator.
- Assign an academic advisor from faculty members for each group of students from the enrollment until graduation.
- Monitoring the academic performance of students through the Academic Guidance Unit in the Department.
- Provide students with the necessary advice on specialization and employment after graduation, providing personal, social, and educational counseling, and contribute to the development of appropriate solutions to academic problems encountered by students.
- Will continuously monitor and evaluate the program.
- Assign specific office hours in each faculty member's weekly schedule and announce them in a clear and dedicated place for students to provide academic assistance and guidance.
- The Department is committed to the Student Rights Policy approved by the King Khalid University.
- The establishment of the Student Affairs Committee in the Department, whose task is to study students' complaints and find appropriate solutions.

4. Special Support:

(Low achievers, disabled, , and talented students).

The Department is committed to the Special Need Student Rights Policy approved by the King Khalid University. Student's rights and duties guides

https://www.kku.edu.sa/sites/default/files/general_files/pdf/Administration/guide.pdf

F. Faculty and Administrative Staff:

1. Needed Teaching and Administrative Staff:

Academic Rank	Specialty		Special Requirements / Skills (if any)	Required Numbers		
	General	Specific		M	F	T
Professor	Applied Mathematics	Financial Mathematics	--	0	0	0
Associate Professor	Applied Mathematics	--	Familiar with statistical software	2	2	4
Assistant Professor	Applied Mathematics	--	Familiar with statistical software	3	1	4
Technicians and Laboratory Assistant	Software experts	Software experts	Ability to download, fix, repair any required software in teaching. Provided by the IT service in the university	1	1	2





Administrative and Supportive Staff	--	--	--	--	--	--
Others (Lecturer)	--	--	--	--	--	--

G. Learning Resources, Facilities, and Equipment:

1. Learning Resources:

Learning resources required by the Program (textbooks, references, and e-learning resources and web-based resources, etc.)

- Coordinating with the Deanship of Library Affairs to provide books, references, and e-learning resources in the field of specialization.
- The use of books and references appropriate to the content with the description of the courses, with the continuous update of those references periodically by the educational committee in the department.
- Encouraging the translation of specialized books and supporting joint authoring between members of the department and members of the same specialization in other Saudi colleges and universities.

2. Facilities and Equipment:

(Library, laboratories, classrooms, etc.)

Coordinate with the Deanship to provide the required laboratories, studios and classrooms.

3. Procedures to ensure a healthy and safe learning environment:

(According to the nature of the program)

The department is committed to the Healthy and Safe Environment Policy approved by the University

H. Program Quality Assurance:

1. Program Quality Assurance System:

Provide a link to quality assurance manual.

The department of Mathematics is committed to the King Khalid University Quality Standards
<https://quality.kku.edu.sa/ar/publications>

2. Program Quality Monitoring Procedures:

The department of Mathematics is committed to the **Standard List of Postgraduate Studies at the Saudi Universities** and its **Executive Regulations at King Khalid University**.

<https://dps.kku.edu.sa/ar/content/261>

and to the **List of Students Rights and Duties adopted by the University**

<http://bit.do/eQJt3>

and to the **List of Rights and Duties for Graduate Students adopted by the University**

<http://bit.do/eQJtA>

3. Procedures to Monitor Quality of Courses Taught by other Departments:

The Department will coordinate with these department through quality and development committee.

4. Procedures Used to Ensure the Consistency between within the main campus:

(including male and female sections).

- Coordination between quality and development committees.
- Common program coordinator.
- Coordination between male and female sections in part of final exams.





5. Assessment Plan for Program Learning Outcomes (PLOs):

The MSc committee will collect feedback from:

- Results of academic achievement.
- Cases of excellence.
- Extracurricular activities.
- Periodic interviews with students.
- Self-assessment by the student through an objective evaluation model.
- An annual test to measure the levels of students in each section of students separately.
- Evaluation by the Deanship of Academic Development and Quality at the University.
- Evaluation by the National Assessment and Accreditation Authority.
- Evaluation by the Deanship of Graduate Studies.
- Review of suggestions from employers to address deficiencies in graduates.

The MSc committee will use the following strategies:

- Information and data obtained from evaluation models.
- Evaluation by the MSc committee of the department for the extent to which learning outcomes have been achieved in the program.
- An annual test to measure the levels of students in each section of students separately.
- Preparation and review of various evaluation models.
- Setting timetables for evaluations.
- The quality and development committee in the department monitors the evaluation and quality of the program.
- Study the proposals submitted by students, graduates, and employers to improve and evaluate the program.

6. Program Evaluation Matrix:

Evaluation Areas/Aspects	Evaluation Sources/References	Evaluation Methods	Evaluation Time
Effectiveness of teaching & assessment	Students and Faculty	Surveys & Interviews	At the end of each semester.
Learning outcomes	Students and Faculty	Surveys & Interviews	At the end of each semester.
Learning resources	Students and Faculty	Surveys & Interviews	At the end of each semester.
Objectives of the operational plan	Students and Faculty	Surveys & Interviews	At the end of each semester.

Evaluation Areas/Aspects (e.g., leadership, effectiveness of teaching & assessment, learning resources, services, partnerships, etc.)

Evaluation Sources (students, graduates, alumni, faculty, program leaders, administrative staff, employers, independent reviewers, and others.)

Evaluation Methods (e.g., Surveys, interviews, visits, etc.)

Evaluation Time (e.g., beginning of semesters, end of the academic year, etc.)





7. Program KPIs: *

The period to achieve the target (2) year(s).

No.	KPIs Code	KPIs	Targeted Level	Measurement Methods	Measurement Time
1	KPI-PG-1	Students' Evaluation of Quality of learning experience in the Program	3/5	Survey of last year student's opinions.	At the end of each academic year
2	KPI- PG-2	Students' evaluation of the quality of the courses	3/5	Survey of student's opinions.	At the end of each academic year
3	KPI-PG-3	Students' evaluation of the quality of academic supervision	75%	Survey of student's opinions.	At the end of each 1st year of a batch
4	KPI-PG-4	Average time for students' graduation	2 years.	Data Analysis from eRegister	End of each semester
5	KPI-PG-5	Rate of students dropping out of the program	<10%	Data Analysis from eRegister	Yearly
6	KPI-PG-6	Employers' evaluation of the program graduates' Competency	3/5	Survey Employers' opinions.	Yearly
7	KPI-PG-7	Students' satisfaction with services provided	3/5	Survey of student's opinions.	At the end of each semester
8	KPI-PG-8	Ratio of students to faculty members	5:1 for courses 2:1 for Graduation Project	Data Analysis from eRegister	End of each semester
9	KPI-PG-9	Percentage of publications of faculty members	75%	Ratio of teaching staff publishing 1 paper to the other teaching staff.	Yearly
10	KPI-PG-10	Rate of published research per faculty member	2 each	Average number of publications. Yearly	Yearly
11	KPI-PG-11	Citations rate in refereed journals per faculty member	10	Average number of citations per published paper	Yearly
12	KPI-PG-12	Percentage of students' publication	100%	Average number of publications.	Graduation
13	KPI-PG-13	Number of patents, innovative products, and awards of excellence	5	Numeric comparison	Yearly

*including KPIs required by NCAAA

I. Specification Approval Data:

Council / Committee	Department Council
Reference No.	23/44
Date	09/01/1445





Council / Committee	College Council
Reference No.	25/44
Date	16/01/1445

