

Revision of Curriculum

BS Mathematics

Fall 2024 and Onwards

Department of Mathematics
Faculty of Basic & Applied Sciences
August 2024


DR. IFFAT ZEHRA
Tenured Associate Professor
Chair Department of Mathematics
Air University PAF Complex
E-9, Islamabad

BS in Mathematics

Title of the program

Degree offered will be BS in Mathematics.

Eligibility criteria

The Intermediate (Part I and II) examination with Physics, Mathematics and Chemistry from any Board of Intermediate and Secondary Education in Pakistan.

HSSC without Mathematics / Pre-Medical may be allowed admission with condition to take two additional courses i.e., Foundational Mathematics and Pre-Calculus in first semester.

Applicant must have scored 50% or more marks.

OR

An examination equivalent to the Intermediate. Such candidates are required to submit an Equivalence Certificate issued by the Inter-Board Chairman Committee, Islamabad before the semester starts. This certificate must indicate the marks equivalent to marks in Intermediate.

AU Entry Test

- | | | | |
|----|---------------------------|---|-----|
| a. | English/general knowledge | - | 30% |
| b. | Physics | - | 30% |
| c. | Mathematics | - | 40% |

Program of Studies

The BS program in Mathematics is based on four years of education after higher secondary school. In the first two years, students will be offered General Education courses, core courses of Mathematics and Physics along with some humanities courses. After two years, the students will take advance courses from Mathematics. While designing the curriculum for this proposed program, the guidelines of Higher Education Commission (HEC) as per the UGE policy 2023 and the curriculum of BS Mathematics given in NCRC document have been taken into account.



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Overview of BS Mathematics

S. No.	Domain	No. of Courses	No. of Credit Hours
1	General Education	12	31
2	Interdisciplinary Allied Courses	4	14
3	Major Courses	26	78
4	Internship		03
5	Capstone Project		06
6	Minor (Optional)	4	12
		42+4=46	132+12=144



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General Education courses

S. No.	Course Code	Course Title	Cr Hrs.	No. of Courses	Subcategory
1	IR 100	Introduction to International Relations	3-0-3	1	Arts & Humanities
2	PH 112	Introduction to Environmental Sciences	3-0-3	1	Natural Sciences
3	BA 152	Introduction to Management	2-0-2	1	Social Sciences
4	EL 170	Functional English	3-0-3	1	Functional English
5	EL 271	Expository Writing	3-0-3	1	Expository Writing
6	HU 124	Islamic Studies and Ethics	2-0-2	1	Islamic Studies
7	HU 405	Ideology and Constitution of Pakistan	2-0-2	1	Ideology and Constitution of Pakistan
8	CS 181	Applications of Information and Communication Technologies	2-0-2	1	Applications of Information and Communication Technologies (ICT)
	CS 181L	Applications of Information and Communication Technologies Lab	0-1-1		
9	MA 116	Single Variable Calculus	3-0-3	2	Quantitative Reasoning
10	MA 105	Multivariable Calculus	3-0-3		
11	BA 353	Entrepreneurship	2-0-2	1	Entrepreneurship
12	HU 411	Civics and Community Engagements	2-0-2	1	Civics and Community Engagement
	Total		31	12	

for
10-9-2024

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Academic
Officer
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Interdisciplinary Allied Courses

S. No.	Course Code	Course Title	Cr Hrs.
1	PH-120	Mechanics	3-0-3
	PH-120L	Mechanics Lab	0-1-1
2	EL-200	Communication & Presentation Skills	3-0-3
3	CS 111	Programming Fundamentals	3-0-3
	CS 111 L	Programming Fundamentals Lab	0-1-1
4	CS 217	Applied Data Structures	2-0-2
	CS 217 L	Applied Data Structures Lab	0-1-1
	Total		11-3-14

Internship

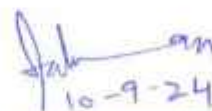
S. No.	Course Code	Course Title	Cr Hrs.
1	MA 490	Internship	3

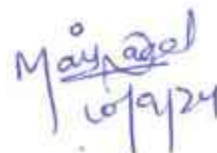
Capstone Project

S. No.	Course Code	Course Title	Cr Hrs.
1	MA 498	Final Year Project-I	3
2	MA 499	Final Year Project-II	3



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List of Major courses

S. No.	Course Code	Course Title	Cr Hrs.
1	MA-201	Linear Algebra	3-0-3
2	MA-215	Ordinary Differential Equations	3-0-3
3	MA-270	Set Theory and Logic	3-0-3
4	MA-221	Numerical Analysis and Computation	2-1-3
5	MA-255	Analytical Mechanics	3-0-3
6	MA-209	Complex Analysis	3-0-3
7	MA-204	Discrete Mathematics	3-0-3
8	MA-260	Vector and Tensor Analysis	3-0-3
9	MA-361	Real Analysis	3-0-3
10	MA-372	Group Theory	3-0-3
11	MA-381	Differential Geometry	3-0-3
12	MA-373	Set Topology	3-0-3
13	MA-342	Fundamentals of Optimization	3-0-3
14	MA-312	Partial Differential Equations	3-0-3
15	MA-366	Functional Analysis	3-0-3
16	MA-322	Theory of Viscous Fluids	3-0-3
17	MA-345	Fundamental of Operations Research	3-0-3
18	MA-333	Mathematical Statistics-I	3-0-3
19	MA-426	Computing Tools for Mathematics	3-0-3
20	MA-436	Mathematical Statistics II	3-0-3
21	MA-414	Integral Equations	3-0-3
22	MA-452	Analytical Dynamics	3-0-3
23	MA -XXX	Elective I	x-x-3
24	MA-XXX	Elective II	x-x-3
25	MA-XXX	Elective III	x-x-3
26	MA-XXX	Elective IV	x-x-3
	Total		78


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May 10
 Total 24


Scheme of Studies (Fall-2022 & onwards)

1 st Semester				
Course Code	Course Title	Pre-req.	Cr. Hr.	Domain
MA 100	Foundational Mathematics		4-0-4*	Non Credit
MA 113	Pre-Calculus		2-0-2*	Non Credit
MA 270	Set theory and logic		3-0-3	Major 1
IR 100	Introduction to International Relations	Nil	3-0-3	GE-AH
HU 124	Islamic Studies & Ethics	Nil	2-0-2	GE
CS 181	Applications of Information and Communication Technologies	Nil	2-0-2	GE-ICT
CS 181L	Applications of Information and Communication Technologies-Lab	Nil	0-1-1	
BA 152	Introduction to Management	Nil	2-0-2	GE-SS
HU 405	Ideology and constitution of Pakistan		2-0-2	GE
Total			14-1-15	

2 nd Semester				
Course Code	Course Title	Pre-req.	Cr. Hr.	Domain
MA 116	Single Variable Calculus		3-0-3	GE – QR – 1
MA 201	Linear Algebra		3-0-3	Major – 2
PH 120	Mechanics	Nil	3-0-3	IAC – 1
PH 120L	Mechanics-Lab	Nil	0-1-1	
MA 204	Discrete Mathematics		3-0-3	Major-3
EL 170	Functional English		3-0-3	GE
HU 411	Civics and Community Engagements		2-0-2	GE
Total			17-1-18	


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(Fall-2024 & onwards)

3 rd Semester				
Course Code	Course Title	Pre-req.	Cr. Hr.	Domain
MA 105	Multivariable Calculus	MA 116	3-0-3	GE – QR – 2
MA 209	Complex Analysis		3-0-3	Major – 4
MA 215	Ordinary Differential Equations		3-0-3	Major – 5
CS 111	Programming Fundamentals		3-0-3	IAC – 2
CS 111 L	Programming Fundamentals Lab		0-1-1	
EL 271	Expository Writing	EL 170	3-0-3	GE
BA 353	Entrepreneurship		2-0-2	GE
Total			17-1-18	

4 th Semester				
Course Code	Course Title	Prerequisite	Cr. Hr.	Domain
MA 221	Numerical Analysis and Computation		2-0-2	Major – 6
MA 221L	Numerical Analysis and Computation-Lab		0-1-1	
MA 255	Analytical Mechanics		3-0-3	Major – 7
MA 342	Fundamentals of Optimization		3-0-3	Major – 8
MA373	Set Topology		3-0-3	Major – 9
MA 260	Vector and Tensor Analysis		3-0-3	Major – 10
PH 112	Introduction to Environmental Science		3-0-3	GE-NS
Total			17-1-18	

Internship				
	Course Title	Prerequisite	Cr. Hr.	Domain
MA 490	Internship (6-8 weeks)		03	Internship

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(Fall-2024 & onwards)

5 th Semester				
Course Code	Course Title	Prerequisite	Cr. Hr.	Domain
MA381	Differential Geometry		3-0-3	Major – 11
MA361	Real Analysis	MA 105	3-0-3	Major – 12
MA372	Group Theory		3-0-3	Major – 13
CS 217	Applied Data Structures		2-0-2	IAC – 3
CS 217L	Applied Data Structures Lab		0-1-1	
MA 345	Fundamentals of Operations Research		3-0-3	Major – 14
Total			14-1-15	

6 th Semester				
Course Code	Course Title	Prerequisite	Cr. Hr.	Domain
MA 312	Partial Differential Equations	MA 215	3-0-3	Major – 15
MA 366	Functional Analysis		3-0-3	Major – 16
MA 322	Theory of Viscous Fluids		3-0-3	Major – 17
MA 333	Mathematical Statistics-I		3-0-3	Major – 18
EL 200	English III: Communication & Presentation Skills		3-0-3	IAC – 4
Total			15-0-15	

7 th Semester				
Course Code	Course Title	Prerequisite	Cr. Hr.	Domain
MA 4xx	Elective-I		x-x-3	Major – 19
MA 4xx	Elective - II		x-x-3	Major – 20
MA 426	Computing Tools for Mathematics		3-0-3	Major – 21
MA 436	Mathematical Statistics-II	MA 333	3-0-3	Major – 22
MA 498	Final Year Project-I		3-0-3	Capstone Project
Total			x-x-15	

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(Fall - 2024 & onwards)

8 th Semester				
Course Code	Course Title	Prerequisite	Cr. Hr.	Domain
MA 414	Integral Equations		3-0-3	Major – 23
MA 452	Analytical Dynamics		3-0-3	Major – 24
MA 4xx	Elective - III		x-x-3	Major – 25
MA 4xx	Elective - IV		x-x-3	Major – 26
MA 499	Final Year Project-II	MA 498	3-0-3	Capstone Project
Total			x-x-15	

Total Credit Hours-BS Mathematics	132
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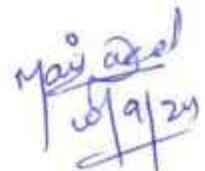
List of Elective Courses

Course Code	Course Title	Prerequisite	Cr. Hr.
MA 417	Special Functions	MA 215	3-0-3
MA 419	Fundamentals of Magneto hydrodynamics		3-0-3
MA 426	Numerical Optimization	MA 342	3-0-3
MA 427	Theory of Viscous Fluids -II	MA 322	3-0-3
MA 428	Numerical Solutions of ODEs	MA 215	2-0-2
MA 428L	Numerical Solutions of ODEs-Lab		0-1-1
MA 429	Numerical Solutions of PDEs	MA 312	2-0-2
MA 429L	Numerical Solutions of PDEs-Lab		0-1-1
MA 430	Integral Transforms		3-0-3
MA 432	Special Theory of Relativity		3-0-3
MA 433	Financial Mathematics		3-0-3
MA 434	Fundamentals of Finite Element Method		3-0-3
MA 443	Variational Calculus	MA 215	3-0-3
MA 445	Monte Carlo Simulations		3-0-3
MA 455	Theory of Elasticity		3-0-3
MA 460	Measure Theory		3-0-3
MA 463	Complex Analysis-II	MA 209	3-0-3
MA 464	Functional Analysis-II	MA 366	3-0-3
MA 466	Real Analysis-II	MA 361	3-0-3
MA 472	Rings and Fields		3-0-3
MA 475	Algebraic Topology	MA 373	3-0-3
MA 476	Cryptography		3-0-3
MA 478	Graph Theory		3-0-3
MA 482	Differential Geometry-II	MA 381	3-0-3
MA 471	Introduction to Number Theory		3-0-3
MA 473	Fuzzy Sets and Uncertainty Modeling		3-0-3
CS 130	Database Systems		3-0-3
CS 130L	Database Systems Lab		0-1-1
CS 332	Design and Analysis of Algorithms		3-0-3


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