Program Specification

(Postgraduate)

Program Name:	Master of Science in Applied Statistics and Data Science
Program Code (as per the Saudi Standard Classification of Educational Levels and Specializations):	**05420106**
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.

Table of Contents

A. Program Identification and General Information 3

B. Mission, Goals, and Program Learning Outcomes 4

C. Curriculum 6

D. Thesis and Its Requirements (if any) 9

H. Student Admission and Support: 9

E. Faculty and Administrative Staff: 11

F. Learning Resources, Facilities, and Equipment: 11

G. Program Quality Assurance: 12

H. Specification Approval Data: 14

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:

- Partnership Arrangement: Under investigations
- Type of Partnership: Under investigations
- Duration of Partnership: Under investigations

6. Professions/jobs for which students are qualified:

Students on this program will have excellent career prospects. They will take up positions in general directorate of statistics, consulting firms, banks and in the public sector. They will help companies to manage and interpret data to solve complex problems. They can work as:

- Diagnostic analyst
- Prescriptive analyst
- Data scientist
- Commercial data analyst
- Actuarist
- Business analyst
- Market research analyst
- Risk management analyst
- Computational scientist
- Associate production scientist
- Web data analyst
- Data engineer
- Data architect
- Lead data scientist
- Data Science manger
- Decision scientist

7. Relevant occupational/ Professional sectors:

All the public services as well as the private sectors are beneficiaries. We cite for instance the agencies of the following sectors:

- Ministry of Interior
- Ministry of Environment, Water and Agriculture

- Ministry of Civil Service
- Minister of Finance
- Ministry of Health
- Ministry of Commerce and Investment
- Minister of Justice
- Ministry of Energy, Industry and Mineral Resources
- Ministry of Hajj and Umrah
- Ministry of National Economy and Planning
- Ministry of Communications and Information Technology
- Ministry of Transport

8. Major Tracks/Pathways (if any):

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

9. Total credit hours: (46)

B. Mission, Goals, and Program Learning Outcomes

1. Program Mission:

Provide professional preparations, involving the use of data analysis to identify appropriate strategies in various real-life problems and statistical methodology to develop data-driven solutions to management challenges, to pursue a career in the domain.

2. Program Goals:

- Promote applied scientific research particularly that are related to requirements of the kingdom in Applied Statistics and Data Analysis.
- 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 data analysts in the industry.
- Train graduates with an adequate understanding of the markets, creating, evaluating, and using appropriate methods, algorithms, and software to be able to:
    - Apply computing theory, languages, and algorithms, as well as statistical models to appropriately formulate and interpret data.
    - Understand at an advanced level, statistical concepts, and techniques to apply them to cross-sectional, time-series, longitudinal and event-oriented data sets.
    - Formulate and use appropriate models of data analysis to solve hidden solutions to business related challenges.
    - Develop an advanced knowledge of statistical inference and stochastic processes, statistical modeling, and data analysis to solve problems in engineering, computing and communications sciences, medicine natural and environmental sciences, health and social sciences, economics, and finance.

- Analyze and interpret data, synthesize information to provide valid conclusions.
- Visualize, curate, and prepare data for use with a variety of statistical methods and models and recognize how the quality of the data and the means of data collection may affect conclusions.
- Develop a professional skill in consulting aspects in different subfields of statistics and data science such as Biometrics, Statistics and Data Science for Social, Behavioral and Educational Sciences, Statistics and Data Science for Business, Statistics and Data Science for Industry, Official Statistics.

- Raise the efficiency of those enrolled in analysis positions in the public and private sectors by developing their skills in using statistical methods, algorithms, and software within the business and management sectors.

3. Program Learning Outcomes:*	
Knowledge and Understanding:	
K1	State statistical reasoning, in exploratory data analysis by graphical and other software tools
K2	Describe the features of the statistical methods involved in Data Science.
K3	Memorize statistical models and their data science algorithms used in big data analysis.
K4	Identify appropriate software package in dealing with database management
K5	Develop solid knowledge in a broad range of methods based on statistics and informatics and can use these for data management, analysis and problem solving
Skills:	
S1	Retrieve specific information from the statistical theory, critically evaluate technical articles, and manage many types of any type of data.
S2	Apply computing theory, languages, and algorithms, as well as statistical models, to appropriately formulate and use data analyses
S3	Explain the statistical properties to evaluate statistical models of data to forecast trends and predict outcomes in a variety of industries including scientific and commercial sector
S4	Demonstrate good understanding of statistical concepts and their implantation in data science
S5	Use and adapt statistical software packages and scalable computing infrastructure to formulate problems, identify and gather relevant existing data, and analyze the data to provide insights
S6	Utilize contemporary computing technologies, such as machine learning, AI, parallel and distributed computing, to solve practical problems characterized by large-scale data.
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	9	28	61
	Elective	5	15	33
Graduation Project (if any)		1	3	6
Thesis (if any)		--	--	--
Field Experience(if any)		--	--	--
Others (.....)		--	--	--
Total		15	46	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	STAT6800	Fundamental Concepts of Probability and Statistics	Required	--	3	Program
	STAT6801	Data Management and Visualization	Required	--	3	Program
	STAT6802	Statistical Software	Required	--	4	Program
	MATH****	Optional course 1	Elective	--	3	Program
Level 2	STAT6803	Probability Models and Statistical Computing	Required	--	3	Program
	STAT6804	Experimental Design	Required	--	3	Program
	STAT6805	Sampling Methods	Required	--	3	Program
	STAT****	Optional course 2	Elective	--	3	Program
Level 3	STAT6806	Applied Multivariate Statistics Analysis	Required	--	3	Program
	STAT6807	Applied Time Series Analysis	Required	--	3	Program
	STAT6808	Demographic Methods	Required	--	3	Program
	STAT****	Optional course 3	Elective	--	3	Program
Level 4	STAT****	Optional course 4	Elective	--	3	Program
	STAT****	Optional course 5	Elective	--	3	Program
	STAT6907	Graduation 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 NCAAA template (T-104)

- STAT6800 Fundamental Concepts of Probability and Statistics
- STAT6801 Data Management and Visualization
- STAT6802 Statistical Software

- STAT6803 Probability Models and Statistical Computing
- STAT6804 Experimental Design
- STAT6805 Sampling Methods
- STAT6806 Applied Multivariate Statistics Analysis
- STAT6807 Applied Time Series Analysis
- STAT6808 Demographic Methods
- STAT6907 Graduation project
- MATH6801 Optimization Methods
- MATH6802 Numerical Methods for Differential Equations
- MATH6803 Applied Linear Models
- STAT6809 Statistical Analysis of Reliability and Survival Data
- STAT6810 Applied Nonparametric Statistics
- STAT6811 Simulation and Monte Carlo Methods
- STAT6812 Collecting and Analyzing Big Data
- STAT6813 Bayesian Data Analysis
- STAT6814 Actuarial Statistics
- STAT6815 Neural Networks
- STAT6816 Longitudinal Data Analysis
- STAT6817 Meta-Analysis
- STAT6818 Data Mining and Machine Learning
- STAT6819 Web, Mobile and Enterprise Computing
- STAT6820 Cloud Computing and Big data Analytics

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	K5	S1	S2	S3	S4	S5	S6	V1	V2	V3
STAT6800	I	I	I	I		I	I	I	I	I	I	I	I	I
STAT6801	I	I		P			P	P	I	I		I	I	I
STAT6802	I		I	I	P	P	P	P				I	I	I
STAT6803		I	M	M	P		M	M	I			I	I	I
STAT6804		I	I	I		P		P	I	I		I	I	I
STAT6805	I	I	I			P	P	I			I	I	I	I
STAT6806	M	M	M	M			P	P	P	P			P	P
STAT6807		M	M	M		P	P	P				P	P	P
STAT6808		M	M	M			P	P	P			P	P	P
STAT6907	M	M	M			M	M		M			M	M	M
MATH6801	M		M	M		P	P	P	P			I	I	I
MATH6802	M	M	M	M		P	P		P			I	I	I
MATH6803	M	M		M		P	P	P	P		P	I	I	I
STAT6809	M	M	M				P	P	M			M	M	M
STAT6810	M		M	M		P	P		M			P	P	P

Course code & No.	Program Learning Outcomes													
	Knowledge and understanding					Skills						Values, Autonomy, and Responsibility		
	K1	K2	K3	K4	K5	S1	S2	S3	S4	S5	S6	V1	V2	V3
STAT6811		M	M	M		P	P	P				P	P	P
STAT6812	M	M			P	P	P		M			P	P	P
STAT6813		M	M	M			P			M	M	P	P	P
STAT6814	M	M			P		P	P	M	M	M	M	M	M
STAT6815	M	M	M	M	P		P	P	M	M	M	M	M	M
STAT6816	M	M	M	M	P		P	P	M	M	M	M	M	M
STAT6817	M	M	M	M	P		P	P	P	M	M	M	M	M
STAT6818	P	P	M	P	P	P	P	P	M	M	M	M	M	M
STAT6819	P	P	M	P	P	P	P	P	M	M	M	M	M	M
STAT6820	P	P	M	P	P	P	P	P	M	M	M	M	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.

1. 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.
2. Develop the capability to use ideas and information via:
   case studies, practicals, projects, demonstrations, group working, simulations (e.g., computer based), problem-solving, discussion and debate, essay-writing.
3. 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.
4. 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
5. Facilitate the personal development of students via:
   feedback, experiential learning, learning logs, structured experiences in groups, selfassessment, profiling.
6. 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

H. 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	450
TOEFL-CBT	133
TOEFL-IBT	45
STEP	67
IELTS	4

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

E. 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	Probability and Statistics	Applied Statistics/ Mathematical Statistics	Familiar with statistical software	1	2	3
Associate Professor	Probability and Statistics	Applied Statistics/ Mathematical Statistics	Familiar with statistical software	1	4	5
Assistant Professor	Probability and Statistics	Applied Statistics/ Mathematical Statistics/ Data Science	Familiar with statistical software	4	5	9
Technicians and Laboratory Assistant	Software experts	Software experts	Ability to download. Fix, repair any required software in teaching	2	2	4
Administrative and Supportive Staff	None	None	None	0	0	0
Others (Lecturer)	Probability and Statistics	Applied Statistics/ Mathematical Statistics	Familiar with statistical software	1	2	3

F. 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

G. 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:

Not Applicable

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

(including male and female sections).

Not Applicable

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	75%	Survey of student's opinions.	At the end of each 1st year of a batch

No.	KPIs Code	KPIs	Targeted Level	Measurement Methods	Measurement Time
		supervision			
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

H. 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