



# Program Specification

— (Postgraduate)

Program Name: **Master of Applied Mathematics**

Program Code (as per the Saudi Standard Classification of Educational Levels and Specializations): **7**

Qualification Level: **Master of Science in Applied Mathematics**

Department: **Mathematics and Statistics Department**

College: **Faculty of Science**

Institution: **Taif University**

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

Last Review Date: **4/4/1445 H**

\*Attach the previous version of the Program Specification.



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## A. Program Identification and General Information:

### 1. Program's Main Location:

Main Campus (Male and Female)  
Taif University, Al-Hawiah- Taif.

### 2. Branches Offering the Program (if any):

None

### 3. System of Study:

Course work & 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: None

- Type of Partnership: None

- Duration of Partnership: None

### 6. Professions/jobs for which students are qualified:

- 1- Lecturer at the university level.
- 2- Teacher for the pre-university levels at the ministry of education.
- 3- Researcher at Applied Mathematical research centers.
- 4- Financial institutions.

### 7. Relevant occupational/ Professional sectors:

### 8. Major Tracks/Pathways (if any):

Major track/pathway	Credit hours (For each track)	Professions/jobs (For each track)
1. One track		
2.		
3.		
...		

### 9. Exit Points/Awarded Degree (if any):

Exit points/Awarded degree	Credit hours
1. None	None
2.	

### 10. Total credit hours: (40 hr)



## B. Mission, Goals, and Program Learning Outcomes

### 1. Program Mission:

Preparing graduates with a deep knowledge of applied mathematics and its applications qualifies them to be creative researchers and serve society.

### 2. Program Goals:

The Master's program in Applied Mathematics is designed with advanced curricula that:

- Promoting cooperation between experts in applied mathematics with their peers in the areas of community service.
- Develop current knowledge in applied mathematics and its applications.
- Employing the latest methods to solve various models in applied mathematics.
- Benefit from the latest knowledge in the field of scientific calculations to model and solve many problems
- Improving cooperation and establishing strategic partnerships that support scientific research locally and globally.

### 3. Program Learning Outcomes:\*

#### Knowledge and Understanding:

K1	<b>Recognize</b> fundamentals of applied mathematics.
K2	<b>Identify</b> mathematical applied knowledge appropriate to professional activities
K3	<b>Describe</b> problems relating to the basic concepts in applied mathematics various fields of science.

#### Skills:

S1	<b>Apply</b> appropriate mathematical, models and tools in solving various problems.
S2	<b>Employ</b> mathematical knowledge to applications related to mathematical sciences or in postgraduate studies.
S3	<b>Explain</b> the complementarity of mathematics as an abstract area of study versus applied disciplines.
S4	<b>Use</b> mathematical techniques in solving many problems in other disciplines.
S5	<b>Demonstrate</b> understanding of the important mathematical concepts, principles, theorems, formulas, computational techniques in the required courses.

#### Values, Autonomy, and Responsibility:

V1	<b>Participate</b> effectively within groups and independently.
V2	<b>Give</b> responsibility for learning importance and continuing personal and professional development.
V3	<b>Accept</b> critical thinking, communication skills, and mathematical methods for solving many problems in other disciplines.

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





## C. Curriculum:

### 1. Curriculum Structure:

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
<b>Course</b>	Required	<b>7</b>	<b>21</b>	<b>53%</b>
	Elective	<b>3</b>	<b>9</b>	<b>22%</b>
Graduation Project (if any)	NA	NA	NA	NA
Thesis (if any)		<b>1</b>	<b>10</b>	<b>25 %</b>
Field Experience(if any)	NA	NA	NA	NA
Others (.....)	NA	NA	NA	NA
<b>Total</b>		<b>10</b>	<b>40</b>	<b>100%</b>

\* 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)
<b>Level 1</b>	202517-3	<b>Analytic Mechanics</b>	Required	None	<b>3</b>	<b>Program</b>
	202606-3	<b>Partial Differential Equations</b>	Required	None	<b>3</b>	<b>Program</b>
	202516-3	<b>Theory of Elasticity</b>	Required	None	<b>3</b>	<b>Program</b>
<b>Level 2</b>	202620-3	<b>Quantum Mechanics</b>	Required	None	<b>3</b>	<b>Program</b>
	202610-3	<b>Numerical Solution of PDE</b>	Required	None	<b>3</b>	<b>Program</b>
	202619-3	<b>Fluid Mechanics</b>	Required	None	<b>3</b>	<b>Program</b>
<b>Level 3</b>	202602-3	<b>Elective course 1</b>	Elective	None	<b>3</b>	<b>Program</b>
	202601-3	<b>Elective course 2</b>	Elective	None	<b>3</b>	<b>Program</b>
	202615-3	<b>Mathematical programming</b>	Required	None	<b>3</b>	<b>Program</b>
<b>Level 4</b>	202613-3	<b>Elective course 3</b>	Elective	None	<b>3</b>	<b>Program</b>
	<b>202699-10</b>	<b>Thesis</b>	Required	None	<b>10</b>	<b>Program</b>

\* 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)

<https://drive.google.com/drive/folders/1MUs-7Y42tKXrGSxD4rfAf5OS1htG5Cpy?usp=sharing>

### 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	---	S1	S2	S3	S4	S5	V1	V2	V3	
Course Analytic Mechanics		P				P					P	P	
Course Partial Differential Equations	P		P		P				P		P	P	
Course Theory of Elasticity	P					P	P				P	P	
Course Quantum Mechanics	P	P			P		P	P			P		P
Course Numerical Solution of PDE	M		M		M				M		M	M	
Course Fluid Mechanics	M	M			M	M					M	M	
Course Mathematical programming	M		M		M				M		M	M	
Course Elective course (1)	M		M		M				M		M	M	
Course Elective (2)	M	M			M		M				M		M
Course Elective (3)	M	M	M		M	M	M				M	M	M
Course Elective (4)	M	M	M		M	M	M				M	M	





Course code & No.	Program Learning Outcomes												
	Knowledge and understanding				Skills					Values, Autonomy, and Responsibility			
	K1	K2	K3	---	S1	S2	S3	S4	S5		V1	V2	V3
Course Elective (5)	M	M			M	M					M	M	
Course Elective (6)	M	M			M		M				M		M
Course Thesis		M			M						M		

## 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.

	NQF Learning Domains and Learning Outcomes	Teaching Strategies
<b>Knowledge and Understanding</b>		
<b>K1</b>	<b>Recognize</b> fundamentals of applied mathematics.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Class discussion</li> </ul>
<b>K2</b>	<b>Identify</b> mathematical applied knowledge appropriate to professional activities	
<b>K3</b>	<b>Describe</b> problems relating to the basic concepts in applied mathematics various fields of science.	
<b>Skills</b>		
<b>S1</b>	<b>Apply</b> appropriate mathematical, models and tools in solving various problems.	<ol style="list-style-type: none"> <li>Lectures</li> <li>Reading and reflecting students' homework.</li> <li>Discussing the common and fatal mistakes reported in the homework, quizzes and exams.</li> <li>Solving problems in the class.</li> <li>Group discussion</li> <li>Projects</li> </ol>
<b>S2</b>	<b>Employ</b> mathematical knowledge to applications related to mathematical sciences or in postgraduate studies.	
<b>S3</b>	<b>Explain</b> the complementarity of mathematics as an abstract area of study versus applied disciplines.	
<b>S4</b>	<b>Use</b> mathematical techniques in solving many problems in other disciplines.	
<b>S5</b>	<b>Demonstrate</b> understanding of the important mathematical concepts, principles, theorems, formulas, computational techniques in the required courses.	



Values		
V1	Participate effectively within groups and independently.	Lectures
V2	Give responsibility for learning importance and continuing personal and professional development.	Team work Group Discussion
V3	Accept critical thinking, communication skills, and mathematical and statistical methods for solving many problems in other disciplines.	Hands on exercises Reading some topics related to the course contents

## 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).

- **Written (Midterm and Final exams).**
- **Quizzes.**
- **General report.**
- **Homework.**
- **Project.**
- **Oral presentation of the projects. Computer's software program.**

## 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)

- The admission requirements are established in accordance with the criteria set by the college council and the admission requirements of Taif University.
- To be eligible for admission, the applicant must pass successfully twenty seven credit hours of courses with a GPA with a minimum average 3.75 out of 5.

### 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)





- The department assigns supervisors for the thesis.
- The student should prepare a thesis under supervision.

This work requires the following main steps:

- ✓ Choose the subject of the project.
- ✓ Prepare a literature survey about the (project) topic.
- ✓ Recognize the importance of library and internet in expansion of our knowledge.
- ✓ Develop a research plan.
- ✓ Investigate the area of interest.
- ✓ Apply appropriate software and web resources.
- ✓ Write up the thesis and defend it.

### 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)

The thesis should be discussed and reviewed by internal and external reviewers.

## H. Student Admission and Support:

### 1. Student Admission Requirements:

The admission requirements for the program will be in accordance with those of KFU and in agreement with the criteria set by the College Council.

In summary, to be eligible for admission, the applicant must:

- 1- Fulfill the admission requirements specified in the unified regulations for graduate studies in universities.
- 2- Have B.Sc. degree in mathematics from a Saudi university or from a recognized university
- 3- Obtain the score specified by the College Board in an English language test.
- 4- Pass an admission test provided by the department in accordance with Article 16 of the Unified Regulations for Postgraduate Studies in Saudi universities.

### 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).

### 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)

The program will apply the QMS policies and procedures (QMS E.2 and E.3) regarding the academic activities, guidance.

### 4. Special Support:

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

**Low achievers, gifted, and talented students:**





The program uses, as a part of student counseling and advising system, an available electronic service that allows for tracking students with special learning difficulties through monitoring their academic records and allows for intervention through counseling to help them overcome their weaknesses. Moreover, the program has a committee for fostering the gifted and talented students. This service is linked to the banner system.

**Students with disabilities:**

Buildings of college of science are highly accessible for individuals with special needs. This includes wheelchair ramp, elevators and disabled toilets facilities

## 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
Professors	Math & Statistics	Applied Math	sufficient experience, skills and possesses extensive relations in their specialization area	0	0	0
Associate Professors	Math & Statistics	Applied Math		0	0	0
Assistant Professors	Math & Statistics	Applied Math		0	0	0
Technicians and Laboratory Assistants				0	0	0
Administrative and Supportive Staff	Secretary		Administrative & Computer skills	0	0	0
Others (specify)			NA			

## 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.)

- The Learning Resource Committee (LRC) of the college facilitates and guides the use of available learning resources. The committee also supports and assists the faculty in the provision and use of such resources inside and outside the classroom to enhance program delivery. The LRC meets with faculty to identify the learning resources' requirements such as books, soft wares, or other resources and plan for their procurement. The committee also submits the demand for books and journals to the Library Deanship as per faculty need.
- The Course Report (CR) contains a section on resources and facilities where difficulties in accessing, adequacy and evaluation are stated.



- The Course Evaluation Survey (CES) is conducted by students at the end of each semester.
- The Learning Resource Committee submits to the college council who approves the list of textbooks for endorsement to the Deanship of Library for the acquisition.

The University provides:

- Library resources, including e-books, on-line journals and databases, which are comprehensive and up-to-date; together with assistance from library staff to enable you to make the best use of these resources.
- High-speed access to online electronic learning resources on the Internet from dedicated PC Workstations onsite and from your own devices; laptops, smartphones and tablet PCs via the KFU wireless network. There is a wide range of application software available from the Student Public Workstations.
- Computer accounts, which will connect you to a number of learning technologies for example, the Blackboard virtual learning environment (which facilitates online learning and access to specific learning resources).
- Standard ICT tools such as Email, secure file store and calendars.

Assessment and support (including specialist IT support) facilities if you have a disability, long-term health problem or specific learning difficulty.

## 2. Facilities and Equipment:

(Library, laboratories, classrooms, etc.)

Policies and Procedure for providing and quality assurance of Facilities and Equipment (Library, laboratories, medical facilities, classrooms, etc.).

1. All the faculty members are asked through heads of their departments to submit the learning resource requirements (books, software's, lab equipment/instrument) required for optimum course delivery, as well as for their research.
2. The Learning Resource Committee collects all pertinent requirements, while the committee for research and labs deals with lab equipment/reagents.
3. The specifications are discussed and approved by the committee and are recommended to the college council.
4. Demands for required text and reference books for courses are forwarded to the Deanship of library affairs for purchase and provision in the library.
5. The laboratory and classroom resources are forwarded to the purchasing department of the university.
6. Other support that includes health services.
7. The department has the following infrastructures to facilitate teaching and research activities:

- Two computer laboratories.
- A self-learning room.
- At least one video conference room.
- A library for faculty members.

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

(According to the nature of the program)

All used classrooms are appropriate and safe.

## G. Program Quality Assurance:

### 1. Program Quality Assurance System:

Provide a link to quality assurance manual.

### 2. Program Quality Monitoring Procedures:



**1. The Academic Programs Committee:**

Implement the periodic procedures to ensure the quality of the academic program, by collecting the information about the program using various assessment tools and analyzing these results annually to identify the strengths and weaknesses to improve performance, according to the following:

- Analyze the results of direct measurement of the CLOs and PLOs and prepare their reports.
- Analyze surveys results and prepare a report about its results.
- Prepare the program's annual report.
- Align PLOs with program graduate attributes and prepare the required reports.
- Study the latest surrounding conditions of the program and the developments of the labor market and the extent of demand for program graduates.
- Prepare a comprehensive annual report including strengths and shortcomings points and declare the proposals for improvement and development of the program.

**2. Department Council:**

Raise the reports of the academic programs committee in the department to the council of the department in accordance with their powers and the council take appropriate recommendations and approve the periodic reviewing reports and raise them to the Dean of the College.

**3. Dean of the College:**

Submit the periodic reviewing reports of the program from the Dean of the College to the Development and Accreditation Committee of the College to review reports and study recommendations as well as take actions to implement and raise that recommendations and reports to the College's Council for approval.

**4. College Council:**

Approve the program's reports and raise them to the University Deanship of Development.

**5. University Deanship of Development:**

- Follow-up the programs' periodic reviews with the concerned departments and provide the Academic Programs Committee with the required academic support.
- Review reports and recommendations related to academic programs submitted from the development and accreditation committees coordinators of college.
- Based on the submitted reports, a report must be raised to the University's Agency on the need to modify, develop or cancel the program a report to the University Agency on the need for the program to modify, develop or cancel in report light raised.

**6. The University Agency for Academic Affairs and Development:**

Submit recommendations to the University Council.

**7. University Council:**

Raise a report on those academic programs which need to modify, developed or cancel to the University Council for appropriate decisions.

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

To be sure that the courses provide by other departments meet the needs of students in the mathematics Program, the following procedures have been done:

- Communication with other departments to ensure that the required course coverage fulfills the needs of mathematics students.
- The syllabus of the courses offered by other programs must be reviewed by the undergraduate committee of the department to ensure compliance with the program's needs.





- The department must approve the syllabus of the courses offered by the other departments.
- Courses evaluation by all stakeholders

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

(including male and female sections).

The department quality assurance committee includes one staff member from all branches as a coordinator for each branch.

- Each coordinator must write a report about his branch at the end of every semester as well as an annual report.
- Follow-up the programs' periodic reviews with the concerned branches' coordinators and provide them with the required academic support.
- Review reports and recommendations related to the program which are submitted from branches' coordinators.

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

A committee was formatted to set and evaluate the learning outcomes of the general mathematics program.

- Use the National Qualifications Framework for Higher Education in the Kingdom of Saudi Arabia as the main source of information required.
- Study the learning outcomes of similar programs in different universities inside or outside Saudi Arabia.
- Taking the opinion of the advisory committee about the learning outcomes of the program.
- Taking the employers' opinion about the learning outcomes of the program.
- Align PLOs with program graduate attributes and prepare the required reports.
- Study the latest surrounding conditions of the program and the developments of the labor market and the extent of demand for program graduates.
- Set the mapping matrix of program learning outcomes with courses.
- Design a plan to generate and collect data.
- Analyze data.
- Prepare a comprehensive annual report including strengths and shortcomings points and declare the proposals for improvement and development of the program.

#### 6. Program Evaluation Matrix:

Evaluation Areas/Aspects	Evaluation Sources/References	Evaluation Methods	Evaluation Time
Leadership	Staff members Students	Surveys	End of the academic year
Effectiveness of teaching	Students	Surveys Exams' results	During semesters
Effectiveness of assessment	Staff members	Inspection of exams according to CLOs	End of semesters
Learning resources	Students Staff members	Surveys	End of semesters
Program KPIs	Program leaders	Results of KPIs	End of the academic year





**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 ( ) year(s)

No	KPI		Targeted Value	Actual Value	Internal Benchmark	Analysis	New Target
			AY 2023-2024	AY 2023-2024	AY 2022-2023		
1	KPI-PG-01	Students' evaluation of quality of learning experience in the program	4.1	4.26	4		4.3
2	KPI-PG-02	Students' evaluation of the quality of the courses	4.1	4.12	4		4.2
3	KPI-PG-03	Students' evaluation of the quality of scientific supervision	4.21	4.24	4		4.3
4	KPI-PG-04	Average time for students' graduation	3 years	3 years (6 semesters)	3 years		3 years
5	KPI-PG-05	Rate of students dropping out of the program	16%	16%	0.0%		0%
6	KPI-PG-06	Employers' evaluation of the program graduates' competency	4	N/A	3.75		3.75
7	KPI-PG-07	Students' satisfaction with the provided service	3.76	3.76	3.75		3.8
8	KPI-PG-08	Ratio of students to faculty members	1:9	1:9	1:9		1:10
9	KPI-PG-09	Percentage of publications of faculty members	72.8%	FEMALE: 72.8% MALE: 72.8%	89%		73%
10	KPI-PG-10	Rate of published research per faculty member	3:1	FEMALE: 3:1 MALE: 9:1	11:1		5:1
11	KPI-PG-11	Citations rate in refereed journals per refereed faculty member	50:1	FEMAE: 60:1 MALE: 60:1	169:1		55:1
12	KPI-PG-12	Percentage of students' publication	0.0%	0.0%	0.0%		0%
13	KPI-PG-13	Number of patents, innovative products, and awards of excellence	0	0	0		0%
14	KPI-AMath-01	The number of initiatives program	35	35	35		36



No	KPI		Targeted Value	Actual Value	Internal Benchmark	Analysis	New Target
			AY 2023-2024	AY 2023-2024	AY 2022-2023		
		offered to the local community per year.					
15	KPI-AMath-02	Percentage of faculty members of the program participating in community service activities.	40.6%	40.6%	40.6%		42%

\*including KPIs required by NCAAA

## H. Specification Approval Data:

Council / Committee	Department of Mathematics and Statistics
Reference No.	
Date	3/9/1445 H

