

Bachelor of Science (B.S.) Economics and Mathematics program

B.S. Economics and Mathematics is a 4-year degree program that contains fundamental components of two fields of study: Economics and Mathematics. The program prepares the students for entry-level positions in private and public sectors, development organizations, banks, insurance companies, investment companies, education sector, and research organizations. A wide range of courses offered in this program give students several opportunities to broaden their knowledge and expand their horizon. The research project in the fourth year enables students to apply the quantitative tools learnt in the program to economic and financial problems in the public and private sectors.

Curriculum structure	
Duration	4 years
Semesters	8
Courses	40
Research project	1
Total credit hours	128

Required courses

Section	Course category	Courses	Credit hours
A	University core courses	4	12
B	Economics core courses	11	35
C	Economics electives	2	6
D	Mathematics core courses	11	35
E	Mathematics electives	2	6
F	Non-specialization courses (core-6 & electives-4)	10	30
G	Research project in Economics or Mathematics (core)	1	4
	Total	41	128

A. University core courses

Course title	Course code	Credit hours
English Grammar and Composition	SSC101	3
Pakistan History	SSC151	3
Speech Communication	HUM201	3
Socioeconomic Philosophy of Islam or Philosophy, Logic and Ethics*	SSC301/HUM357	3

*All Muslim students are required to register for SEPI. Non-Muslim students may either take SEPI or PLE

B. Economics core course

Course title	Course code	Credit hours	Pre-requisite
Principles of Microeconomics	ECO103	3	-
Principles of Macroeconomics	ECO104	3	-
Intermediate Microeconomics	ECO201	3	ECO103, MTS101
Intermediate Macroeconomics	ECO202	3	ECO104, MTS101
Development Economics I	ECO203	3	ECO103, ECO104
Microeconomic Theory	ECO312	3	ECO201
Macroeconomic Theory	ECO313	3	ECO202
Applied Econometrics I	ECO343	4	MTS202
Applied Econometrics II	ECO344	4	ECO341
Research Methods for Economics	ECO411	3	ECO303
International Trade or International Economics	ECO466/ECO305	3	ECO103, ECO104
Economics Elective I	ECO-	3	-
Economics Elective II	ECO-	3	-

C. Economics electives (2 to be selected from the following list)

Course title	Course code	Credit hours	Pre-requisite
Public Economics	ECO401/ECO567	3	ECO103, ECO104/ECO531, ECO532 & ECO533
Public Finance	ECO451	3	ECO103, ECO104
Monetary Economics	ECO452/ECO566	3	ECO103, ECO104
Time Series Econometrics	ECO457	3	MTS202
Climate Change Economics	ECO458/ECO551	3	ECO103, ECO104
Natural Resource and Environmental Economics	ECO461	3	ECO103, ECO104
Game Theory/Game Theory & Competitive Strategy	ECO464/ECO573	3	ECO103, ECO104
Health Economics	ECO471/ECO563	3	ECO103, ECO104
Labour Economics	ECO472	3	ECO103, ECO104
Economic Forecasting	ECO555	3	ECO537
Public Policy Analysis: Theory and Practice	ECO560	3	ECO531/501/102 /104 /103/113
Environmental and Resource Economics	ECO561	3	ECO531, ECO533
Financial Economics	ECO562	3	ECO531, ECO533
Time Series Modeling	ECO570	3	ECO537
Industrial Economics	ECO571	3	ECO631
Water Economics and Policy	ECO574	3	ECO103
Microeconomics of Public Policy Analysis	ECO575	3	ECO531/301/312/501
Social Impact Evaluation	ECO577	3	ECO103
Contemporary Issues in Global Economics	ECO404	3	ECO103, ECO104
History of Economic Thought	ECO467	3	ECO103, ECO104
Development Economics II	ECO302	3	ECO103, ECO104
Major Issues in Pakistan Economy	ECO403	3	ECO103, ECO104

D. Mathematics core course

Course title	Course code	Credit hours	Pre-requisite
Calculus-I with Plane Geometry	MTS101	3	-
Discrete Mathematics	MTS211	3	-
Calculus-II with Solid Geometry	MTS232	3	MTS101
Linear Algebra	MTS203	3	-
Introduction to Differential Equations	MTS241	3	MTS101
Multivariable Calculus ₁	MTS242	4	MTS232
Partial Differential Equations ₂	MTS436	3	MTS241
Optimization Techniques	MTS330	3	MTS203
Stochastic Process	MTS304	3	MTS231
Probability & Statistical Models	MTS430	3	MTS231
Real Analysis I ₃	MTS341	4	MTS232
Mathematics elective I	MTS-	3	-
Mathematics elective II	MTS-	3	-

1. "Multivariable Calculus (MTS242)" could be counted in place of "Calculus III (MTS204)" but vice-versa is not applicable.
2. "Partial Differential Equations (MTS436) is equivalent to "Advance Differential Equations (MTS303)".
3. "Real Analysis I (MTS341) could be counted in place of "Real Analysis (MTS301)" but vice-versa is not applicable.

E. Mathematics electives (2 to be selected from the following list)

Course title	Course code	Credit hours	Pre-requisite
Abstract Algebra I	MTS305	3	MTS203
Abstract Algebra II	MTS413	3	MTS305
Complex Analysis	MTS302	3	MTS341
Functional Analysis I	MTS411	3	MTS341
Functional Analysis II	MTS412	3	MTS411
Numerical Analysis	MTS306	3	MTS232

Topology I	MTS451	3	MTS341
Numerical Solutions of PDE	MTS431	3	MTS414
Integral Equations	MTS432	3	MTS303
Advanced Numerical Analysis I	MTS433	3	MTS414
Advanced Numerical Analysis II	MTS434	3	MTS433
Differential Geometry	MTS435	3	MTS204, MTS203
Fluid Dynamics I	MTS437	3	-
Fluid Dynamics II	MTS438	3	-
Financial Mathematics with a computational approach	MTS441	3	-
Computational Finance	MTS442	3	-
Modern Algebra I (Galois Theory & Applications)	MTS443	3	MTS413
Modern Algebra II (Commutative Rings & Fields)	MTS444	3	MTS413
Measure Theory I	MTS445	3	-
Measure Theory II	MTS446	3	-
Operations Research I	MTS447	3	-
Operations Research II	MTS448	3	-
Scientific Computing for Linear PDE's	MTS414	3	MTS413
Introduction to Differential Topology	MTS452	3	MTS451
Financial Engineering	MTS453	3	MTS441

F. Non-specialization courses

Course title	Course code	Credit hours	Pre-requisite
Introduction to Statistics	MTS102	3	MTS105
Statistical Inference	MTS202	3	MTS102
Probability Theory ₁	MTS231	3	MTS102
Essential Software	MTS111	3	-
Foundations of Data Science	CSE-	3	-
Introduction to Academic Writing	SSC236	3	-
Non-specialization elective-I	-	3	-
Non-specialization elective-II	-	3	-

Non-specialization elective-III	-	3	-
Non-specialization elective-IV	-	3	-

1 “Probability Theory (MTS231) is equivalent to “Applied Probability Theory (MTS112)”.

Non-specialization electives: Four courses are to be chosen from courses other than Mathematics and Economics. These non-specialization electives may be from different subject areas including Accounting, Finance, Marketing, Management, Social Sciences and Liberal Arts, Computer Sciences, or any other field.

G. Research project

Course title	Course code	Credit hours	Pre-requisite
Economics Research Project or Mathematics Research Project*	ECO441/MTS471	4	-

*Students can take either ECO441 or MTS471.

Semester-wise sequence of courses

Freshman	Semester - 1	Course code	Credit hours	Pre-requisite
1	English Grammar & Composition	SSC101	3	-
2	Pakistan History	SSC151	3	-
3	Introduction to Statistics	MTS102	3	MTS105
4	Calculus I with Plane Geometry	MTS101	3	-
5	Principles of Microeconomics	ECO103	3	-
	Semester - 2	Course code	Credit hours	Pre-requisite
1	Speech Communication	HUM201	3	-
2	Socioeconomic Philosophy of Islam or Philosophy, Logic and Ethics*	SSC301/HUM357	3	-
3	Calculus II with Solid Geometry	MTS232	3	MTS101
4	Statistical Inference	MTS202	3	MTS102
5	Principles of Macroeconomics	ECO104	3	-

Sophomore	Semester - 3	Course code	Credit hours	Pre-requisite
1	Introduction to Academic Writing	SSC-236	3	-
2	Multivariable Calculus	MTS242	4	MTS232
3	Essential Software	MTS111	3	-
4	Intermediate Microeconomics	ECO201	3	-
5	Discrete Mathematics	MTS211	3	-
	Semester - 4	Course code	Credit hours	Pre-requisite
1	Linear Algebra	MTS203	3	-
2	Foundations to Data Science	CSE-	3	-
3	Intermediate Macroeconomics	ECO202	3	MTS202
4	Probability Theory	MTS231	3	MTS102
5	Development Economics I	ECO203	3	ECO103, ECO104

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Junior	Semester - 5	Course code	Credit hours	Pre-requisite
1	Real Analysis I	MTS341	4	MTS232
2	Introduction to Differential Equations	MTS241	3	MTS101
3	Microeconomic Theory	ECO312	3	ECO201, MTS112, MTS201
4	Applied Econometrics I	ECO343	4	ECO103, ECO104 & MTS202
5	Non-specialization elective I	-	3/4	-
	Semester - 6	Course code	Credit hours	Pre-requisite
1	Optimization Techniques	MTS330	3	MTS203
2	Stochastic Processes	MTS304	3	MTS231
3	Macroeconomic Theory	ECO313	3	ECO201, MTS112, MTS201
4	Applied Econometrics II	ECO344	4	ECO301
5	Non-specialization elective II	-	3/4	-

Senior	Semester - 7	Course code	Credit hours	Pre-requisite
1	Economics elective I	ECO-	3	-
2	Partial Differential Equations	MTS436	3	MTS241
3	Non-specialization elective III	MTS-	3	-
4	Mathematics elective I	-	3	-
5	Research Methods for Economics	ECO411	3	-
6	Research Project in Economics or Mathematics	ECO441/MTS471	4	-
	Semester - 8	Course code	Credit hours	Pre-requisite
1	International Trade or International Economics	ECO466/ECO305	3	-
2	Non-specialization elective IV	-	3	-
3	Probability & Statistical Models	MTS430	3	MTS231
4	Economics elective II	ECO-	3	-
5	Mathematics elective II	MTS-	3	-

Note: Students are eligible to carry out their responsible citizen initiative (RCI)/social internships right after their 1st year of studies/2nd semester and should complete this mandatory graduation requirement by the end of their 3rd year of studies/6th semester.