Master of Philosophy in Microbiology

Program Code	112	Minimum Duration	4 Semesters, 2 Years
Number Of Courses	9+ Research Thesis	Maximum Duration	8 Semesters, 4 Years
Credit Hours	32	Minimum CGPA Required To Earn Degree	2.50

PROGRAM OBJECTIVES:

- To Provide scholars with a solid foundation in the field of Microbiology.
- To explore the role of microorganisms in human and live stock diseases and the production of value added products and services like biomass, enzymes, chemicals, vaccines, monoclonal antibodies, diagnosis, degradation of organic wastes and bio leaching of minerals from raw ores etc.
- To update the scholars on techniques in different disciplines such as molecular microbiology, microbial bio process technology, medical microbiology and environmental microbiology etc.
- To enhance at national and international level the skills and capabilities of the graduates through participation in seminars, symposia and workshops.

ELIGIBILITY :

Candidate having 16 years of education in relevant field with 2.00 CGPA on the scale of 4.00 in semester system or at least 50% marks in annual system from any recognized institute/university is eligible to apply.

Applicant needs to pass GAT (General) to be conducted by NTS/ETEA/any Registered Testing Agency or University, with at least 50% cumulative score and to clear departmental interview at the time of admission.

PROGRAM OUTCOMES:

After completion of M.Phil program in Microbiology, scholars will be able to:

- Envisage local and national problems pertaining to Microbiology and design and undertake independent research to find solutions.
- Handle, preserve and manipulate microorganisms for the benefit of mankind.
- Strengthen the theoretical & practical foundation of our graduates through state of the art lab and course work.
- Write and review research and communicate with peers in the field.
- The Successful Graduates will prove to be good researchers.

SEMESTER 1

Course Code	Course Title	Cr. Hrs. 12
	Core Course I	3-0
	Core Course II	3-0
	Core Course III	3-0
	Elective I	3-0

SEMESTER 2

Course Code	Course Title	Cr. Hrs. 12
	Core Course IV	3-0
	Core Course V	3-0
	Core Course VI	3-0
	Elective II	3-0

SEMESTER 3

Course Code	Course Title	Cr. Hrs. 2
RES 581	Research Methodology	2-0

SEMESTER 4

Course Code	Course Title	Cr. Hrs. 6
RES 690	Research Thesis	0-6

LIST OF CORE COURSES (SELECT ANY SIX COURSES):

Course Code	Course Title	Cr. Hrs.
MB 501	Advances in Microbiology	3-0
MB 503	Biodegradation and Bioremediation	3-0
MB 507	Advances in Medical Microbiology	3-0
RES 581	Research Methodology	2-0
RES 511	Research Planning Scientific writing	3-0
MB 514	Microbial Biotechnology	3-0
MB 515	Clinical Virology	3-0
MB 517	Microbial Diversity	3-0
BIO 519	Advances in Molecular Biology	3-0
MB 521	Research Techniques and Instrumentation	3-0
MB 525	Microbial Enzyme Technology	3-0
MB 610	Antimicrobials and Resistance Issues	3-0

Course Code	Course Title	Cr. Hrs.
MB 614	Pharmaceutical Microbiology	3-0
MB 618	Microbial Proteins Isolation and Purification	3-0
MB 622	Advances in Immunology	3-0
MB 628	Molecular Mechanisms of Pathogenesis	3-0
MB 630	Pharmaceutical Bioassays	3-0
PHC 837	Quality Control in Quality Assurance	3-0
PH 610	Epidemiology	3-0
BT 662	Biological Nitrogen Fixation	3-0
BT 711	Fungal Biotechnology	3-0
BOT 501	Biotechnological Aspect of Allelopathy	3-0
BT 629	Proteomics	3-0

LIST OF ELECTIVES COURSES (SELECT ANY ONE IN EACH SEMESTER)

Course Code	Course Title	Cr. Hrs.
MA 534	Biostatistics	3-0
MB 527	Clinical Microbiology	3-0
MB 530	Food Microbiology	3-0
MB 538	Fermentation Technology	3-0
MB 605	Microbial Physiology	3-0
MB 612	Industrial Microbiology	3-0
MB 620	Metabolic Engineering	3-0
BIO 637	Molecular Cancer Biology	3-0
MB 640	Vaccinology	3-0
MB 643	Current trends in Microbiology	3-0
MB 644	Molecular Biology of Gene Expression	3-0
MB 645	Epidemiology: An Analytical and Experimental Approaches	3-0

Course Code	Course Title	Cr. Hrs.
MB 647	Management of Infectious Waste	3-0
MB 649	Mycotic Infection	3-0
MB 651	Diagnostic Chemistry for Microbial Diseases	3-0
MB 653	Environment Microbiology & Public Health	3-0
MB 655	Advances in Soil Microbiology	3-0
MB 657	Veterinary Microbiology	3-0
MB 659	Microbial Human Diseases	3-0
MB 662	Current Trends in Molecular Medicine	3-0
MB 664	Microbial Plant Diseases	3-0
MB 665	E. Coli Genetics	3-0
MB 666	Microbial Biofilm	3-0
MB 667	Extremophiles	3-0

Master of Philosophy in Biotechnology

Program Code	113	Minimum Duration	4 Semesters, 2 Years
Number Of Courses	9+ Research Thesis	Maximum Duration	8 Semesters, 4 Years
Credit Hours	32	Minimum CGPA Required To Earn Degree	2.50

PROGRAM OBJECTIVES:

- To provide scholars with a solid foundation in the rapidly expanding field of Biotechnology.
- To provide scholars with knowledge, understanding of current theories, concepts and laboratory practices in biotechnology.
- Microbial Enzymes, Biosurfactants, Fermentation Biotechnology, Forensic Biotechnology and Diagnostics etc.
- To spread general awareness regarding utilization of biotechnology in different sectors of society and R&D organization.
- To promote and facilitate applications of biotechnology at gross-root level to strengthen the national economy.
- To enhance at national and international level the skills and capabilities of the graduates through participation in seminars, symposia and workshops.

ELIGIBILITY :

Candidate having 16 years of education in relevant field with 2.00 CGPA on the scale of 4.00 in semester system or at least 50% marks in annual system from any recognized institute/university is eligible to apply.

Applicant needs to pass GAT (General) to be conducted by NTS/ETEA/any Registered Testing Agency or University, with at least 50% cumulative score and to clear departmental interview at the time of admission.

PROGRAM OUTCOMES:

After completion of M.Phil program in Biotechnology, graduates will be able to:

- Envisage local and national problems pertaining to Biotechnology and design and undertake independent research to find solutions.
- Strengthen the theoretical & practical foundation of our graduates through state of the art lab and course work.
- Handle and manipulate biotechnology for the benefit of mankind.
- Write and review research and communicate with peers in the field.
- To promote and facilitate applications of biotechnology at gross-root level to strengthen the national economy.
- The Successful Graduates will prove to be good researchers.

SEMESTER 1

Course Code	Course Title	Cr. Hrs. 12
	Core Course I	3-0
	Core Course II	3-0
	Core Course III	3-0
	Elective I	3-0

SEMESTER 2

Course Code	Course Title	Cr. Hrs. 12
	Core Course IV	3-0
	Core Course V	3-0
	Core Course VI	3-0
	Elective II	3-0

SEMESTER 3

Course Code	Course Title	Cr. Hrs. 2
RES 581	Research Methodology	2-0

SEMESTER 4

Course Code	Course Title	Cr. Hrs. 6
RES 690	Research Thesis	0-6

LIST OF CORE COURSES (SELECT ANY SIX COURSES):

Course Code	Course Title	Cr. Hrs.
BIO 525	Cell and Molecular Biology	3-0
BT 501	Recombinant DNA Technology	3-0
BT 505	Plant Biotechnology	3-0
BT 509	Microbial Biotechnology	3-0
BT 517	Techniques in Biotechnology	3-0
BT 521	Gene Expression and Regulation	3-0
BT 525	Current Trends in Biotechnology	3-0
BT 601	Medical Biotechnology	3-0
BT 604	Food Biotechnology	3-0
BT 607	Forensic Biotechnology	3-0
BT 609	Environmental Biotechnology	3-0
BT 616	Principles of Gene Manipulations	3-0
BT 619	Biosafety and Risk Management	3-0
BT 623	Biological Sequence Analysis and Structural Bioinformatics	3-0
RES 511	Research Planning and Scientific Writing	3-0

LIST OF ELECTIVES COURSES (SELECT ANY ONE IN EACH SEMESTER)

Course Code	Course Title	Cr. Hrs.
MA 534	Biostatistics	3-0
BT 530	Molecular Immunology	3-0
BT 535	General Virology	3-0
BT 540	Bioprocess Technology	3-0
BT 543	Current Trends in Molecular Medicine	3-0
BT 549	Cell Signaling	3-0
BT 627	Genomics	3-0
BT 629	Proteomics	3-0
BT 631	Tissue Engineering	3-0
BT 635	Fundamentals of Biotechnology	3-0
BT 639	Gene Therapy	3-0
BT 640	Dermatogenetics	3-0
BT 641	Microbial Enzyme Technology	3-0
BT 642	Advances in Medical Microbiology	3-0
BT 644	Biodegradation and Bioremediation	3-0
BT 646	Molecular Plant Virology	3-0
BT 650	Molecular Mechanism of Pathogenesis	3-0
BOT 501	Biotechnological Aspect of Allelopathy	3-0
BT 660	Mushroom Culturing as Novel Commercial Crop	3-0
BT 661	Molecular Diagnostics	3-0
BT 662	Biological Nitrogen Fixation	3-0
BT 663	Dairy Technology	3-0
BT 664	Vaccines	3-0
BT 666	Stem Cells and Therapeutic Medicine	3-0
BT 667	Molecular Biology	3-0
BT 669	Biosensors	3-0
BT 671	Hospital Waste Management	3-0
BT 672	Water and Waste Water Treatment	3-0
BT 673	Biochemistry of Nucleic Acid	3-0
BT 674	Epigenetics	3-0
BT 675	Bioinformatics & Protein Structure & Function	3-0
BT 677	Plasmids, Episomes & Insertion Sequences	3-0
BT 678	Biofuels and Biorefineries	3-0

Master of Philosophy in Botnay

Program Code	165	Minimum Duration	4 Semesters, 2 Years
Number Of Courses	9+ Research Thesis	Maximum Duration	8 Semesters, 4 Years
Credit Hours	32	Minimum CGPA Required To Earn Degree	2.50

PROGRAM OBJECTIVES:

The graduates will have solid foundation in the field of Botany. They will be able to explore the role of plants in human welfare in services like biomass, enzymes, medicinal chemicals, ethnobotany and conservation of resources. The students will be equipped with the techniques in different disciplines such as Taxonomy, Ecology, Phycology, Mycology, Resource & conservation management, Genetics, Soil-plant and Soil-Microbe interaction and Environmental health and Biology..

ELIGIBILITY :

Candidate having 16 years of education in relevant field with 2.00 CGPA on the scale of 4.00 in semester system or at least 50% marks in annual system from any recognized institute/university is eligible to apply.

Applicant needs to pass GAT (General) to be conducted by NTS/ETEA/any Registered Testing Agency or University, with at least 50% cumulative score and to clear departmental interview at the time of Admission.

PROGRAM OUTCOMES:

After completion of M.Phil program in Botany, graduates will be able to:

- Envisage local and national problems pertaining to plant sciences and design and undertake independent research to find solutions.
- Strengthen the theoretical & practical foundation of our graduates through state of the art course and lab work.
- Handle, preserve and manipulate medicinal plant resources for the benefit of mankind.
- To promote and facilitate applications of botanical knowledge at gross-root level to strengthen the biodiversity and national economy.

SEMESTER 1

Course Code	Course Title	Cr. Hrs. 12
	Core Course I	3-0
	Core Course II	3-0
	Core Course III	3-0
	Elective I	3-0

SEMESTER 2

Course Code	Course Title	Cr. Hrs. 12
	Core Course IV	3-0
	Core Course V	3-0
	Core Course VI	3-0
	Elective II	3-0

SEMESTER 3

Course Code	Course Title	Cr. Hrs. 2
RES 581	Research Methodology	2-0

SEMESTER 4

Course Code	Course Title	Cr. Hrs. 6
RES 690	Research Thesis	0-6

LIST OF CORE COURSES (SELECT ANY SIX COURSES):

Course Code	Course Title	Cr. Hrs.
BOT501	Biotechnological aspect of Allelopathy	3-0
BOT503	Edaphology	3-0
BOT507	Vegetation Resources of Pakistan	3-0
BOT509	Natural Resource management	3-0
BOT511	Advances in Pharmacognosy	3-0
BOT513	Limnology of Freshwater Bodies	3-0
BOT515	Taxonomy and ecology of Freshwater algae	3-0
BOT517	Soil Algae and its importance	3-0
BOT519	Biostatistics and its Applications	3-0
BOT521	Advances in Plant Physiology	3-0

Course Code	Course Title	Cr. Hrs.
BOT602	Ecophysiology of Plants under Stress	3-0
BOT604	Advances in Biodiversity and Conservation	3-0
BOT608	Biological Nitrogen Fixation	3-0
BOT610	Plant Propagation Technology	3-0
BT629	Proteomics	3-0

LIST OF ELECTIVES COURSES (SELECT ANY ONE IN EACH SEMESTER)

Course Code	Course Title	Cr. Hrs.
BOT600	Recombinant DNA Technology	3-0
BOT606	Techniques in Molecular Biology	3-0
BOT612	Cyanophyta and its Importance	3-0
BOT614	Plant Microbe Interaction	3-0
BOT616	Mycorrhizae and Plant interaction	3-0
BOT618	Environmental Toxicology	3-0
BOT620	Air Pollution	3-0
BOT622	Phycological Research Techniques	3-0
BOT624	Diseases of important vegetables	3-0
BOT626	Economic Botany	3-0
BOT628	Gymnosperms of Pakistan	3-0
BOT630	Plant Propagation and Conservation	3-0

Course Code	Course Title	Cr. Hrs.
BOT632	Stress Physiology	3-0
BOT634	Plant Tissue Culture	3-0
BOT636	Plant Virology	3-0
BOT638	Plant Bacteriology	3-0
BOT640	Phytosociological Techniques and their Analysis	3-0
BOT642	Taxonomy, Ecology and Importance of Quranic Plants	3-0
BOT644	Flora and Ecology of Alpine Ecosystems of Pakistan	3-0
BOT646	The Art of Making Bonsai Plants	3-0

Doctor of Philosophy in Microbiology

Program Code	160	Minimum Duration	6 Semesters, 3 Years
Number Of Courses	6+ Dissertation	Maximum Duration	16 Semesters, 8 Years
Credit Hours	54	Minimum CGPA Required To Earn Degree	3.00

PROGRAM OBJECTIVES:

The curriculum designed for Ph.D in Microbiology offers extensive training that will equip the graduates to meet the challenges with the issues for board spectrum of areas of Microbiology such as health, food, poultry, agricultural, environmental and industrial avenues. These skilled graduates will play a vital role in the uplift of national economic growth of the country. The program will also create awareness about the role of microbiology in improving socio-economic uplift of the country and make liaison between microbiologists with society and industry.

ELIGIBILITY :

Candidate having 18 years of education in relevant field with 3.00 CGPA on the scale of 4.0 in semester system or at least 60% marks in annual system from any recognized institute/university is eligible to apply.

Applicant needs to pass GAT (Subject) to be conducted by NTS/ETEA/any registered Testing Agency or University with at least 60% cumulative score and to clear Departmental interview at the time of admission.

Candidates who have done MS without Research thesis may be considered for admission in the PhD program provided they have one published paper in an HEC recognized journal as a principal author.

PROGRAM OUTCOMES:

- Graduates after successful completion of PhD will be able to critically analyze problems related to environment, health, agriculture and industry and devise innovative solutions through microbiological interventions.
- The graduates will be able to effectively communicate with scientific community seminars, conferences, workshops, publications in national and international forms.
- This program will produce skilled researchers in the field of microbiology for serving the academia, industry and research organizations at national and international level.

SEMESTER 1

Course Code	Course Title	Cr. Hrs. 9
	Core Course I	3-0
	Core Course II	3-0
	Elective I	3-0

SEMESTER 2

Course Code	Course Title	Cr. Hrs. 9
	Core Course III	3-0
	Core Course IV	3-0
	Elective - II	3-0

SEMESTER THREE AND ONWARDS : RES 900 DISSERTATION 0-9

- Course will be selected from the given list of approved courses in consultation with the Research Advisor.
- The Research Advisor may direct the scholar to register for additional courses related to the area of research.
- Scholar will submit his research proposal through GSC for approval from BOASAR.
- The scholar shall be required to publish a research paper from his dissertation in an HEC recognized journal before the public defense of the PhD dissertation.
- University Rules and Regulations for Post Graduate Degrees will be applicable.

  * HEC quality criteria are applicable.

LIST OF CORE COURSES (SELECT ANY FOUR COURSES):

Course Code	Course Title	Cr. Hrs.
MB 700	Fermentation Technology	3-0
MB 703	Virology	3-0
MB 705	Soil and Agriculture Microbiology	3-0
MB 707	Chromosomal Abnormalities and Genetic Counselling	3-0
MB 709	Microbiology and Environmental Hazards	3-0
MB 711	Probiotics	3-0
MB 713	Biodegradation & Bioremediation	3-0
MB 715	Microbes and Nervous System	3-0
MB 717	Plant Virology	3-0
MB 719	Advances in Microscopy and Image Analysis	3-0
BT 715	Algal Biotechnology	3-0
RES900	Dissertation	0-9

LIST OF ELECTIVES COURSES (SELECT ANY TWO COURSES):

Course Code	Course Title	Cr. Hrs.
MA 800	Biostatics	3-0
MB 802	Microbial Diversity	3-0
MB 804	Clinical Microbiology	3-0
MB 805	Food Microbiology	3-0
MB 806	Fermentation Technology	3-0
MB 808	Microbial Physiology	3-0
MB 810	Industrial Microbiology	3-0
MB 812	Metabolic Engineering	3-0
MB 814	Molecular Cancer Biology	3-0
MB 816	Vaccinology	3-0
MB 818	Current Trend in Microbiology	3-0
MB 820	Epidemiology: Analytical and Experimental Approaches	3-0
MB 822	Management of Infectious Wastes	3-0
MB 824	Mycotic Infection	3-0
MB 826	Diagnostics Chemistry for Microbial Diseases	3-0
MB 828	Environmental Microbiology & Public Health	3-0
MB 830	Advances in Soil Microbiology	3-0
MB 832	Veterinary Microbiology	3-0
MB 834	Microbial Plant Diseases	3-0
BOT501	Biotechnological Aspect of Allelopathy	3-0

Doctor of Philosophy in Biotechnology

Program Code	161	Minimum Duration	6 Semesters, 3 Years
Number Of Courses	6+ Dissertation	Maximum Duration	16 Semesters, 8 Years
Credit Hours	54	Minimum CGPA Required To Earn Degree	3.00

PROGRAM OBJECTIVES:

- To provide scholars with a solid foundation in the rapidly expanding field of biotechnology.
- To provide scholars with knowledge, understanding of current theories, concepts and laboratory practices in biotechnology.
- To offer opportunity to the prospective scholars to carry out research in areas such as, Nano-biotechnology, Biodegradation, Microbial Enzymes, Biosurfactants, Fermentation Biotechnology, Forensic Biotechnology & diagnostics etc.
- To spread general awareness regarding utilization of biotechnology in different sectors of society and R&D organizations.

ELIGIBILITY :

Candidate having 18 years of education in relevant field with 3.00 CGPA on the scale of 4.00 in semester system or at least 60% marks in annual system from any recognized institute/university is eligible to apply.

Applicant needs to pass GAT (Subject) to be conducted by NTS/ETEA/any registered Testing Agency or University with at least 60% cumulative score and to clear Departmental interview at the time of admission.

Candidates who have done MS without Research thesis may be considered for admission in the PhD program provided they have one published paper in an HEC recognized journal as a principal author.

PROGRAM OUTCOMES:

- Graduates after successful completion of PhD will be able to critically analyze problems related to environment, health, agriculture and industry and devise innovative solutions through biotechnological interventions.
- The graduates will be able to effectively communicate science orally in seminars & conferences and through publication in reputable national and international journals.
- This program will produce skilled researchers in the field of biotechnology for serving in academia, industry and research organizations.
- They will be capable to teach, supervise and develop novel techniques.

SEMESTER 1

Course Code	Course Title	Cr. Hrs. 9
	Core Course I	3-0
	Core Course II	3-0
	Elective I	3-0

SEMESTER 2

Course Code	Course Title	Cr. Hrs. 9
	Core Course III	3-0
	Core Course IV	3-0
	Elective - II	3-0

SEMESTER THREE AND ONWARDS : RES 900 DISSERTATION 0-9

- Course will be selected from the given list of approved courses in consultation with the Research Advisor.
- The Research Advisor may direct the scholar to register for additional courses related to the area of research.
- Scholar will submit his research proposal through GSC for approval from BOASAR.
- The scholar shall be required to publish a research paper from his dissertation in an HEC recognized journal before the public defense of the PhD dissertation.
- University Rules and Regulations for Post Graduate Degrees will be applicable.

* HEC quality criteria are applicable.

LIST OF CORE COURSES (SELECT ANY FOUR COURSES):

Course Code	Course Title	Cr. Hrs.
BT 700	Fermentation Biotechnology	3-0
BT 703	Animal Cell and Tissue Culture	3-0
BT 705	Methods in Molecular Diagnostics	3-0
BT 707	Biofuels and biorefineries	3-0
BT 709	Pharmaceutical Biotechnology	3-0
BT 711	Fungal Biotechnology	3-0
BT 713	Mycorrhizal Biotechnology	3-0
BT 715	Algal Biotechnology	3-0
BT 717	Animal Biotechnology	3-0
BT 719	Phytoremediation and Bioremediation Technology	3-0
MB 711	Probiotics	3-0

LIST OF ELECTIVES (SELECT ANY TWO COURSES):

Course Code	Course Title	Cr. Hrs.
BT 821	Biosensors	3-0
BT 823	Hospital Waste Management	3-0
BT 825	Water and Waste Water Treatment	3-0
BT 827	Biochemistry of Nucleic Acid	3-0
BT 829	Epigenetics	3-0
BT 831	Bioinformatics and Protein Structure/Function	3-0
BT 833	Microbial Enzyme Technology	3-0
BT 835	Plasmids, Episomes and Insertion Sequences	3-0
BT 800	Molecular Immunology	3-0
BT 802	General Virology	3-0
BT 804	Bioprocess Technology	3-0
BT 805	Current Trends in Molecular Medicine	3-0
BT 806	Cell Signaling	3-0
BT 808	Genomics	3-0
BT 810	Proteomics	3-0
BT 812	Tissue Engineering	3-0
BT 814	Fundamentals of Biotechnology	3-0
BT 816	Gene Therapy	3-0
BT 819	Dermatogenetics	3-0
BOT 501	Biotechnological Aspect of Allelopathy	3-0