Department of Mathematics

MISSION, OBJECTIVES AND OUTCOMES

Mission Statement

To develop human resources by inculcating professional knowledge, skills and ethical values, to bring-in prosperity and technological advancement based on high-tech. research in the individual's life and society at large.

M. Sc Mathematics Program
(Program Mission, Objectives and Outcomes)

Standard 1-1: The program must have documented measurable objectives that support faculty / college and institution mission statements

---

Mission Statement for M. Sc Mathematics

Department of Mathematics aims to advance the intellectual level and enable the students to provide data analysing services to the researchers from universities and other sectors. This program develops human resources by inculcating professional knowledge, skills and ethical values, to bring-in prosperity and technological advancement based on high-tech. research in the individual's life and society at large.'

Program objectives

The department has the objectives to provide the knowledge in Mathematics so that they Can meet the future challenges and be able to:

1. To enable the students of Mathematics to utilize the knowledge gained in the degree program effectively and efficiently.
2. To establish necessary techniques, needed to start a career of research, development, teaching or financial application involving mathematics. .
3. Analyze and produce the solution to different problems.
4. To prepare mathematics students to speak through physics, this is the formulation of general laws applying, mainly, inductive logic.
5. Work as a team member.
6. Engineering is the modeling from the general laws to create practical systems.
7. Technology is the implementation and the adoption of a laboratory model to create a working system which is good being mass produced.
8. Physics makes contact with outside world, technology becoming the stage, where one enjoys the blessings.

9. In other disciplines, like economics, life sciences, a similar route is followed to transform the abstract formulae and equations developed by a pure mathematician to live and vibrating applications in everyday world.

Objective	How measured	When measured	Improvement identified	Improvement made
2,3,7,8,9	Student Course Evaluation Questionnaire	Dec 2012	course organization, Lack of learning resources, lack of practical material, Shortage of books.	
1,2,4,6	Survey of Graduating Students	Dec 2012	➤ Program objectives achievements need more attention ➤ Infrastructure Improvement in lab work	

Standards1-2: **The program must have documented outcome for graduating students .It must be demonstrated that the outcome support the program objective and that graduating students are capable of performing these outcomes**.

Program Outcomes

Program objectives will result in following outcomes:

1. Students will be able to apply and transfer familiar concepts to solve different problems in various fields.
2. Students will be able to develop skills to allow learners to carry out calculations involving fractions, percentages, and then make decisions and choices.
3. Students will be able to analyze and produce the solution to problems.
4. Students will be take part in competitive and other carreer making examinations.
5. Students will be able to work as team member.
6. Students will be able to step into research and development effectively..
7. Students will be able to use Mathematical technique being powerful tools for analyzing numerical data in almost every branch of life.
8. Students will be able to link between simple probability and expected frequency.
9. Students will be able to apply theoratical knowledge into practical like to develop range of symmetrical pictures and patterns using a range of media.
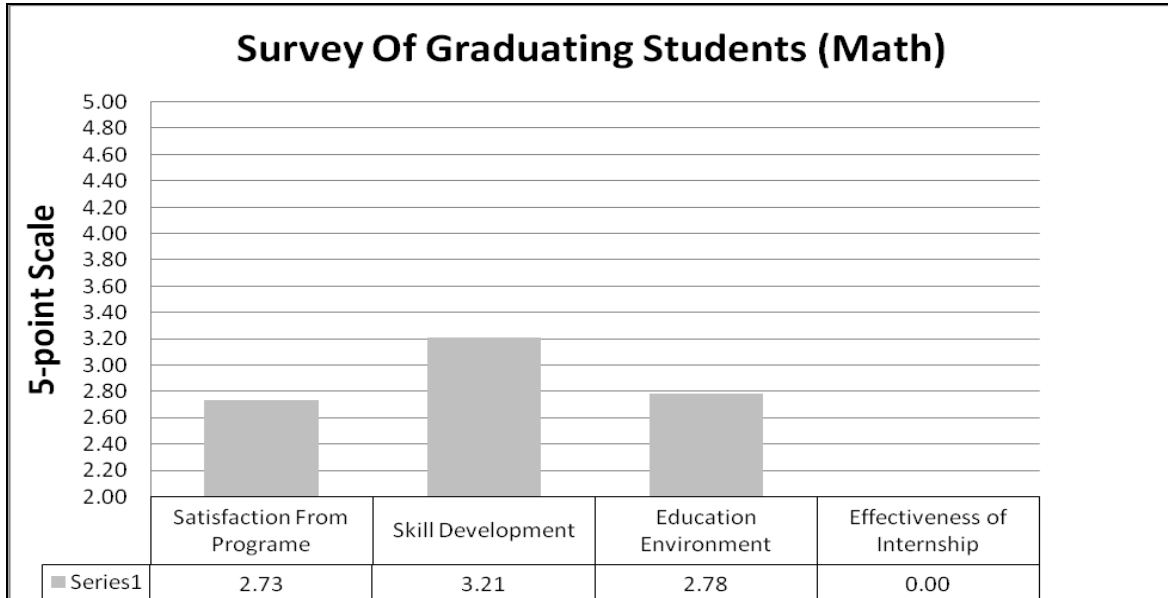
Program Objectives	Program Outcomes								
	1	2	3	4	5	6	7	8	9
1				√					
2		√							√
3								√	√
4							√		
5					√				
6	√		√					√	

7						√	√		
8									√
9							√	√	√

> **Standard 1-3: The results of programs assessment and the extent to which they are used to improve the program must be documented**

After the assessment of Graduating students' survey, the strength and weaknesses identified.

- **Areas for improvement**
  - ➢ Program objective achievement need more attention
  - ➢ Infrastructure
  - ➢ No computer labs. for practical work
  - ➢ Professional development.

Describe the actions taken based on the results of periodic assessments
Actions to be taken on the recommendations of AT visits

- **Strength and weakness of the program**

Strengths:

➢ Program smoothness

➢ Independent thinking and teamwork

➢ Skill Development

➢ Education Environment

➢ Planning abiliteis

➢ Data analyst

➢ Good Researcher

Weaknesses:

➢ Program objective achievement needs more attention

➢ Lack of Responsibilities in official work.

➢ Lack of computer labs.

➢ Internship for completion of program.

➢ Lacking of communication skills.

- **List future development plan for the program**

➢ Latest computer labs with net facilities.

➢ New and advanced curriculum

➢ Stress on Research Work

➢ Infrastructure.

➢ Professional development.

Standard 1-4:   The department must asses its overall performance periodically using quantifiable measures.

Present students enrolment (M. Sc Mathematics)

Years	No of students	No of graduate students
2010	52	32
2011	45	35
2012	56	35

Criterion 2: Curriculum Design & Organization

A. **Title of Degree Program:** M. Sc Mathematics
B. **Definition of credit hour:** One credit hour means a class of one hour per week for one term/ semester. One term means 15 weeks continuous duration program. .
C. **Degree Plan:** The table-1 shows the course division of the program.
D. **Curriculum breakdown:** No breakdown available for the courses. Needs improvement

Following matrix links courses in the program to program outcomes

	Courses	Program Outcomes								
		1	2	3	4	5	6	7	8	9
1st Year Courses										
1st term	Real Analysis-I	√		√						
	Algebra							√		
	G. Topology									
	ODE		√	√					√	
	English-I									
	D.Geometry									
2nd term	Real Analysis-II	√		√						
	Complex Analysis							√		
	Group Theory									
	Dynamics		√			√				
	English-II									
	Set theory and logic									
2nd Year Courses										
3rd Term	Mathematical statistics-I							√		
	Measure and Integration-I		√	√			√			√
	Numerical Analysis-I						√			
	Functional Analysis-I						√			

	Integral equations	√			√	√			√
4th Term	Mathematical statistics-II	√					√		
	Measure and Integration-II		√			√			√
	Numerical Analysis-II	√				√			
	Functional Analysis-II				√			√	
	PDE	√		√					√

Table 1: Courses versus program outcomes

> **Standard 2-2: Theoretical background, problems analysis and solution design must be stressed within the program's core material.**

Automation and Control Concentration (Regular Stream)	
Elements	**Courses**
Theoretical	Real Analysis-I, Algebras, G. Topology, D.Geometry, Real Analysis-II, Group Theory, Set theory and logic, Mathematical statistics-I, Measure and Integration-I, Mathematical statistics-II, Measure and Integration-II
Problem Analysis	ODE, Complex Analysis, Dynamics, Numerical Analysis-I, Functional Analysis-I, Integral equations, Numerical Analysis-II, Functional Analysis-II, PDE.
Solution Design	Numerical Analysis-I, Numerical Analysis-I, PDE,

Table 2: Fulfilling requirements in standard 2-2

> **Standard2-3: The curriculum must satisfy the mathematics and basic sciences requirements for the program as specified by the respective accreditation body**

Mathematics subject is part of the syllabus

Standard 2-4: The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body

The curriculum in the program is fully satisfied the major requirements and objectives of the program.

Standard 2-5: The curriculum must satisfy humanities, social sciences, arts, ethical, professional and other discipline requirements for the program as specified by the respective accreditation body

Table 3 shows how the M. Sc Statistics program satisfies requirements in standards 2-3, 2-4 and 2-5. It's clear from the table that all requirements are met but only in the area of humanities and social sciences needs little attention.

M. Sc Mathematics	Mathematics and Basic Sciences		Program Topics				Humanities and Social Sciences	
			Core		Elective			
	Required	Present	Required	Present	Required	Present	Required	Present
	0	0	20	20	0	0	2	2

Table.3: Standard 2-3, 2-4, 2-5 requirements

Standard 2-6: Information technology component of the curriculum must be Integrated throughout the program

There is no inclusion of Information technology course in the program, department is also lacking of computer lab, so the information technology component is missing in the program.

Standard 2-7: Oral and written communication skills of the students must be developed and applied in the program

Oral and written communication has been given importance in the program. Students are to take following English courses to improve their communication skills:

- English (Study Skills)
- Communication Skills

Students' skills in oral and written communication are not satisfactory, its need improvement.

Criterion 03: Laboratories & Computing Facilities

Standard- 3-1: (Lab manuals/documentation/instruction for experiments must be available and readily accessible to faculty and students.

NA

Standard 3-2: There must be adequate support personal for instruction and maintaining the computing laboratories

NA

Standard 3-3: The university computing infrastructure and facilities must be adequate to support programs objectives.

University has the IT infrastructure and provide the internet facility to all university, university has 32 MB dedicated link which is quite enough fulfill the requirements of different departments of the university. So we can take benefits from the IT facilities when computer lab may establish here.

Criterion 4: Student Support and Advising

Standard 4.1: Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner.

All the courses are first discussed by departmental academic committee. The recommendations are then discussed in the Board of Studies meeting comprising of some senior professors of the university and experts of curriculum from other universities and affiliated colleges. The recommendations of this board are further submitted to Academic committee for approval and onward submission to the syndicate. In this way the course and the curriculum passes and screens through a number of levels.

Standard 4-2: Courses in the major areas of study must be structured to ensure effective interaction between student, faculty and teacher assistants.

No proper procedure to assign the responsibility to structure courses and to maintain the consistency of contents. Improvement needs in this area to fulfill the requirements.

Standard 4-3 Guidance on how to complete the program must be available to all students and access to academic advising must be available to make course decisions and careers choices.

There is no such facility available for the students in the department to guide them for their professional life, academic advising, and other guidance throughout the program. No specializations are available at master level for the students to select as field of expertise. However in M.phil specializations are available.

Criterion 5: Process Control

Standard 5-1: **The process by which students are admitted to the Program must be based on quantitative and qualitative criteria and clearly documented. The process must be periodically evaluated to ensure that it is meeting its objectives.**

A very transparent system for admission in M.Sc Mathematics, NTS test and interview is taken for admission. Admission in this program based on the following selection criteria.

1. The candidate must qualify NTS test to appear in interview.(40%)
2. Candidate must have passed B.Sc. with Math-A, Math-B, at least 2nd division.
3. Candidate must have
4.   Merit formula: (60%)

$$SSC *1 = X$$
$$HSSC*2 = Y$$
$$B. Sc*3 = Z$$
$$Merit = X+Y+Z / 6$$

Standard 5-2: **The process by which students are registered in the program and monitoring of students progress to ensure timely completion of the program must be documented.**

At the start of term applications are invited through leading news papers. After getting the applications students are scrutinized with reference to pre-requisite of the program. Merit list of eligible candidates is made according to the formula given in standard 5-1.

To monitor the students' performance we have internal as well as external base evaluation system. In every term at least 2 tests are conducted which carry 20 % marks along with assignments at the end of the term, external exam is conducted for 80 %. The result is based over the combined assessment of the students.

Standard 5-3: The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation.

In order to attract qualified faculty , different domains of computing is defined in the programs and as per the expertise required , demand for the staff along with the expertise details is send to Administration for advertising the positions in leading English and Urdu News papers. As per the application received, the scrutiny committee short list the applicants for the evaluation test as per the criteria advertised. A third party is involved for conducting the test to make the process transparent and successful candidates of the test are further passed through a selection board in which a panel of experts interviews the candidate. After the selection board syndicate gives the approval of these selections, there after appointment is offered to the faculty.

Standard 5-4: The process and procedures used to ensure that teaching and delivery of course material to the students emphasize active learning and that course learning outcome is met. The process must be periodically evaluated to ensure that it is meeting the objectives.

In order to ensure that the teaching is effective a quarterly survey is conducted by the University QEC and the findings are communicated to the concern faculty members. After completion of survey assessment team meeting is called to assess the process and make implementation plan for the said department.

Standard 5-5: **The process that ensures that graduates have completed the requirements of the program must be based on standards, effective and clearly documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives.**

No proper procedures to assure that the graduates meet the program requirements or not. This area needs concentration to develop this procedure. Plan required for this area.

Criterion 06: Faculty

Standard 6-1: There must be enough full time faculty who are committed to the program to provide adequate coverage of the program areas / courses, continuity and stability. The interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph. D. in the Discipline.

There are two P.hD degree holders in mathematics department.

Standard 6-2: All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place.

The department of Mathematics has number of faculty members involved in professional development. No specific time frame to arrange the workshops and seminars. Improvement needs to arrange refresher courses.

Standard 6-3: Faculty members should be motivated and have job satisfaction to excel in their profession

There are different programs for faculty benefits and there motivation i.e.

1)   Reasonable work load and class size as per the HEC requirement for getting quality in education.
2)   Attractive salary packages.
3)   Paid vacations.
4)   Hard area allowance.

Criterion 07: Institutional Facilities

Standard 7-1: The institution must have the infrastructure to support new trends in learning such as e-learning

The e-learning facilities are not sufficient to fulfill the requirements to meet the new challenges. There is no Computer Lab available in the department to carry out practical work.

Standard 7-2 : The library must possess an up to date technical collection relevant to the program and must be adequately staffed with professional personnel

The departmental library has the collection of latest books. The total numbers of books in the library are

Name of Item	Quantity
Books	4689

.

Central Library:

The central library has also the facility to facilitate the Mathematics department graduate students but with small number of books. Our central library has very small number of books in all fields. No e-learning facility. Improvement needs in this section.

Standard 7-3: Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities

Class room shortcomings

1. **Multimedia:** No multimedia present in the classrooms.
2. **Sound System:** No sound system present.
3. **Desks / Chairs:** Desks and chairs are present but their conditions are not good.
4. **Light System:** Light system is present but not up to the requirements.
5. **No UPS or generator system**.

No multimedia concept here. All the lectures are delivered via white board.

Criterion 08: Institutional Support

> **Standard 8-1:** There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teacher and scholar.

All the financial matters of Department of Mathematics run by University Finance Directorate and very little is left at department level. The university provides all the financial support needed to run the programs of studies in Department of Chemistry. Salaries of the faculty as well as supporting staff are facilitated by the university. The compensation including benefits like housing and children are also provided by the administration.

The University has the department of Staff Welfare which is run by the SWO (Staff Welfare Officer).

> **Standard 8-2:** There must be an adequate number of high quality graduate students, research assistants and PhD students.

NA

> **Standard 8-3:** Financial resources must be provided to acquire and maintain library holding, laboratories and computer facilities

At the moment the departmental library has almost 4689 volume of books, out of these most are latest in different fields.