FACULTY
OF
HEALTH
AND
LIFE SCIENCES

DEAN'S MESSAGE



Dr. Muhammad Abdul Qadir

The Faculty of Health and Life Sciences aims to produce professionals and researchers who are equipped with the knowledge and skills to meet the challenges of national and international trends. To achieve this objective, a team of highly qualified and dedicated faculty members is engaged. As life sciences encompass a considerable breadth of scientific disciplines and study phenomena of life, from a molecular level to microbial to genetics and ultimately to the applied knowledge of basic biology to benefit human health and environment. Based on this, along with interdisciplinary approaches, the Faculty

envisions addressing the multifaceted challenges of the future. Therefore, academic programs are supported by well-equipped labs that strengthen the applied aspect of the domain. The Faculty has also established a strong liaison with research and development organizations and the industry.

The Faculty comprises Department of Bioinformatics and Biosciences and Department of Pharmacy. The Department offers BS, MS and PhD programs with different specializations. Alumni of the faculty are playing dynamic roles in academia and research.

FACULTY MEMBERS

Department of Bioinformatics and Biosciences

Dr. Sahar Fazal

PhD Agricultural Entomology, (South China Agricultural University, China),

MSc Agricultural Entomology, (Agriculture University, Faisalabad)

Associate Professor / HoD

■ Dr. Shaukat Igbal Malik

PhD Molecular Biology and Biochemistry, (National & Kapodestrain University of Athens),

1st Postdoctoral RTP, NC, USA

2nd Postdoctoral University of North Carolina Hill, NC, USA MSc Honor, (Genetics Cytogenetic, Sindh University, Jamshoro)

Professor

Dr. Sveda Marriam Bakhtiar

PhD Biotechnology, (Quaid-i-Azam University, Islamabad), MPhil Biotechnology, (Quaid-i-Azam University, Islamabad) Assistant Professor

Dr. Erum Dilshad

PhD Biochemistry/Molecullar Biology, (Quaid-i-Azam University, Islamabad),

Master of Philosophy, (Quaid-i-Azam University, Islamabad) Master of Science Biochemistry, (Quaid-i-Azam University, Islamabad)

Assistant Professor

■ Dr. Arshia Amin Butt

PhD Microbial Biotechnology and Bacterial Systematic, (Quaid-i-Azam University, Islamabad),

MPhil Microbiology and Molecular Genetics, (University of Punjab Lahore)

Assistant Professor

Ms. Fatima Khan

MS Healthcare Biotechnology, (NUST, Islamabad). BS (Hons) Biotechnology, (Forman Christian College, FCCU. Lahore)

Lecturer

Department of Pharmacy

Dr. Muzaffar Abbas

PhD Neuropharmacology, (South Dakota State University, USA).

MPhil Neuropharmacology, (University of Peshawar, KPK) B.Pharmacy, (Gomal University, Dera Islmail Khan) Associate Professor/ HoD

Dr. Samra Bashir

PhD Pharmacology, (The Aga Khan University, Karachi), MPhil Pharmacology, (Bahauddin Zakariya University, Multan)

B. Pharmacy. (Bahauddin Zakariya University, Multan) Professor

Dr. Mahboob Alam

PhD Pharmacy, (University of Peshawar), Pharm D, (University of Peshawar) Assistant Professor

Dr. Nadia Shamshad Malik

PhD Pharmaceutics, (The Islamia University, Bahawalpur), MPhil Pharmaceutics, (The Islamia University, Bahawalpur) Bachelor in Pharmacy, (The Islamia University, Bahawalpur) Assistant Professor

■ Mr. Muhammad Tarig Khan

MPhil Pharmaceutical Chemistry, (Bahauddin Zakariya University, Multan) Pharm-D, (University of Sargodha) Lecturer

Mr. Fahad Khan Tareen

MPhil Pharmacy, (QAU, Islamabad), Pharm-D Pharmacy, (Gomal University, DI Khan) Lecturer

Mr. Muhammad Majid

MPhil Biochemistry/Molecular Biology, (QAU, Islamabad), Pharm-D Pharmacy, (Gomal University, DI Khan) Lecturer

Mr. Akash Syed

MS Pharmacy Practice, (COMSATS Uni. Abbottabad Campus),

Pharm-D Pharmacy, (COMSATS Uni. Abbottabad Campus)

Lecturer

Mr. Muhammad Yasir

MS Microbiology & Immunology, (COMSATS University, Islamabad).

Pharm-D Pharmacy, (University of Peshawar) Lecturer

Ms. Igra Hamid

MPhil Pharmaceutical Chemistry, (Riphah International University, Islamabad), Pharm-D, (RIU, Islamabad), Lecturer

■ Mr. Zulkifal Malik

MPhil Pharmacology, (RIU, Islamabad), Pharm-D, (Gomal University, DI Khan), Lecturer

■ Ms. Mahwish Siddiqui

Pharm-D, (RIU, Islamabad), Junior Lecturer

Mr. Mateen Abbas

Pharm-D, (Gomal University, DI Khan), Junior Lecturer

Mr. Asif Safdar

Pharm-D, (RIU, Islamabad), Junior Lecturer



DEPARTMENT OF BIOSCIENCES

HOD'S MESSAGE



Dr. Sahar Fazal

The Department promotes excellence in interdisciplinary biological research by encouraging independent and original work and training. Furthermore, to enhance the understanding of concepts and to have a hand-on experience, most of the courses are supported by wet lab and research based assignments. To accomplish this, department has established state-of-the-art lab facilities, including fully equipped wet lab, tissue culture lab, green house, and computer labs. The Department now offers BS programs in Biotechnology, Biosciences and Microbiology as well as the graduate program in Biosciences. Since the beginning of the 1990s, many laboratories are engaged to concentrate on full genome of several species such as bacteria, yeasts, mice, plant and humans. Biotechnology is the use of living organisms to create new products and processes.

This field is an application of scientific and engineering principals to process materials by the use of biological agents to deliver goods and services. It is an applied science and has a great scope in medical, agricultural, food and pharmaceutical sciences. Microbiology is the study of microscopic organisms such as viruses, bacteria, algae, fungi, slime molds and protozoa. Microbiologists can pursue their careers in various fields such as agriculture, food, environment, industrial microbiology, public health, pharmaceuticals, resource management, and Academia. A number of general courses in the area of humanities, social sciences, religion and ethics, health & physical education, languages and communication skills are made compulsory in order to provide the students with a social, psychological and religious understanding thereby ensuring a balanced personality.

BS Biosciences Program

■ Program Educational Objectives (PEOs)

- (i) The graduates will demonstrate advancement in biological profession by enhancing their knowledge and skills.
- (ii) The graduates will contribute competently in the industry by applying requisite technical skills.
- (iii) The graduates will demonstrate ethical values and contribute positively towards the society.

■ Program Learning Outcomes (PLOs)

- (i) Knowledge: An ability to apply fundamental and specialized knowledge of biosciences to the solution of complex biosciences problems.
- (ii) **Hypothesis Formulation:** An ability to identify, formulate, research literature, analyze complex biosciences problems, and reaching substantiated conclusions towards formulation of hypothesis using fundamental principles of biosciences.
- (iii) Experiment/Process Design: An ability to design experimental solutions to validate biosciences hypothesis, and design processes while maintaining biosciences standards, cultural. societal, and environmental considerations.
- (iv) **Investigation**: An ability to investigate complex issues related to biosciences in a methodical way including literature survey, analysis and interpretation of experimental data, and synthesis of information to draw conclusions.
- (v) Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources. and modern tools, including prediction and modeling, to complex biosciences activities, with an understanding of the limitations.

- (vi) Impact Analysis: An ability to apply reasoning informed by contextual knowledge to assess societal, legal and cultural issues and the consequent responsibilities relevant to professional biosciences practice and solution to complex biosciences problems.
- (vii) Management Skills: An ability to demonstrate management skills and apply biosciences principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.
- (viii) **Team Work:** An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.
- (ix) Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of biosciences practice.
- (x) Communication: An ability to communicate effectively, orally as well as in writing, on complex biosciences activities with the biosciences community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
- (xi) Lifelong Learning: An ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments.

■ Admission Requirements

- (i) Higher Secondary School Certificate or equivalent securing at least 45% marks in aggregate
- (ii) CUST Admission Test/HEC Approved Test

■ Degree Requirements

Each candidate for the BS Biosciences degree is required to successfully earn 131 credit hours as per the following detail:

	Area	Cr. Hrs.
(a)	Core Courses	57
(b)	Elective Courses	24
(c)	Supporting Science Courses	19
(d)	General Education Courses	25
(e)	Internship	00
(f)	Community Service	00
(g)	Design Project	06
	Total	131

■ Core Courses (57 Cr. Hrs)

Course Title	Code	Cr. Hrs.
Cell Biology	BS1113	3
Cell Biology Lab	BS1111	1
Biochemistry	BS2223	3
Biochemistry Lab	BS2221	1
Introduction to Microbiology	BS1143	3
Introduction to Microbiology Lab	BS1141	1
Protein Chemistry	BS3513	3
Molecular Genetics	BS2423	3
Molecular Genetics Lab	BS2421	1
Introduction to Bioinformatics	BS2713	3
Introduction to Bioinformatics Lab	BS2711	1
Bio-ethics and Bio-safety	BS3823	3
Introduction to Immunology	BS1153	3
Introduction to Immunology Lab	BS1151	1
Introduction to Biotechnology	BS3813	3

Biodiversity and Conservation	BS2173	3
Biosystematics and Classification	BS3193	3
Functional Genomics	BS4523	3
Endocrinology	BS3183	3
Animal and Plant Physiology	BS2153	3
General Ecology	BS2123	3
Evolutionary Biology	BS3173	3
Developmental Biology	BS2163	3

■ Elective Courses (24 Cr. Hrs)

Course Title	Code	Cr. Hrs.
Enzymology	BS3533	3
Health Biotechnology	BT3843	3
Recombinant DNA Technology	BS3453	3
Agriculture Biotechnology	BT3853	3
Public Health and Environment	B\$3343	3
Medical Microbiology	MB3313	3
Principles of Breeding	BS4723	3
Microbial Genetics	MB3413	3
Human Genetics	BS3443	3
Synthetic Biology	BS4783	3
Mitochondrial Genetics	BS4443	3
Microarray Data Analysis	BS4743	3
Bioinformatics Algorithms	BI4433	3
Pharmacogenomics	BS3463	3
Machine Learning for Bioinformatics	BI4763	3
Food Biotechnology	BS4853	3
Cancer Biology	BS4123	3
Chemoinformatics	BS4693	3
Cancer Cytogenetics	BS4133	3

Computational Biology	BI4773	3
Systems Biology	BI4783	3
Genetic Engineering	BT4453	3
Virology	MB3333	3
Applications of Biotechnology	BS4863	3
Nano Biotechnology	BS4793	3
Clinical Biochemistry	BS4213	3
Environmental Biotechnology	BT4873	3
Environmental Law and Policy	BS4623	3
Population Genetics	BS4473	3
Molecular Immunology	BS4113	3
Microbial Biotechnology	BT3373	3
Medical Microbiology	MB3313	3

■ Supporting Science Courses (19 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Introduction to Programming	CSBS1133	3
Introduction to Programming Lab	CSBS1131	1
Chemistry	BS2213	3
Basic Mathematics	MTBS1003	3
Calculus-I	MTBS1013	3
Statistical Methods in Biology	MTBS2033	3
Biophysics	BS2143	3

■ General Education Courses (25 Cr. Hrs

■ General Education Courses (25 Cr. Hrs)		
Course Title	Code	Cr. Hrs.
Pakistan Studies	HMBS1002	2
Islamic Studies / Ethics	HMBS1012	2
English-I	HMBS1013	3
English-II	HMBS1023	3
Technical Report Writing	HMBS2033	3
Humanities-I	HMBS2xx3	3

Humanities-II	HMBS2xx3	3
Management-I	MGBS4xx3	3
Management-II	MGBS4xx3	3

■ Design Project (6 Cr. Hrs)

A student may register final year project in the 7^{th} semester of his/her degree program, or on the completion of 90 Cr. Hrs

Course Title	Code	Cr. Hrs.
Design Project-I	BS 4912	2
Design Project-II	BS 4924	4

■ Internship (BI4200)

It is mandatory for every student to register in an 8-week summer internship program following their 6^{th} semester or after the completion of 90 Cr. Hrs. A formal evaluation is carried out and Pass/Fail grade is awarded to the student.

■ Community Service (VIS4000)

It is mandatory for every student to get involved in 65 hours community service during summer (not allowed when student is registered for internship) following their 4th semester or after completion of 50 Cr. Hrs.



■ CGPA Requirement

A student is required to earn a minimum 2.00/4.00 CGPA on the completion of his/her degree requirements.

■ Program Duration

This is a four-year degree program comprising of 8 semesters with minimum of 131 semester credit hours (Cr. Hrs). There will be a Fall and a Spring semester in each year. The summer session will be utilized for internships or deficiency courses. The maximum duration to complete BS is 7 years.



SCHEME OF STUDIES

BS Biosciences Program

☐ Semester-I (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BS1113	Cell Biology	Core	3
BS1111	Cell Biology Lab	Core	1
CSBS1133	Introduction to Programming	Supporting Science	3
CSBS1131	Introduction to Programming Lab	Supporting Science	1
MTBS1003	Basic Mathematics	Supporting Science	3
HMBS1013	English-I	General Education	3
HMBS1002	Pakistan Studies	General Education	2

☐ Semester-II (19 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS1143	Introduction to Microbiology	Core	3
BS1141	Introduction to Microbiology Lab	Core	1
BS1153	Introduction to Immunology	Core	3
BS1151	Introduction to Immunology lab	Core	1
MTBS1013	Calculus-I	Supporting Science	3
BS2213	Chemistry	Supporting Science	3
HMBS1023	English-II	General Education	3
HMBS1012	Islamic Studies / Ethics	General Education	2

☐ Semester-III (17 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS2223	Biochemistry	Core	3
BS2221	Biochemistry Lab	Core	1
BS2423	Molecular Genetics	Core	3
BS2421	Molecular Genetics Lab	Core	1
BS2143	Biophysics	Supporting Science	3
HMBS2033	Technical Report Writing	General Education	3
HMBS2xx3	Humanities -I	General Education	3

☐ Semester-IV (16 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS3513	Protein Chemistry	Core	3
BS2123	General Ecology	Core	3
BS2713	Introduction to Bioinformatics	Core	3
BS2711	Introduction to Bioinformatics Lab	Core	1
BS3813	Introduction to Biotechnology	Core	3
MTBS2033	Statistical Methods in Biology	Supporting Science	3

☐ Semester-V (18 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS2153	Animal and Plant Physiology	Core	3
BS3193	Biosystematics and Classification	Core	3
BS2173	Biodiversity and Conservation	Core	3
BS3173	Evolutionary Biology	Core	3
MB3333	Elective-I (Virology)	Elective	3
BT3853	Elective II (Agriculture Biotechnology)	Elective	3

☐ Semester-VI (18 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS3183	Endocrinology	Core	3
BS2163	Developmental Biology	Core	3
BT3843	Elective-III (Health Biotechnology)	Elective	3
MB3313	Elective-IV (Medical Microbiology)	Elective	3
BT3373	Elective-V (Microbial Biotechnology)	Elective	3
HMBS2xx3	Humanities-II	General Education	3

☐ Semester-VII (14 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS3823	Bioethics and Biosafety	Core	3
BS4793	Elective-VI (Nano-Biotechnology)	Elective	3

BS4443	Elective-VII (Mitochondrial Genetics)	Elective	3
MGBS4xx3	Management-I	General Education	3
BS4912 Project Part-I	Design Project	2	

☐ Semester-VIII (13 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS4523	Functional Genomics	Core	3
BS4113	Elective-VIII (Molecular Immunology)	Elective	3
MGBS4xx3	Management-II	General Education	3
BS4924	Project Part-II	Design Project	4





BS Biotechnology

■ Program Educational Objectives (PEOs)

- (i) The graduates will contribute competently in the industry related to biotechnology by applying requisite technical skills.
- (ii) The graduates will demonstrate advancement in profession by enhancing their knowledge and skills in their relevant field
- (iii) The graduates will demonstrate commitment to ethical values and contribute positively towards the society.

■ Program Learning Outcomes (PLOs)

- (i) Knowledge: An ability to apply fundamental and specialized knowledge of biotechnology to the solution of complex biotechnological problems.
- (ii) Hypothesis Formulation: An ability to identify, formulate, research literature, analyze complex biotechnology problems, reaching substantiated conclusions towards formulation of hypothesis using fundamental principles of biotechnology.
- (iii) Experiment/Process Design: An ability to design experimental solutions to validate biotechnology hypothesis and design process while maintaining biotechnology standards, cultural, societal, and environmental considerations.
- (iv) Investigation: An ability to investigate complex issues in biotechnology in a methodical way including literature survey, and development of systems, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

- (v) Modern Tool Usage: An ability to select and apply appropriate techniques, resources, and modern tools, including prediction and modeling, to complex biotechnology activities, with an understanding of the limitations.
- (vi) Impact Analysis: An ability to apply reasoning informed by contextual knowledge to assess societal, legal and cultural issues and the consequent responsibilities relevant to professional biotechnology practice and solution to complex biotechnology problems.
- (vii) Management Skills: An ability to demonstrate management skills and apply biotechnology principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.
- (viii) **Team Work:** An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.
- (ix) Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of biotechnology practice.
- (x) Communication: An ability to communicate effectively, orally as well as in writing, on complex biotechnology activities with the biotechnology community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- (xi) Lifelong Learning: An ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments.

■ Admission Requirements

- (i) Higher Secondary School Certificate or equivalent securing at least 45% marks in aggregate
- (ii) CUST Admission Test/HEC Approved Test

■ Degree Requirements

Each candidate for the BS Biotechnology degree is required to successfully earn 131 credit hours as per the following detail:

	Area	Cr. Hrs.
(a)	Core Courses	57
(b)	Elective Courses	24
(c)	Supporting Science Courses	19
(d)	General Education	25
(e)	Internship	0
(f)	Community Service	0
(g)	Project	6
	Total	131

■ Core Courses (57 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Cell Biology	BS1113	3
Cell Biology Lab	BS1111	1
Biochemistry	BS2223	3
Biochemistry Lab	BS2221	1
Introduction to Microbiology	BS1143	3
Introduction to Microbiology Lab	BS1141	1
Protein Chemistry	BS3513	3
Molecular Genetics	BS2423	3
Molecular Genetics Lab	BS2421	1
Introduction to Bioinformatics	BS2713	3
Introduction to Bioinformatics Lab	BS2711	1
Bio-ethics and Bio-safety	BS3823	3
Animal and Plant Physiology	BS2153	3
Introduction to Biotechnology	BS3813	3
Functional Genomics	BS4523	3

Introduction to Immunology	BS1153	3
Introduction to Immunology Lab	BS1151	1
Agriculture Biotechnology	BT3853	3
Industrial Biotechnology	BT3733	3
Health Biotechnology	BT3843	3
Genetic Engineering	BT4453	3
Environmental Biotechnology	BT4873	3
Microbial Biotechnology	BT3373	3

■ Elective Courses (24 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Nano- Bio Technology	BS4793	3
Bioprocess Engineering	BS3833	3
Tissue & Cell Culture	BS3713	3
Food Biotechnology	BS4853	3
Enzymology	BS3533	3
Principles of Breeding	BS4723	3
Microarray Data Analysis	BS4743	3
Microbial Genetics	MB3413	3
Synthetic Biology	BS4783	3
Mitochondrial Genetics	BS4443	3
Pharmacogenomics	BS3463	3
Virology	MB3333	3
Pharmaceutical Biotechnology	BS4843	3
Bioremediation	BS3543	3
Water and Waste Water Treatment	BS3523	3
Marine Biotechnology	BS3133	3
Biofuel and Biorefinery	BS3553	3
Fungal Biotechnology	BS3743	3
Biomaterials	BS4883	3

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Biodiversity and Conservation	BS2173	3
Biosystematics and Classification	BS3193	3
Endocrinology	BS3183	3
General Ecology	BS1123	3
Evolutionary Biology	BS3173	3
Developmental Biology	BS2163	3
Medical Microbiology	MB3313	3
Soil Biotechnology	BS4323	3

■ Supporting Science Courses (19 Cr. Hrs.)

Comparative Anatomy

Course Title	Code	Cr. Hrs.
Introduction to Programming	CSBS1133	3
Introduction to Programming Lab	CSBS1131	1
Chemistry	BS2213	3
Basic Mathematics	MTBS1003	3
Calculus-I	MTBS1013	3
Statistical Methods in Biology	MTBS2033	3
Biophysics	BS2143	3

■ General Education Courses (25 Cr. Hrs)

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Course Title	Code	Cr. Hrs.
Pakistan Studies	HMBS1002	2
Islamic Studies / Ethics	HMBS1012	2
English-I	HMBS1013	3
English-II	HMBS1023	3
Technical Report Writing	HMBS2033	3
Humanities-I	HMBS2xx3	3
Humanities-II	HMBS2xx3	3
Management-I	MGBS4xx3	3

BS3163

Management-II MGBS4xx3 3

■ Design Project (6 Cr. Hrs)

A student may register final year project in the 7th semester of his/her degree program, or on the completion of 90 Cr. Hrs.

Course Title	Code	Cr. Hrs.
Design Project-I	BS 4912	2
Design Project-II	BS 4924	4

■ Internship (BI4200)

It is mandatory for every student to register in an 8-week summer internship program following their 6^{th} semester or after the completion of 90 Cr. Hrs. A formal evaluation is carried out and Pass/Fail grade is awarded to the student.

■ Community Service (VIS4000)

It is mandatory for every student to get involved in 65 hours community service during summer (not allowed when student is registered for internship) following their 4th semester or after completion of 50 Cr. Hrs.

■ CGPA Requirement

A student is required to earn a minimum 2.00/4.00 CGPA on the completion of his/her degree requirements.

■ Program Duration

This is a four-year degree program comprising of 8 semesters with minimum of 131 semester credit hours (Cr. Hrs.). There will be a Fall and a Spring semester in each year. The summer session will be utilized for internships or deficiency courses. The maximum duration to complete BS is 7 years.





SCHEME OF STUDIES

BS Biotechnology Program

☐ Semester-I (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BS1113	Cell Biology	Core	3
BS1111	Cell Biology Lab	Core	1
CSBS1133	Introduction to Programming	Supporting Science	3
CSBS1131	Introduction to Programming Lab	Supporting Science	1
MTBS1003	Basic Mathematics	Supporting Science	3
HMBS1013	English-I	General Education	3
HMBS1002	Pakistan Studies	General Education	2

☐ Semester-II (19 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS1143	Introduction to Microbiology	Core	3
BS1141	Introduction to Microbiology Lab	Core	1
BS1153	Introduction to Immunology	Core	3
BS1151	Introduction to Immunology lab	Core	1
MTBS1013	Calculus-I	Supporting Science	3
BS2213	Chemistry	Supporting Science	3
HMBS1023	English-II	General Education	3
HMBS1012	Islamic Studies / Ethics	General Education	2

☐ Semester-III (17 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS2223	Biochemistry	Core	3
BS2221	Biochemistry Lab	Core	1
BS2423	Molecular Genetics	Core	3
BS2421	Molecular Genetics Lab	Core	1
BS2143	Biophysics	Supporting Science	3
HMBS2033	Technical Report Writing	General Education	3
HMBS2xx3	Humanities-I	General Education	3

☐ Semester-IV (16 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS3513	Protein Chemistry	Core	3
BS3813	Introduction to Biotechnology	Core	3
BS2713	Introduction to Bioinformatics	Core	3
BS2711	Introduction to Bioinformatics Lab	Core	1
MTBS2033	Statistical Methods in Biology	Supporting Science	3
HMBS2xx3	Humanities-II	General Education	3

☐ Semester-V (18 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS2153	Animal and Plant Physiology	Core	3
BT4453	Genetic Engineering	Core	3
BT3853	Agriculture Biotechnology	Core	3
BT3733	Industrial Biotechnology	Core	3
MB3333	Elective-I (Virology)	Elective	3
BS2173	Elective-II (Biodiversity and Conservation)	Elective	3

☐ Semester-VI (18 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BT3843	Health Biotechnology	Core	3
BT4873	Environmental Biotechnology	Core	3
BT3373	Microbial Biotechnology	Core	3
BS3183	Elective-III (Endocrinology)	Elective	3
MB3313	Elective-IV (Medical Microbiology)	Elective	3
MB4323	Elective-V (Soil Microbiology)	Elective	3

☐ Semester-VII (14 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS3823	Bioethics and Biosafety	Core	3
BS4793	Elective-VI(Nano-Biotechnology)	Elective	3
BS4443	Elective-VII (Mitochondrial Genetics)	Elective	3
MGBS4xx3	Management-I	General Education	3
BS4912	Project Part-I	Design Project	2

☐ Semester-VIII (13 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
BS4523	Functional Genomics	Core	3
BS3463	Elective-VIII (Pharmacogenomics)	Elective	3
MGBS4xx3	Management-II	General Education	3
BS4924	Project Part-II	Design Project	4



BS Microbiology

■ Program Educational Objectives (PEOs)

- (i) The graduates will contribute competently in the industry related to microbiology by applying requisite technical skills.
- (ii) The graduates will demonstrate advancement in profession by enhancing their knowledge and skills in the related field.
- (iii) The graduates will demonstrate commitment to ethical values and contribute positively towards the society.

■ Program Learning Outcomes (PLOs)

- (i) **Knowledge:** An ability to apply fundamental and specialized knowledge of microbiology to the solution of complex microbiology problems.
- (ii) Hypothesis Formulation: An ability to identify, formulate, research literature, analyze complex microbiology problems, reaching substantiated conclusions towards formulation of hypothesis using fundamental principles of microbiology.
- (iii) Experiment/Process Design: An ability to design experimental solutions to validate microbiology hypothesis and design process while maintaining microbiology standards, cultural, societal, and environmental considerations.
- (iv) **Investigation**: An ability to investigate complex issues in microbiology in a methodical way including literature survey, and development of systems, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.

- (v) Modern Tool Usage: An ability to select and apply appropriate techniques, resources, and modern tools, including prediction and modeling, to complex microbiology activities, with an understanding of the limitations.
- (vi) Impact Analysis: An ability to apply reasoning informed by contextual knowledge to assess societal, legal and cultural issues and the consequent responsibilities relevant to professional microbiology practice and solution to complex microbiology problems.
- (vii) Management Skills: An ability to demonstrate management skills and apply microbiology principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.
- (viii) **Team Work:** An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.
- (ix) Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of microbiology practice.
- (x) Communication: An ability to communicate effectively, orally as well as in writing, on complex microbiology activities with the microbiology community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- (xi) Lifelong Learning: An ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments.

■ Admission Requirements

- (i) Higher Secondary School Certificate or equivalent securing at least 45% marks in aggregate
- (ii) CUST Admission Test/HEC Approved Test

■ Degree Requirements

Each candidate for the BS Microbiology degree is required to successfully earn 131 credit hours as per the following detail:

	Area	Cr. Hrs.
(a)	Core Courses	57
(b)	Elective Courses	24
(c)	Supporting Science Courses	19
(d)	General Education	25
(e)	Internship	0
(f)	Community Service	0
(g)	Project	6
	Total	131

■ Core Courses (57 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Cell Biology	BS1113	3
Cell Biology Lab	BS1111	1
Biochemistry	BS2223	3
Biochemistry Lab	BS2221	1
Introduction to Microbiology	BS1143	3
Introduction to Microbiology Lab	BS1141	1
Protein Chemistry	BS3513	3
Molecular Genetics	BS2423	3
Molecular Genetics Lab	BS2421	1
Introduction to Bioinformatics	BS2713	3
Introduction to Bioinformatics Lab	BS2711	1
Bio-ethics and Bio-safety	BS3823	3
Introduction to Biotechnology	BS3813	3
Introduction to Immunology	BS1153	3

Introduction to Immunology Lab	BS1151	1
Functional Genomics	BS4523	3
Microbial Ecology	MB2323	3
Virology	MB3333	3
Mycology	MB3353	3
Soil Microbiology	MB4323	3
Food Microbiology	MB4333	3
Medical Microbiology	MB3313	3
Microbial Genetics	MB3413	3

■ Elective Courses (24 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Epidemiology	BS3363	3
Fresh Water Microbiology	BS4313	3
Molecular Mechanism of anti-microbial agent.	BS4533	3
Anti-viral therapies	BS4543	3
Microbial Biotechnology	BT3373	3
Mol Immunology	BS4113	3
Genetic Engineering	BT4453	3
Clinical Bacteriology	BS3213	3
Clinical Biochemistry	BS4213	3
Mitochondrial Genetics	BS4443	3
Microarray Data Analysis	BS4743	3
Chemo Informatics	BS4693	3
Bio Nano Technology	BS4793	3
Environmental Biotechnology	BT4873	3
Water and Waste water treatment	BS3523	3
Bioremediation	BS3543	3
Biofuel and Biorefinery	BS3553	3
Industrial Biotechnology	BT3733	3

Pharmaceutical Biotechnology	BS4843	3
Fungal Biotechnology	BS3743	3
Food Biotechnology	BS4853	3
Comparative Anatomy	BS3163	3
Biodiversity and Conservation	BS2173	3
Biosystematics and Classification	BS3193	3
Endocrinology	BS3183	3
Evolutionary Biology	BS3173	3
Developmental Biology	BS2163	3
Animal and Plant Physiology	BS2153	3
Agriculture Biotechnology	BT3853	3

■ Supporting Science Courses (19 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Introduction to Programming	CSBS1133	3
Introduction to Programming Lab	CSBS1131	1
Chemistry	BS2213	3
Basic Mathematics	MTBS1003	3
Calculus-I	MTBS1013	3
Statistical Methods in Biology	MTBS2033	3
Biophysics	BS2143	3

■ General Education Courses (25 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Pakistan Studies	HMBS1002	2
Islamic Studies / Ethics	HMBS1012	2
English-I	HMBS1013	3
English-II	HMBS1023	3
Technical Report Writing	HMBS2033	3
Humanities-I	HMBS2xx3	3

Humanities-II	HMBS2xx3	3
Management-I	MGBS4xx3	3
Management-II	MGBS4xx3	3

■ Design Project (6 Cr. Hrs.)

A student may register final year project in the 7th semester of his/her degree program, or on the completion of 90 Cr. Hrs.

Course Title	Code	Cr. Hrs.
Design Project-I	BS 4912	2
Design Project-II	BS 4924	4

■ Internship (BI4200)

It is mandatory for every student to register in an 8 week summer internship program following their 6^{th} semester or after the completion of 90 Cr. Hrs. A formal evaluation is carried out and Pass/Fail grade is awarded to the student.

■ Community Service (VIS4000)

It is mandatory for every student to get involved in 65 hours community service during summer (not allowed when student is registered for internship) following their 4th semester or after completion of 50 Cr. Hrs.

■ CGPA Requirement

A student is required to earn a minimum 2.00/4.00 CGPA on the completion of his/her degree requirement.

■ Program Duration

This is a four-year degree program comprising of 8 semesters with minimum of 131 semester credit hours (Cr. Hrs.). There will be a Fall and a Spring semester in each year. The summer session will be utilized for internships or deficiency courses. The maximum duration to complete BS is 7 years.



SCHEME OF STUDIES

BS Microbiology Program

☐ Semester-I (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BS1113	Cell Biology	Core	3
BS1111	Cell Biology Lab	Core	1
CSBS1133	Introduction to Programming	Supporting Science	3
CSBS1131	Introduction to Programming Lab	Supporting Science	1
MTBS1003	Basic Mathematics	Supporting Science	3
MTBS1013	English-I	General Education	3
HMBS1002	Pakistan Studies	General Education	2

☐ Semester-II (19 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BS1143	Introduction to Microbiology	Core	3
BS1141	Introduction to Microbiology Lab	Core	1
BS1153	Introduction to Immunology	Core	3
BS1151	Introduction to Immunology lab	Core	1
MTBS1013	Calculus-I	Supporting Science	3
BS2213	Chemistry	Supporting Science	3
HMBS1023	English-II	General Education	3
HMBS1012	Islamic Studies / Ethics	General Education	2

\square Semester-III (17 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BS2223	Biochemistry	Core	3
BS2221	Biochemistry Lab	Core	1
BS2423	Molecular Genetics	Core	3
BS2421	Molecular Genetics Lab	Core	1
BS2143	Biophysics	Supporting Science	3
HMBS2033	Technical Report Writing	General Education	3
HMBS2xx3	Humanities-I	General Education	3

☐ Semester-IV (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BS3513	Protein Chemistry	Core	3
MB2323	Microbial Ecology	Core	3
BS2713	Introduction to Bioinformatics	Core	3
BS2711	Introduction to Bioinformatics Lab	Core	1
BS3813	Introduction to Biotechnology	Core	3
MTBS2033	Statistical Methods in Biology	Supporting Science	3

☐ Semester-V (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MB3333	Virology	Core	3
MB3353	Mycology	Core	3
MB3413	Microbial Genetics	Core	3
BT3853	Elective-I (Agriculture Biotechnology)	Elective	3
BS2173	Elective-II (Biodiversity and Conservation)	Elective	3
HMBS2xx3	Humanities-II	General Education	3

☐ Semester-VI (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
MB4323	Soil Microbiology	Core	3
MB4333	Food Microbiology	Core	3
MB3313	Medical Microbiology	Core	3
BS3183	Elective-III (Endocrinology)	Elective	3
BT3843	Elective-IV (Health Biotechnology)	Elective	3
BT3373	Elective-V (Microbial Biotechnology)	Elective	3

☐ Semester-VII (14 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BS3823	Bioethics and Biosafety	Core	3
BS4793	Elective-VI (Nano-Biotechnology)	Elective	3
BS4443	Elective-VII (Mitochondrial Genetics)	Elective	3
MGBS4xx3	xx3 Management-I General Educat		3
BS4912	Project Part-I	Design Project	2

☐ Semester-VIII (13 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
BS4523	Functional Genomics	Core	3
BS4113	Elective-VIII (Molecular Immunology)	Elective	3
MGBS4xx3	Management-II	General Education	3
BS4924	Project Part-II	Design Project	4



MS Biosciences

■ Admission Requirements

- (i) A minimum of 16 years of education leading to BS Bioinformatics/M.Sc. Biotechnology/Biological Sciences or equivalent
- (ii) Minimum 2.00/4.00 CGPA or 50% marks
- (iii) Admission Test/HEC Approved Test

■ Degree Requirements

A student admitted in this program will have to complete the degree requirements by following any one of the options given below:

- (i) 24 Cr. Hrs course work with 6 Cr. Hrs Thesis
- (ii) 27 Cr. Hrs course work with 3 Cr. Hrs Project
- (iii) Course work only (10 Courses)

■ Core Courses (12 Cr. Hrs)

Students are required to qualify all the core courses listed below:

Course Title	Code	Cr. Hrs.
Advanced Molecular Genetics	BI5633	3
Advanced Bioinformatics	BI5753	3
Applied Biotechnology	BI5733	3
Advanced Microbiology and Immunology	BI5193	3

■ Elective Courses (12 Cr. Hrs)

Course Title	Code	Cr. Hrs.
Advanced Endocrinology	BI5763	3
Eukaryotic Regulatory Mechanisms	BI5723	3
Drug Design and Development	BI5213	3
Advanced Environmental Biotechnology	BI5833	3
Advanced Protein Chemistry	BI5523	3
Bioremediation and Biodegradation	BI5843	3
Climate Change Adaptation and Mitigation	BI5143	3
Advanced Systems Biology	BI5513	3
Molecular Dynamics Simulation	BI5773	3
Medical Genetics	BI5423	3
Advanced Cancer Cytogenetics	BI5413	3

Advanced Topics in Bioinformatics	BI5153	3
Pathways and Networks in Biology	BI6113	3
Protein Engineering and Enzyme Technology	BI5533	3
Molecular Biophysics	BI5663	3
Advanced Cancer Biology	BI5683	3
Advanced Medical Entomology	BI6123	3
Advanced Clinical Biochemistry	BI5223	3
Advanced Microbial Genomics	BI6413	3
Advanced Human Genetics	BI5483	3
Gene Chip Technology	BI6423	3
Advanced Nano-biotechnology	BI6713	3
Advanced Forensic Biology	BI5163	3
Medicinal Plants	BI5623	3
Advanced Epidemiology	BI6143	3
Sustainable Ecosystems	BI5323	3
Climatology	BI5333	3
Biosafety and Biosecurity	BI6723	3

■ Research Thesis/Project

Course Title	Code	Cr. Hrs.
Research Thesis	BI6916	6
Research Project	BI6913	3

■ CGPA Requirement

A student is required to earn a minimum 3.00/4.00 CGPA on the completion of his/her degree requirements.

■ Program Duration

This is normally a two year degree program comprising 4 semesters. There will be a Fall and a Spring semester in each year. The maximum duration to complete MS in Bioisciences is 4 years.

PhD Biosciences

The department offers a thought-provoking. multidisciplinary atmosphere for advanced studies and research through its state-of-the-art lab facilities, including fully equipped wet lab, tissue culture lab, green house, and computer labs. We have experienced and highly qualified faculty with diverse international exposure and backgrounds in the basic sciences, applied sciences and computational sciences pursuing diverse teaching and research interests in biosciences discipline. We follow an interdisciplinary approach that executes cutting edge research in a wide range of areas including computational biology, systems biology, medical informatics, agri-informatics, computer aided drug designing, cancer cytogenetics, human genetics, molecular phylogeny and chemo-informatics. We have close research collaborations with various institutes and R&D organizations.

■ Admission Requirements

- (i) MS/MPhil degree in relevant discipline
- (ii) Minimum CGPA 3.0/4.0 (Semester System) or 60% marks (Annual System)

- (iii) Admission Test/GAT Subject/HEC Test
- (iv) Interview

■ Degree Requirements

A PhD candidate shall be awarded degree on successful completion of the following requirements:

- (i) 18 Cr. Hrs. Course Work with minimum CGPA 3.00/4.00
- (ii) Comprehensive Examination (written and oral)
- (iii) 30 Cr. Hrs. Research Work
- (iv) Synopsis Defense
- (v) Dissertation Foreign Reviews
- (vi) Publication/Acceptance of at least one research paper in HEC approved journal.
- (vii) Dissertation Final Defense

Note: PhD scholars are required to comply with the following timeline:

Activity	Preferred Time	Maximum
Course Work	2 Semesters	3 Semesters
Comprehensive Exam	3 Semesters	5 Semesters
Synopsis Qualification	4 Semesters	6 Semesters
Thesis Submission	6 Semesters	10 Semesters



DEPARTMENT OF PHARMACY

HOD'S MESSAGE



Dr. Muzaffar Abbas

The Department of Pharmacy promotes excellence in pharmaceutical sciences by encouraging active learning in a conducive environment. To meet the challenges to healthcare and the pharmacy profession, the Department follows curriculum that not only provides a solid foundation of the discipline, it also equips our graduates with required skills and knowledge to practice as a quality health care professional to serve the community, hospitals and industry. Furthermore, to enhance the understanding and to have a hands-on experience, most of the courses are supported by practical training in well-equipped laboratories and clinical settings. Regular visits to the industry, hospital and guest lectures by experts from various pharmaceutical sectors are integral part of the training. Apart from pharmacy related courses, a number of general courses in the area of humanities, computer science and communication are compulsory in order to provide the students with a

social and psychological perspectives of the training, thereby ensuring a balanced personality. All the faculty members are well qualified, competent and experienced to provide quality education.

After successful completion of pharmacy curriculum, students are awarded Doctor of pharmacy (Pharm.D.) degree. The graduates can serve hospitals, industry, drug regulatory authorities, academia and fulfill the increasing demand of pharmacists at national and international level. Moreover, the graduates can continue their studies up to Master/PhD level and can contribute in the on-going pharmaceutical sciences research worldwide.

If you are looking for a rewarding educational experience in pharmaceutical sciences, you are at the right place. Explore, experience and excel with us!

Doctor of Pharmacy

■Program Educational Objectives (PEOs)

The Pharm.D. program aims to produce leading professionals who will:

- (i) Contribute competently in the pharmaceutical profession by applying requisite knowledge and skills.
- (ii) Exhibit guest for learning and initiative through elevation in education or growth in professional status.
- (iii) Demonstrate ethical values and contribute positively towards the society.

■Program Learning Outcomes (PLOs)

Upon completion of Pharm.D. program, the graduating students should be able to demonstrate the following attributes:

- (i) Foundational Knowledge: An ability to develop, integrate and apply knowledge from the foundational sciences (basic medical and pharmaceutical sciences) to execute various services in pharmacy profession.
- (ii) Problem Analysis and Decision Making: An ability to identify and systematically analyze problems, synthesize and interpret information, explore and prioritize potential strategies and make logical and appropriate decision to reach a viable solution.
- (iii) Medication Use System Management: An ability to manage healthcare system using human, financial, technological and physical resources, appropriate techniques and tools to optimize safety and efficacy of medications.

- (iv) Pharmaceutical Care: An ability to deliver customized pharmaceutical care to the patients by identifying patient needs, cultural sensitivity, socio-economic conditions and understand how population-based care influences patient-centered care to develop evidence-based guidelines and provide best pharmaceutical care for individuals and communities
- (v) Dispensing and Compounding Practices: An ability to implement the process of compounding and dispensing medications in compliance with established standards to meet specific patient needs
- (vi) Drug Design and Development: An ability to demonstrate appropriate professional skills and techniques involved in drug manufacture, design, development and screening, quality control and quality assurance of pharmaceutical products.
- (vii) Professionalism and Ethics: An ability to practice pharmacy in legal, ethical and professional ways and exhibit behaviors and values that are consistent with the trust given to the profession by patients, other healthcare providers and society.
- (viii) Individual and Team Work: An ability to work effectively as an individual or as a member or leader of a team, in multidisciplinary settings.
- (ix) Communication: An ability to effectively communicate verbally and nonverbally and use appropriate technologies when interacting with individuals, groups and organizations.
- (x) Research, Innovation and Entrepreneurship: An ability to engage in research, innovation and entrepreneurship in pharmacy profession by using creative thinking to envision better ways of accomplishing professional goals.

(xi) Life-Long Learning: An ability to demonstrate independent study skills to pursue lifelong learning by engaging in experiences and activities that challenge them to continuously update their knowledge and develop new abilities for their personal and professional growth.

■Admission Requirements

(i) Higher Secondary School Certificate (FSc./A Levels (Pre-Medical) 60% marks in aggregate. A-Level Students are required to submit IBCC equivalent certificate.

(ii) CUST Admission Test/HEC Approved Test

■Degree Requirements

Each candidate for the Pharm.D. degree is required to successfully earn 198 Cr. Hrs. as per the following details:

	Area	Cr. Hrs.
	Alea	CI. IIIs.
(a)	Pharmaceutics Courses	56
(b)	Pharmaceutical Chemistry Courses	32
(c)	Basic Medical Sciences Courses	32
(d)	Pharmacognosy Courses	16
(e)	Pharmacy Practice Courses	41
(f)	Mathematics and Bio-statistics Courses	06
(g)	Computer Science Courses	04
(h)	Humanities Courses	11
	Total	198

■Pharmaceutics Courses (56 Cr. Hrs)

Course Title	Code	Cr. Hrs.
Pharmaceutics-IA (Physical Pharmacy)	PH1113	03
Pharmaceutics-IB (Physical Pharmacy)	PH1123	03
Pharmaceutics-IIA (Dosage Forms Science)	PH2133	03
Pharmaceutics-IIB (Dosage Forms Science)	PH2143	03
Pharmaceutics-IIIA (Pharmaceutical Microbiology & Immunology)	PH2153	03
Pharmaceutics-IIIB (Pharmaceutical Microbiology & Immunology)	PH2163	03
Pharmaceutics-IVA (Industrial Pharmacy)	PH4173	03
Pharmaceutics-IVB (Industrial Pharmacy)	PH4183	03

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Pharmaceutics-VB (Biopharmaceutics & Pharmacokinetics)	PH4223	03
Pharmaceutics-VIA (Pharmaceutical Quality Management)	PH4233	03
Pharmaceutics-VIB (Pharmaceutical Quality Management)	PH4243	03
Pharmaceutics-VIIA (Pharmaceutical Technology)	PH5253	03
Pharmaceutics-VIIB (Pharmaceutical Technology)	PH5263	03
Pharmaceutics-IA (Physical Pharmacy) Lab	PH1111	01
Pharmaceutics-IB (Physical Pharmacy) Lab	PH1121	01
Pharmaceutics-IIA (Dosage Forms Science) Lab	PH2131	01
Pharmaceutics-IIB (Dosage Forms Science) Lab	PH2141	01
Pharmaceutics-IIIA (Pharmaceutical Microbiology &Immunology) Lab	PH2151	01
Pharmaceutics-IIIB (Pharmaceutical Microbiology & Immunology) Lab	PH2161	01
Pharmaceutics-IVA (Industrial Pharmacy) Lab	PH4171	01
Pharmaceutics-IVB (Industrial Pharmacy) Lab	PH4181	01
Pharmaceutics-VA (Biopharmaceutics & Pharmacokinetics) Lab	PH4211	01
Pharmaceutics-VB (Biopharmaceutics & Pharmacokinetics) Lab	PH4221	01
Pharmaceutics-VIA (Pharmaceutical Quality Management) Lab	PH4231	01
Pharmaceutics-VIB (Pharmaceutical Quality Management) Lab	PH4241	01
Pharmaceutics-VIIA (Pharmaceutical Technology) Lab	PH5251	01
Pharmaceutics-VIIB (Pharmaceutical Technology) Lab	PH5261	01

Pharmaceutics-VA (Biopharmaceutics & Pharmacokinetics)

■Pharmaceutical Chemistry Courses (32 Cr. Hrs)			
Course Title	Code	Cr. Hrs.	
Pharmaceutical Chemistry-IA (Organic)	PH1313	03	
Pharmaceutical Chemistry-IB (Organic)	PH1323	03	
Pharmaceutical Chemistry-IIA (Biochemistry)	PH1333	03	
Pharmaceutical Chemistry-IIB (Biochemistry)	PH1343	03	
Pharmaceutical Chemistry-IIIA (Pharmaceutical Analysis)	PH3353	03	
Pharmaceutical Chemistry-IIIB (Pharmaceutical Analysis)	PH3363	03	

PH4213

03

Pharmaceutical Chemistry-IVA (Medicinal Chemistry)	PH5373	03
Pharmaceutical Chemistry-IVB (Medicinal Chemistry)	PH5383	03
Pharmaceutical Chemistry-IA (Organic) Lab	PH1311	01
Pharmaceutical Chemistry-IB (Organic) Lab	PH1321	01
Pharmaceutical Chemistry-IIA (Biochemistry) Lab	PH1331	01
Pharmaceutical Chemistry-IIB (Biochemistry) Lab	PH1341	01
Pharmaceutical Chemistry-IIIA (Pharmaceutical Analysis) Lab	PH3351	01
Pharmaceutical Chemistry-IIIB (Pharmaceutical Analysis) Lab	PH3361	01
Pharmaceutical Chemistry-IVA (Medicinal Chemistry) Lab	PH5371	01
Pharmaceutical Chemistry-IVB (Medicinal Chemistry) Lab	PH5381	01

■Basic Medical Sciences Courses (32 Cr. Hrs)

Course Title	Code	Cr. Hrs.
Physiology-A	PH1513	03
Physiology-B	PH1523	03
Anatomy & Histology	PH1533	03
Pharmacology and Therapeutics-IA	PH2543	03
Pharmacology and Therapeutics-IB	PH2553	03
Pharmacology and Therapeutics-IIA	PH3563	03
Pharmacology and Therapeutics-IIB	PH3573	03
Pathology	PH3583	03
Physiology-A Lab	PH1511	01
Physiology-B Lab	PH1521	01
Anatomy & Histology Lab	PH1531	01
Pharmacology and Therapeutics-IA Lab	PH2541	01
Pharmacology and Therapeutics-IB Lab	PH2551	01
Pharmacology and Therapeutics-IIA Lab	PH3561	01
Pharmacology and Therapeutics-IIB Lab	PH3571	01
Pathology Lab	PH3581	01

■Pharmacognosy Courses (16 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Pharmacognosy-IA (Basic)	PH2713	03
Pharmacognosy-IB (Basic)	PH2723	03
Pharmacognosy-IIA (Advanced)	PH3733	03
Pharmacognosy-IIB (Advanced)	PH3743	03
Pharmacognosy-IA (Basic) Lab	PH2711	01
Pharmacognosy-IB (Basic) Lab	PH2721	01
Pharmacognosy-IIA (Advanced) Lab	PH3731	01
Pharmacognosy-IIB (Advanced) Lab	PH3741	01

■Pharmacy Practice Courses (41 Cr. Hrs)

Course Title	Code	Cr. Hrs.
Pharmacy Practice-IIA (Dispensing Pharmacy)	PH3813	03
Pharmacy Practice-IIB (Community, Social & AdministrativePharmacy)	PH3823	03
Pharmacy Practice-IVA (Hospital Pharmacy)	PH4833	03
Pharmacy Practice-IVB (Hospital Pharmacy)	PH4843	03
Pharmacy Practice-VA (Clinical Pharmacy-I)	PH4853	03
Pharmacy Practice-VB (Clinical Pharmacy-I)	PH4863	03
Pharmacy Practice-VIA (Advanced Clinical Pharmacy-II)	PH5873	03
Pharmacy Practice-VIB (Advanced Clinical Pharmacy-II)	PH5883	03
Pharmacy Practice-VIIA (Forensic Pharmacy)	PH5913	03
Pharmacy Practice-VIIB (Forensic Pharmacy)	PH5923	03
Pharmacy Practice-VIIIA (Pharmaceutical Management & Marketing)	PH5933	03
Pharmacy Practice-VIIIB (Pharmaceutical Management & Marketing)	PH5943	03
Pharmacy Practice-IIA (Dispensing Pharmacy) Lab	PH3811	01
Pharmacy Practice-VA (Clinical Pharmacy-I) Lab	PH4851	01
Pharmacy Practice-VB (Clinical Pharmacy-I) Lab	PH4861	01
Pharmacy Practice-VIA (Advanced Clinical Pharmacy-II) Lab	PH5871	01
Pharmacy Practice-VIB (Advanced Clinical Pharmacy-II) Lab	PH5881	01

■ Mathematics and Bio-statistics Courses (06 Cr. Hrs)

Course Title	Code	Cr. Hrs.
Pharmacy Practice-IA (Pharmaceutical Mathematics)	MTPH2013	03
Pharmacy Practice-IB (Bio-Statistics)	MTPH2023	03

■Computer Science Courses (04 Cr. Hrs)

Course Title	Code	Cr. Hrs.
Pharmacy Practice-III (Computer and its Applications in Pharmacy)	CSPH3113	03
Pharmacy Practice-III (Computer and its Applications in Pharmacy) Lab	CSPH3111	01

■Humanities Courses (11 Cr. Hrs)

Course Title	Code	Cr. Hrs.
English-A (Functional English)	HMPH1012	02
English-B (Communication & Writing Skills)	HMPH1024	04
Islamic Studies	HMPH2033	03
Pakistan Studies	HMPH2042	02

■Pharmacognosy Study Tour

A pharmacognosy study tour is an integral part of the syllabus and is usually arranged after 2nd semester for the collection of medicinal plants from the country. It is mandatory for the students to prepare and submit a report about the medicinal plants. The report is formally evaluated in the final examination

■Pharmaceutical Industry Visit

A visit to the pharmaceutical industry following 6th semester is an integral part of the syllabus. Students are required to prepare and submit a report about operations in Pharmaceutical industry. The report is formally evaluated in the final examination.

■Clerkship in the Clinical Setting

Clerkships are mandatory for clinical training of students during 7th, 8th, 9th and 10th semester in a well reputed hospital. Students are required to prepare and submit a report during 7th and 8th semester and a project during 9th and 10th semester. The report and project are formally evaluated in the final examination.

■Community Service (VIS4000)

It is mandatory for every student to complete 65 hours of community service during summer usually after 4th semester which is prerequisite for the award of degree.

■ CGPA Requirement

A student is required to earn a minimum 2.00/4.00 CGPA on the completion of his/her degree requirements.

■ Program Duration

This is a five-year degree program comprising of 10 semesters with minimum of 198 Cr. Hrs. There will be a Fall and a Spring semester in each year. The summer session will be utilized for internships or deficiency courses. The maximum duration to complete Pharm.D. degree is 08 years.





SCHEME OF STUDIES

Pharm.D. Program

☐ Semester-I (22 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
HMPH1012	English – A (Functional English)	Humanities	2
PH1113	Pharmaceutics-IA (Physical Pharmacy)	Pharmaceutics	3
PH1111	Pharmaceutics-IA (Physical Pharmacy) Lab	Pharmaceutics	1
PH1313	Pharmaceutical Chemistry-IA (Organic)	Pharmaceutical Chemistry	3
PH1311	Pharmaceutical Chemistry-IA (Organic) Lab	Pharmaceutical Chemistry	1
PH1333	Pharmaceutical Chemistry-IIA (Biochemistry)	Pharmaceutical Chemistry	3
PH1331	Pharmaceutics Chemistry-IIA (Biochemistry) Lab	Pharmaceutical Chemistry	1
PH1513	Physiology-A	Basic Medical Sciences	3
PH1511	Physiology-A Lab	Basic Medical Sciences	1
PH1533	Anatomy & Histology	Basic Medical Sciences	3
PH1531	Anatomy & Histology Lab	Basic Medical Sciences	1

☐ Semester-II (20 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
HMPH1024	English-B (Communication & Writing skills)	Humanities	4
PH1123	Pharmaceutics-IB (Physical Pharmacy)	Pharmaceutics	3
PH1121	Pharmaceutics-IB (Physical Pharmacy) Lab	Pharmaceutics	1
PH1323	Pharmaceutical Chemistry-IB (Organic)	Pharmaceutical Chemistry	3
PH1321	Pharmaceutical Chemistry-IB (Organic) Lab	Pharmaceutical Chemistry	1
PH1343	Pharmaceutics Chemistry-IIB (Biochemistry)	Pharmaceutical Chemistry	3
PH1341	Pharmaceutical Chemistry-IIB (Biochemistry) Lab	Pharmaceutical Chemistry	1
PH1523	Physiology-B	Basic Medical Sciences	3
PH1521	Physiology-B Lab	Basic Medical Sciences	1

☐ Semester-III (22 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
HMPH2033	Islamic Studies	Humanities	3
PH2133	Pharmaceutics-IIA (Dosage Forms Science)	Pharmaceutics	3

PH2131	Pharmaceutics-IIA (Dosage Forms Science) Lab	Pharmaceutics	1
PH2153	Pharmaceutics-IIIA (Pharmaceutical Microbiology & Immunology)	Pharmaceutics	3
PH2151	Pharmaceutics-IIIA (Pharmaceutical Microbiology & Immunology) Lab	Pharmaceutics	1
PH2543	Pharmacology and Therapeutics-IA	Basic Medical Sciences	3
PH2541	Pharmacology and Therapeutics-IA Lab	Basic Medical Sciences	1
PH2713	Pharmacognosy-IA (Basic)	Pharmacognosy	3
PH2711	Pharmacognosy-IA (Basic) Lab	Pharmacognosy	1
MTPH2013	Pharmacy Practice-IA (Pharmaceutical Mathematics)	Mathematics and Bio-statistics	3

☐ Semester-IV (21 Cr. Hrs)

Course Code	Course Title	Category	
HMPH2042	Pakistan Studies	Humanities	2
PH2143	Pharmaceutics-IIB (Dosage Forms Science)	Pharmaceutics	3
PH2141	Pharmaceutics-IIB (Dosage Forms Science) Lab	Pharmaceutics	1
PH2163	Pharmaceutics-IIIB (Pharmaceutical Microbiology & Immunology)	Pharmaceutics	3
PH2161	Pharmaceutics-IIIB (Pharmaceutical Microbiology & Immunology) Lab	Pharmaceutics	1
PH2553	Pharmacology and Therapeutics-IB	Basic Medical Sciences	3
PH2551	Pharmacology and Therapeutics-IB Lab	Basic Medical Sciences	1
PH2723	Pharmacognosy-IB (Basic)	Pharmacognosy	3
PH2721	Pharmacognosy-IB (Basic) Lab	Pharmacognosy	1
MTPH2023	Pharmacy Practice-IB (Bio-statistics)	Mathematics and	3

☐ Semester-V (20 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
PH3813	Pharmacy Practice-IIA (Dispensing Pharmacy)	Pharmacy Practice	3
PH3811	Pharmacy Practice-IIA (Dispensing Pharmacy) Lab	Pharmacy Practice	1
PH3353	Pharmaceutical Chemistry-IIIA (Pharmaceutical Analysis)	Pharmaceutical Chemistry	3

PH3351	Pharmaceutical Chemistry-IIIA (Pharmaceutical Analysis) Lab	Pharmaceutical Chemistry	1
PH3563	Pharmacology and Therapeutics-IIA	Basic Medical Sciences	3
PH3561	Pharmacology and Therapeutics-IIA Lab	Basic Medical Sciences	1
PH3733	Pharmacognosy-IIA (Advanced)	Pharmacognosy	3
PH3731	Pharmacognosy-IIA (Advanced) Lab	Pharmacognosy	1
PH3583	Pathology	Basic Medical Sciences	3
PH3581	Pathology Lab	Basic Medical Sciences	1

☐ Semester-VI (19 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
PH3823	Pharmacy Practice-IIB (Community, Social & Administrative Pharmacy)	Pharmacy Practice	3
PH3363	Pharmaceutical Chemistry-IIIB (Pharmaceutical Analysis)	Pharmaceutical Chemistry	3
PH3361	Pharmaceutical Chemistry-IIIB (Pharmaceutical Analysis) Lab	Pharmaceutical Chemistry	1
PH3573	Pharmacology and Therapeutics-IIB	Basic Medical Sciences	3
PH3571	Pharmacology and Therapeutics-IIB Lab	Basic Medical Sciences	1
PH3743	Pharmacognosy-IIB (Advanced)	Pharmacognosy	3
PH3741	Pharmacognosy-IIB (Advanced) Lab	Pharmacognosy	1
CSPH3113	Pharmacy Practice-III (Computer and its Applications in Pharmacy)	Computer Science Courses	3
CSPH3111	Pharmacy Practice-III (Computer and its Applications in Pharmacy) Lab	Computer Science Courses	1

☐ Semester-VII (19 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
PH4833	Pharmacy Practice-IVA (Hospital Pharmacy)	Pharmacy Practice	3
PH4853	Pharmacy Practice-VA (Clinical Pharmacy-I)	Pharmacy Practice	3
PH4851	Pharmacy Practice-VA (Clinical Pharmacy-I) Lab	Pharmacy Practice	1
PH4173	Pharmaceutics-IVA (Industrial Pharmacy)	Pharmaceutics	3

PH4171	Pharmaceutics-IVA (Inc	lustrial Pharmacy) La	b	Pharmaceutics	1
PH4213	Pharmaceutics-VA Pharmacokinetics)	(Biopharmaceutics	&	Pharmaceutics	3
PH4211	Pharmaceutics-VA Pharmacokinetics) Lab	(Biopharmaceutics	&	Pharmaceutics	1
PH4233	Pharmaceutics-VIA Management)	(Pharmaceutical	Quality	Pharmaceutics	3
PH4231	Pharmaceutics-VIA Management) Lab	(Pharmaceutical	Quality	Pharmaceutics	1

☐ Semester-VIII (19 Cr. Hrs)

Course Code	Course Title			Category	Cr. Hrs.
PH4843	Pharmacy Practice-IVB	(Hospital Pharmacy)		Pharmacy Practice	3
PH4863	Pharmacy Practice-VB	(Clinical Pharmacy-I)		Pharmacy Practice	3
PH4861	Pharmacy Practice-VB	(Clinical Pharmacy-I)	Lab	Pharmacy Practice	1
PH4183	Pharmaceutics-IVB (Inc	dustrial Pharmacy)		Pharmaceutics	3
PH4181	Pharmaceutics-IVB (Inc	dustrial Pharmacy) La	b	Pharmaceutics	1
PH4223	Pharmaceutics-VB Pharmacokinetics)	(Biopharmaceutics	&	Pharmaceutics	3
PH4221	Pharmaceutics-VB Pharmacokinetics) Lab	(Biopharmaceutics	&	Pharmaceutics	1
PH4243	Pharmaceutics-VIB Management)	(Pharmaceutical	Quality	Pharmaceutics	3
PH4241	Pharmaceutics-VIB Management) Lab	(Pharmaceutical	Quality	Pharmaceutics	1

☐ Semester-IX (18 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
PH5253	Pharmaceutics-VIIA (Pharmaceutical Technology)	Pharmaceutics	3
PH5251	Pharmaceutics-VIIA (Pharmaceutical Technology) Lab	Pharmaceutics	1
PH5873	Pharmacy Practice-VIA (Advanced Clinical Pharmacy-II)	Pharmacy Practice	3

PH5871	Pharmacy Practice-VIA (Advanced Clinical Pharmacy-II) Lab	Pharmacy Practice 1	
PH5913	Pharmacy Practice-VIIA (Forensic Pharmacy)	Pharmacy Practice 3	
PH5933	Pharmacy Practice-VIIIA (Pharmaceutical Management & Marketing)	Pharmacy Practice 3	
PH5373	Pharmaceutical Chemistry-IVA (Medicinal Chemistry)	Pharmaceutical Chemistry 3	
PH5371	Pharmaceutical Chemistry-IVA (Medicinal Chemistry) Lab	Pharmaceutical Chemistry 1	

☐ Semester-X (18 Cr. Hrs)

Course Code	Course Title	Category	Cr. Hrs.
PH5263	Pharmaceutics-VIIB (Pharmaceutical Technology)	Pharmaceutics	3
PH5261	Pharmaceutics-VIIB (Pharmaceutical Technology) Lab	Pharmaceutics	1
PH5883	Pharmacy Practice-VIB (Advanced Clinical Pharmacy-II)	Pharmacy Practice	3
PH5881	Pharmacy Practice-VIB (Advanced Clinical Pharmacy-II) Lab	Pharmacy Practice	1
PH5923	Pharmacy Practice-VIIB (Forensic Pharmacy)	Pharmacy Practice	3
PH5943	Pharmacy Practice-VIIIB (Pharmaceutical Management & Marketing)	Pharmacy Practice	3
PH5383	Pharmaceutical Chemistry-IVB (Medicinal Chemistry)	Pharmaceutical Chemistry	3
PH5381	Pharmaceutical Chemistry-IVB (Medicinal Chemistry) Lab	Pharmaceutical Chemistry	1





