

BS - Mathematics

[(Bachelor of Studies Mathematics)]

ELIGIBILITY CRITERIA :

- a. The candidate has passed the Intermediate or equivalent examination with Mathematics securing at least 50% marks in aggregate from an institution recognized by the Higher Education Commission of Pakistan / Inter Board Committee of Chairmen, Pakistan.

or

Any other examination of a Foreign University / Institution /Examining Body, equivalent to Intermediate with Mathematics. Equivalence and percentage of marks will be determined by the IBCC.

or

Diploma of Associate Engineering Examination, securing at least 60% marks in aggregate.

- b. Subject to policy/applicability, the candidate shall pass the Entrance Test as required by the HEC.

PROGRAM STRUCTURE:

(Program is equivalent to 16 years of education)

Minimum Duration: 4 years; through 8 regular semesters (Fall/Spring)

Minimum Credits: 132

The breakup of these 132 Credits is as follows:

Category	Credits	No. of Courses
General Education	39	13
Distribution Courses	39	13
Major	54	18
Internship	Non Credit (compulsory)	-
PLL	Non Credit (compulsory)	-

COURSES OF STUDY:

General Education Courses

Category	Courses	<u>Title of Course</u>	<u>Credits</u>	<u>Code</u>
Arts & Humanities	2	15. Functional Urdu	2	GENL15 1
		16. Translation of Holy Quran (for Muslim Students) OR	4	GENL25 2
		Principles of Ethics (for Non-Muslim Students)	4	GENL25 3
		17. Sports and Exercise Physiology	3	GENL32 4
		18. Short Film and Drama Production	3	GENL43 4
		19. Cultural Heritage in Pakistan	3	GENL43 5
Natural Sciences	2	15. Environmental Sciences	3	GENL12 1
		16. Fundamentals of Applied Physics	3	GENL12 2
		17. Every Day Science	3	GENL12 3
		18. Geography and Natural Resources	3	GENL12 4
		19. Introduction to Ecology	3	GENL12 5
Social Sciences	2	18. Population Studies	3	GENL13 1

		19. Legal Systems of Pakistan	3	GENL13 2
		20. Introduction to International Relations	3	GENL10 2
		21. Introduction to Political Science	3	GENL10 1
		22. Introduction to Sociology	3	SOCL10 1
		23. Gender Studies	3	GENL23 1
Expository Writing	3	10. Technical Writing	3	GENL16 1
		11. Creative Writing	3	GENL26 2
		12. Academic Writing	3	GENL26 3
Quantitative Reasoning	2	17. Elements of Statistics & Probability	3	GENL11 1
		18. General Mathematics	3	GENL11 2
		19. Introduction to Mathematical Reasoning	3	GENL11 3
		20. Introduction to Information and Communication Technology	3	GENL11 4
		21. Logic and Critical Thinking	3	GENL11 5
Pakistan Studies	1	22. Pakistan Studies	3	GENL14 3
Islamiyat/Moral Values	1	4. Fundamentals of Islamic Studies (For Muslim Students) OR	3	GENL14 1

		Moral Values (for Non-Muslim Students)	3	GENL14 2
--	--	---	---	-------------

Structure A (Single Major)

Major: Mathematics

These are further divided into two parts.

Core Courses:

41 Credits

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH111	Logic and Set Theory	3
MATH131	Calculus I	3
MATH132	Calculus II	3
MATH201	History of Mathematics	3
MATH211	Affine & Euclidean Geometry	3
MATH231	Linear Algebra I	4
MATH2201	Calculus III	4
MATH311	Real Analysis I	3
MATH312	Algebra I	3
MATH313	Complex Analysis	3
MATH331	Ordinary Differential Equations	3
MATH332	Vector and Tensor Analysis	3
MATH411	Topology	3

Elective Courses:

15 Credits

Student can select any five from the following or three with a Research Project.

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH314	Real Analysis II	3
MATH315	Algebra II	3
MATH316	Measure Theory	3
MATH317	Linear Algebra II	3
MATH318	Number Theory	3
MATH333	Partial Differential Equations	3
MATH335	Classical Mechanics	3
MATH381	Research Methods in Mathematics	3
MATH412	Functional Analysis	3
MATH413	Special Functions	3
MATH414	Fundamentals of Graph Theory	3
MATH415	Theory Of Optimization	3
MATH416	Differential Geometry	3
MATH421	Numerical Methods	3
MATH431	Fluid Mechanics I	3
MATH432	Integral Equations	3
MATH433	Fluid Mechanics II	3
MATH434	Operations Research	3
MATH435	Theory of Relativity	3
MATH436	Quantum Mechanics	3
MATH437	Solid Mechanics	3
MATH474	Programming with MATLAB	3

STAT372	Theory of Probability	3
STAT371	Statistics for Mathematics II	3

Research Project in Specialization Total: 6 Credits

<u>CourseCode</u>	<u>Title of Course</u>	<u>Credits</u>
MATH481	Research Project (for BS Mathematics)*	6
Or		
*The Research Project can be substituted with two courses to be chosen from the list of Elective Courses (subject to University offering).		3+3

Structure B (One Major + One Minor)

Major: Mathematics

Minor: Computer Science

COURSES FOR MAJORING IN MATHEMATICS

These are further divided into two parts.

Total: 51 Credits

Core Courses:

41 Credits

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH111	Logic and Set Theory	3
MATH131	Calculus I	3
MATH132	Calculus II	3
MATH201	History of Mathematics	3
MATH211	Affine & Euclidean Geometry	3
MATH231	Linear Algebra I	4
MATH2201	Calculus III	4
MATH311	Real Analysis I	3
MATH312	Algebra I	3
MATH313	Complex Analysis	3
MATH331	Ordinary Differential Equations	3
MATH332	Vector and Tensor Analysis	3
MATH411	Topology	3

Elective Courses:

12 Credits

Student can select any four from the following.

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH314	Real Analysis II	3
MATH315	Algebra II	3
MATH316	Measure Theory	3
MATH317	Linear Algebra II	3
MATH318	Number Theory	3
MATH333	Partial Differential Equations	3
MATH335	Classical Mechanics	3
MATH381	Research Methods in Mathematics	3
MATH412	Functional Analysis	3
MATH413	Special Functions	3
MATH414	Fundamentals of Graph Theory	3
MATH415	Theory Of Optimization	3
MATH416	Differential Geometry	3
MATH421	Numerical Methods	3
MATH431	Fluid Mechanics I	3
MATH432	Integral Equations	3
MATH433	Fluid Mechanics II	3
MATH434	Operations Research	3
MATH435	Theory of Relativity	3
MATH436	Quantum Mechanics	3
MATH437	Solid Mechanics	3

MATH474	Programming with MATLAB	3
STAT371	Statistics for Mathematics	3
STAT372	Theory of Probability	3

COURSES FOR MINORING IN COMPUTER SCIENCE

Total: 12 Credits

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
CSCM121	Programming Fundamentals	3
CRSC222	Data Structure and Algorithms	3
CRSC242	Database Management Systems	3
CRSC293	Web Engineering	3

Structure C (Double Major)

Major 1: Mathematics

Major 2: Computer Science

COURSES FOR MAJORING IN MATHEMATICS

These are further divided into two parts. *Total: 39 Credits*

Core Courses: Student will be offered 8 courses from this list 26 Credits

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH111	Logic and Set Theory	3
MATH131	Calculus I	3
MATH201	History of Mathematics	3
MATH211	Affine & Euclidean Geometry	3
MATH231	Linear Algebra I	4

MATH2201	Calculus III	4
MATH311	Real Analysis I	3
MATH312	Algebra I	3
MATH313	Complex Analysis	3
MATH331	Ordinary Differential Equations	3
MATH332	Vector and Tensor Analysis	3
MATH411	Topology	3

Elective Courses:

15 Credits

Student can select any five from the following

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH314	Real Analysis II	3
MATH315	Algebra II	3
MATH316	Measure Theory	3
MATH317	Linear Algebra II	3
MATH318	Number Theory	3
MATH333	Partial Differential Equations	3
MATH335	Classical Mechanics	3
MATH381	Research Methods in Mathematics	3
MATH412	Functional Analysis	3
MATH413	Special Functions	3
MATH414	Fundamentals of Graph Theory	3
MATH415	Theory Of Optimization	3
MATH416	Differential Geometry	3

MATH421	Numerical Methods	3
MATH431	Fluid Mechanics I	3
MATH432	Integral Equations	3
MATH433	Fluid Mechanics II	3
MATH434	Operations Research	3
MATH435	Theory of Relativity	3
MATH436	Quantum Mechanics	3
MATH437	Solid Mechanics	3
MATH474	Programming with MATLAB	3
STAT372	Theory of Probability	3
STAT371	Statistics for Mathematics	3

COURSES FOR MAJORING IN COMPUTER SCIENCE

Total: 39 Credits

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
CRSC121	Programming Fundamentals	4
CRSC221	Object Oriented Programming	4
CRSC222	Data Structure and Algorithms	4
CRSC242	Database Management Systems	4
CRSC251	Introduction to Software Engineering	3
CRSC311	Theory of Automata	3
CRSC312	Artificial Intelligence	3
CRSC331	Computer Networks	4
CRSC381	Computer Architecture and Assembly Language	4
CRSC482	Final Year Project for CSC	6

Structure D (One Major + 2 Minors)

Major: Mathematics
Minor 1: Economics
Minor 2: Finance

COURSES FOR MAJORING IN MATHEMATICS

Total: 45 Credits

These are further divided into two parts.

Core Courses:

41 Credits

<u>Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH111	Logic and Set Theory	3
MATH131	Calculus I	3
MATH132	Calculus II	3
MATH201	History of Mathematics	3
MATH211	Affine & Euclidean Geometry	3
MATH231	Linear Algebra I	4
MATH2201	Calculus III	4
MATH311	Real Analysis I	3
MATH312	Algebra I	3
MATH313	Complex Analysis	3
MATH331	Ordinary Differential Equations	3
MATH332	Vector and Tensor Analysis	3
MATH411	Topology	3

Elective Courses:

Student can select any two from the following. 6 Credits

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH314	Real Analysis II	3
MATH315	Algebra II	3
MATH316	Measure Theory	3
MATH317	Linear Algebra II	3
MATH318	Number Theory	3
MATH333	Partial Differential Equations	3
MATH335	Classical Mechanics	3
MATH381	Research Methods in Mathematics	3
MATH412	Functional Analysis	3
MATH413	Special Functions	3
MATH414	Fundamentals of Graph Theory	3
MATH415	Theory Of Optimization	3
MATH416	Differential Geometry	3
MATH421	Numerical Methods	3
MATH431	Fluid Mechanics I	3
MATH432	Integral Equations	3
MATH433	Fluid Mechanics II	3
MATH434	Operations Research	3
MATH435	Theory of Relativity	3
MATH436	Quantum Mechanics	3
MATH437	Solid Mechanics	3
MATH474	Programming with MATLAB	3

STAT372	Theory of Probability	3
STAT371	Statistics for Mathematics	3

COURSES FOR MINORING IN ECONOMICS

Total: 15 Credits

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
ECON211	Principal of Micro Economics	3
ECON221	Principal of Macro Economics	3
ECON241	Development Economics I	3
ECON311	Intermediate Microeconomics	3
ECON321	Intermediate Macroeconomics	3

COURSES FOR MINORING IN FINANCE

Total: 15 Credits

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
BUSS421	Corporate Finance	3
BUSS422	Portfolio Analysis and Management	3
BUSS423	International Finance	3
BUSS424	Behavioral Finance	3
BUSS425	Financial Institutions and Markets	3

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
MATH111	Logic and Set Theory	3
MATH131	Calculus I	3
MATH201	History of Mathematics	3
MATH231	Linear Algebra I	4
MATH312	Algebra I	3

List of Distribution Courses

No. of Distribution courses for Single Major:	13 courses (39 credits)
No. of Distribution courses for Double Major:	5 courses (15 credits)
No. of Distribution courses for Single Major and One Minor:	10 courses (30 credits)
No. of Distribution courses for Single Major and Two Minors:	6 courses (18 credits)
No. of Distribution courses for Associate Degree Program:	2 courses (6 credits)

<u>Course Code</u>	<u>Title of Course</u>	<u>Credits</u>
<u>Mathematics</u>		
MATH111	Logic and Set Theory	3
MATH112	Discrete Structures for CSC	3
MATH113	Calculus and Analytical Geometry for CSC	3
MATH131	Calculus I	3
MATH201	History of Mathematics	3
MATH212	Linear Algebra for CSC	3
MATH231	Linear Algebra I	4
MATH233	Differential Equations	3
MATH312	Algebra I	3

MATH321	Numerical Methods and Computation	3
MATH333	Multivariable Calculus for CSC	3
<u>Computer Sciences & IT</u>		
CRSC111	Basic Electronics	3
CRSC112	Applied Physics	3
CSCM121	Programming Fundamentals	3
CRSC225	Web Engineering	3
CRSC241	Database Systems	3
CRSC251	Introduction to Software Engineering	3
CRSC331	Computer Networks	3
CRSC341	Enterprise Systems	3
CRSC342	Business Process Engineering	3
CRSC343	Graph Theory	3
CRSC344	Theory of Programming Languages	3
CRSC353	Software Requirements Engineering	3
CRSC381	Research Methodology for CSC	3
CRSC382	Operations Research	3
CRSC383	Stochastic Processes	3
CRSC422	Information Security	3
CRSC452	Formal Methods	3
CRSC453	Modeling and Simulation	3
<u>Physical Education & Sport Sciences</u>		
SPSC121	Basics of Human Anatomy	3

SPSC122	Introduction to Sports Physiology	3
SPSC111	Philosophical Basis of Physical Education	3
SPSC112	Rules and Techniques of the Games	3
SPSC212	Science of Track and Field	3
	<u>Psychology</u>	
PSY101	Introduction to Psychology	3
PSY112	Social Psychology	3
PSY121	Theories of personality	3
PSY412	Positive Psychology	3
PSY413	Attachment and Relationship	3
	<u>Economics</u>	
ECON101	Introduction to Economics	3
ECON 141	Introduction to Development Economics	3
ECON271	Issues in Pakistan's Economy	3
ECON 272	Comparative Economic system	3
ECON275	Islamic Economics	3
	<u>Sociology</u>	
SOCL 132	Pakistani Society and Culture	3
SOCL 231	Gender Studies	3
SOCL 331	Sociology of Emotions and Human Feelings	3
SOCL 341	Criminology and Society	3
SOCL 421	Sociology of Globalization	3
SOCL 441	Human Rights and Citizenship	3
SOCL 442	Sociological Approaches to Conflict Resolution	3

<u>Political Science</u>		
PSIR101	Introduction to Political Science	3
PSIR102	Introduction to International Relations	3
PSIR221	Introduction to Local Government Systems	
PSIR302	Comparative Political Systems of Developing States	3
PSIR319	Contemporary Political Ideologies	3
PSIR334	Major Issues in Pakistan's Politics	3
PSIR420	Conflict and Corporation in South Asia	3
PSIR431	Major Issues of Muslim World	3
PSIR432	Politics of South Asia	3
<u>International Relations</u>		
PSIR303	Comparative Political Systems of Developed States	3
PSIR322	Conflict and Conflict Resolution	3
PSIR431	Major Issues of Muslim World	3
PSIR432	Politics of South Asia	3
PSIR442	Contemporary Regional and International Issues	3
<u>Management Sciences</u>		
BUSS101	Introduction to Business	3
BUSS102	Management Principles and Application	3
BUSS103	Principles and Practices of Marketing	3
BUSS104	Business on Internet	3
BUSS105	Digital and Social Media Marketing	3
BUSS106	Banking and Financial Markets	3

BUSS107	Digital Banking	3
BUSS108	Islamic Banking Systems	3
BUSS109	Legal Mechanism of Business	3
BUSS121	Principles of Business Finance	3
BUSS141	Principles of Human Resource Management	3
BUSS201	Business Investment Decisions	3
BUSS202	Cross-border Business	3
BUSS203	Business Ethics	3
BUSS204	Professional Practices for Future Leaders	3
BUSS205	Business and Society	3
BUSS206	Fundamentals of Project Management	3
	<u>Accounting & Finance</u>	
ACCT111	Financial Accounting	3
	<u>LAW</u>	
LAW101	Introduction to Law	3
LAW214	Human Rights Law	3
LAW335	Law of Business Organizations	3
LAW421	Constitutional History in Pakistan	3
LAW483	Law of Contract	3
LAW484	Islamic Personal Law	3
	<u>Mass Communications</u>	
MCOM101	Introduction to Journalism & Mass Communication	3
MCOM111	Introduction to Social Media	3

MCOM211	Journalistic English	3
MCOM221	News Reporting and Writing	3
MCOM231	Broadcast Journalism	3
MCOM322	Data Journalism	3
	<u>Education</u>	
EDU211	School, Community and Teacher	3
EDU241	Assessment and Evaluation in Classroom	3
EDU272	Principles of Guidance and Counseling	3
EDU315	Critical Thinking and Reflective Practices	3
EDU313	Contemporary Trends and Issues in Education	3
	<u>Islamic Studies</u>	
ARAB111	آسان عربی بول چال	3
ISLM431	فقہ الاسرة	3
ISLM313	قرآن کا انسانِ مطلوب	3
ISLM333	نذائیں حلال و حرام اسلامی احکام	3
ISLM371	اسلام اور جدید چیلنجز	3
ISLM472	تزکیہ و تصوف (کیئریکٹر بلڈنگ)	3
	<u>English</u>	
ELL 102	Introduction to Literary Studies	3
ELL 103	Introduction to Language Studies	3
ELL 203	Short Fictional Narrative	3
ELL 204	Academic Reading and Writing	3
ELL 304	Popular Fiction	3

ELL 422	Introduction to Syntax	3
	<u>Urdu</u>	
URDU111	عملی قواعد اُردو	3
URDU211	شعرِ مہی	3
URDU313	شعری اصناف	3
URDU371	نظم کا مطالعہ	3
URDU411	ناول کا مطالعہ	3