

# Master of Applied Mathematics program learning outcomes assessment plan

## 1- Basic information

<b>Program Name: Master of Applied Mathematics</b>
<b>Qualification semester: First semester (NAQF)</b>
<b>Department: Mathematics &amp; Statistics Department</b>
<b>College: College of Science</b>
<b>Institution: Taif University</b>
<b>Academic Year: 1445H</b>
<b>Location: Taif Male Students Main Campus, Hawaiyah, Taif, Taif Female, Students Main Campus, Hawaiyah, Taif.</b>

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### **3- List of abbreviations**

#### **Abbreviation**

#### **Meaning**

CLOs

Course learning outcomes

PLOs

Program learning outcomes

LOs

Learning outcomes

As

Assignments

E

Exams

O

Oral

Q

Quizzes

R

Reports

I

Introduced

P

Practiced

M

Mastered

### **4- Introduction**

Learning outcomes are statements describing of the knowledge, skills and values that the learner is expected to acquire by the end of the course or the academic program. It is the end result of the learning process that is must be measurable.

### **5- Importance of learning outcomes**

- a) For learners: providing them with information that help them to choose their specialties.
- b) For educational institutions: a means of developing courses and programs and one of requirements to qualify for accreditation.
- c) Locally: A means of differentiating between qualifications, mobility between institutions, as well as academic accreditation.
- d) Internationally: A means of international recognition of qualifications, and facilitating equivalences.

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## 6- Master of Applied Mathematics program learning outcomes assessment

The Master of Applied Mathematics program has assigned 12 PLOs according to the latest NCAAA forms and learning domains also to be consistent with the general Master of Applied Mathematics program's mission and goals.

### **Master of Applied Mathematics program learning outcomes**

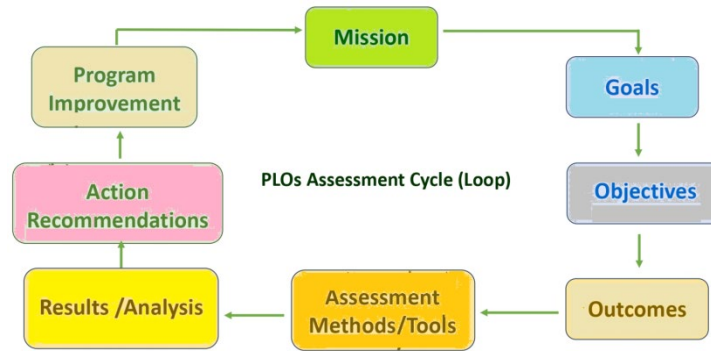
Knowledge	
K1	<b>Recognize</b> fundamentals of different branches of pure and applied mathematics in addition to applied statistics.
K2	<b>Identify</b> mathematical and statistical knowledge appropriate to professional activities.
K3	<b>Describe</b> problems relating to the basic concepts in various fields of science.
Skills	
S1	<b>Apply</b> appropriate mathematical and statistical theories, 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 and statistical concepts, principles, theorems, formulas, computational techniques in the required courses.
Values	
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 and statistical methods for solving many problems in other disciplines.

## 7- Short-Term plan for program's annual progress

In this plan, courses of first semester have been chosen for the PLOs measurement. The assessment plan depends on assessing all PLOs annually and follows the PLOs assessment cycle to propose actions for improvement of outcomes.

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### PLOs assessment cycle



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The assessment strategy assigned for each of the selected courses and each of the PLOs have been shown in the following table.

### Program learning outcomes assessment strategy for levels 10, 11 and 12 courses

Level	Code	Course Name	Program Learning Outcomes											
			Knowledge			Skills					Values			
			K1	K2	K3	S1	S2	S3	S4	S5	V1	V2	V3	
1	202517-3	Analytic Mechanics		Q, As, E			Q, As, E					O	O	
	202606-3	Partial Differential Equations	E			E	E			E				O
	202516-3	Theory of Elasticity			Q, As, E					Q, As, E		O	O	
3 & 4	202602-3	Topics in Fluid Mechanics	Q	Q, As, E		Q, As, E	Q, As, E					O	O	
	202601-3	Thermoelasticity	Q, As, E				Q, As	E, Q				O	O	
	202650-3	Approximation theory and BVB	Q, E		Q, As, E	E				E		O		O
	202615-3	Mathematical programming	Q	E, As		Q, As		E, Q		E, Q, As		O	O	
	202613-3	Stability Theory of Differential Equations	Q, E	Q, As, E		Q, E	Q, As, E	Q, E	Q, As, E			O	O	O
	202612-3	Topics in Quantum Mechanics	Q, As, E	Q, As, E		Q, As, E		Q, As, E	Q, As, E			O		O
	202612-10	thesis	I			M						P		

### 8- Indirect assessment using students' evaluations

The indirect assessment for the LO's is measured using the students' evaluations that are available on the university system after confirming the final result of each course and after determining the questions that measure each of the learning outcomes. A program is designed in Excel to calculate the indirect average learning outcomes for all courses.

## 9- Direct assessment by mean method

In this part, we will describe the mean method for measuring the PLOs by weight 100% as follows:

- 1- The Academic programs committee determines the target level for each learning outcome of the course according to the results of measuring the learning outcomes in the previous course report.
- 2- In all course assessment methods, whether short exams, periodic or final exams, semester works, the intended learning outcomes of each question are determined.
- 3- We now use the mean method to calculate the learning outcomes, according to the following equation.

The average of a certain course learning outcome = the sum of the scores of the questions or activities which measure this course learning outcome for all students divided by the total number of students multiplied by the total score for this learning outcome , then we multiply the quotient by 100.

- 4- A committee was organized from the department to create a program in the Excel language that suits the electronic and paper tests to measure the learning outcomes of the courses and link them to the learning outcomes of the program using the averaging method.
- 5- **PLOs will be a weighted average from the direct course learning outcomes with weight 80% and the indirect PLOs with weigh 20%.**

### Mathematics program learning outcomes assessment plan

PLO Code	Assessment Modules	Assessment strategies	Assessment period	Responsibility for assessment		Monitoring and evaluation
				Reference	Participation	
K1	<b>Recognize</b> fundamental of different branches of pure and applied mathematics in addition to applied statistics.	Assignments Exams Quizzes Reports	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los

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<b>K2</b>	<b>Identify</b> mathematical and statistical knowledge appropriate to professional activities	Assignments Exams Quizzes	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los
<b>K3</b>	<b>Describe</b> problems relating to the basic concepts in various fields of science.	Assignments Exams Quizzes	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los
<b>S1</b>	<b>Apply</b> appropriate mathematical and statistical theories, models and tools in solving various problems.	Assignments Exams Quizzes Reports	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los
<b>S2</b>	<b>Employ</b> mathematical knowledge to applications related to mathematical sciences or in postgraduate studies.	Assignments Exams Quizzes Reports	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los
<b>S3</b>	<b>Explain</b> the complementarity of mathematics as an abstract area of study versus applied disciplines.	Assignments Exams Quizzes Reports	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los
<b>S4</b>	<b>Use</b> mathematical techniques in solving many problems in other disciplines.	Assignments Exams Quizzes Reports	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los
<b>S5</b>	<b>Demonstrate</b> understanding of the important mathematical and statistical concepts, principles, theorems, formulas, computational techniques in the required courses.	Assignments Exams Quizzes Reports	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los
<b>V1</b>	<b>Participate</b> effectively within groups and independently.	Oral presentation of projects.	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los



V2	<b>Give</b> responsibility for learning importance and personal and professional development.	Oral presentation of projects	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los
V3	<b>Accept</b> critical thinking, communication skills, and mathematical and statistical methods for solving many problems in other disciplines.	Oral presentation of projects	The end of academic year	Course instructor	Course coordinator	Program committee for KPIs and Los

**10- Long-Term plan using several courses from different levels over a period of 2 years**

The selected courses cover different levels of performance and cover all PLOs during the study period of the students (2 years). The same strategy of PLOs measurements, as illustrated earlier will be used.

**PLOs mapping matrix of the selected courses**  
According to the desired levels of performance

Level	Code	Course Name	Program Learning Outcomes											
			Knowledge			Skills					Values			
			K1	K2	K3	S1	S2	S3	S4	S5	V1	V2	V3	
1	202517-3	Analytic Mechanics		I			M					P	P	
	202606-3	Partial Differential Equations	I			M	M			M				P
	202516-3	Theory of Elasticity			I					M	P	P		
3	202602-3	Topics in Fluid Mechanics	I	I		M	M				P	P		
	202601-3	Thermoelasticity	I				M	M			P	P		
	202650-3	Approximation theory and BVB	I		I	M				M	P		P	
	202615-3	Mathematical programming	I	I		M		M		M	P	P		
	202613-3	Stability Theory of Differential Equations	I	I		M	M	M	M		P	P	P	
	202612-3	Topics in Quantum Mechanics	I	I		M		M	M		P		P	

### Program learning outcomes assessment strategy (Long-term plan)

Level	Code	Course Name	Program Learning Outcomes											
			Knowledge			Skills					Values			
			K1	K2	K3	S1	S2	S3	S4	S5	V1	V2	V3	
1	202517-3	Analytic Mechanics		Q, As, E			Q, As, E					0	0	
	202606-3	Partial Differential Equations	E			E	E			E				0
	202516-3	Theory of Elasticity			Q, As, E					Q, As, E		0	0	
3	202602-3	Topics in Fluid Mechanics	Q	Q, As, E		Q, As, E	Q, As, E					0	0	
	202601-3	Thermoelasticity	Q, As, E				Q, As	E, Q				0	0	
	202650-3	Approximation theory and BVB	Q, E		Q, As, E	E				E		0		0
	202615-3	Mathematical programming	Q	E, As		Q, As		E, Q		E, Q, As		0	0	
	202613-3	Stability Theory of Differential Equations	Q, E	Q, As, E		Q, E	Q, As, E	Q, E	Q, As, E			0	0	0
	202612-3	Topics in Quantum Mechanics	Q, As, E	Q, As, E		Q, As, E		Q, As, E	Q, As, E			0		0

### 11- Approval page

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