

SYLLABUS FOR BS BIOINFORMATICS
(4-YEAR DEGREE PROGRAMME)

COURSE BREAKUP

Course Code	Course Title	Credit Hrs.
Semester-I		
BNB-301	Cell Biology	3(2-1)
BNB-303	Fundamentals of Genetics	4(3-1)
BNB-305	General Chemistry	3(3-0)
CSI-321	Introduction to Computing Applications	3(3-0)
ENG-321	Functional English	3(3-0)
MTH-321	Mathematics-I	3(3-0)
Semester Credit Hours		19
Semester-II		
BNB-302	Molecular Biology	4(3-1)
BIN-304	Elementary Biochemistry	3(2-1)
CSI-322	Introduction to Computer Programming	4(3-1)
ENG-322	English Comprehension and Composition	3(3-0)
ISL-321	Islamic Studies / Ethics	2(2-0)
MTH-322	Mathematics-II	3(3-0)
Semester Credit Hours		19
Semester-III		
BNB-401	Fundamentals of Microbiology	4(3-1)
BNB-403	Molecular Genetics	3(2-1)
BNB-405	Introduction to Biotechnology	3(2-1)
CSI-421	Data Structure and Algorithms	4(3-1)
MTH-423	Differential Equations and Transforms	3(3-0)
PST-321	Pakistan Studies	2(2-0)
Semester Credit Hours		19
Semester-IV		
BNB-402	Bioinformatics-I	4(3-1)
BNB-404	Molecular Evolution	3(3-0)
BNB-406	Biostatistics	4(3-1)
BIN-408	Applications of Biotechnology	2(2-0)
CSI-422	Object Oriented Programming	4(3-1)
MTH-424	Linear Algebra	3(3-0)
Semester Credit Hours		20

Semester-V		
BIN-501	Bioinformatics-II	4(3-1)
BIN-503	Essential Techniques in Biotechnology and Molecular Biology	2(0-2)
CSI-521	Database Management Systems	4(3-1)
CSI-523	Discrete Structures	2(2-0)
CSI-525	Information Modeling	3(3-0)
MTH-521	Discrete Mathematics	3(3-0)
Semester Credit Hours		18
Semester-VI		
BNB-502	Proteomics	3(2-1)
BNB-504	Genomics	3(3-0)
BIN-506	Bioinformatics-III	4(3-1)
BIN-508	Social, Ethical and Legal Issues in Bioinformatics	2(2-0)
CSI-522	Bioinformatics Software Development-I	3(1-2)
CSI-524	Computer Graphics and Visualization	3(2-1)
Semester Credit Hours		18
Semester-VII		
BIN-601	Advance Bioinformatics	3(2-1)
BIN-603	Bioinformatics Scripting	3(2-1)
BIN-605	Modeling and Simulations	3(2-1)
CSI-621	Bioinformatics Software Development-II	3(1-2)
CSI-623	Artificial Intelligence	2(2-0)
MIC-401	Immunology	3(3-0)
Semester Credit Hours		17
Semester-VIII		
BNB-602	Research Methodologies	3(0-3)
BNB-604	Recent Trends in Biotechnology and Bioinformatics	3(3-0)
OR		
BNB-631	Project	6(0-6)
Semester Credit Hours		06
Total Credit Hours = 136		

SYLLABUS FOR BS BIOTECHNOLOGY
(4-YEAR DEGREE PROGRAMME)

COURSE BREAKUP

Course Code	Course Title	Credit Hrs.
Semester-I		
BNB-301	Cell Biology	3(2-1)
BNB-303	Fundamentals of Genetics	4(3-1)
BNB-305	General Chemistry	3(3-0)
CSI-321	Introduction to Computing Applications	3(3-0)
ENG-321	Functional English	3(3-0)
MTH-321	Mathematics-I	3(3-0)
Semester Credit Hours		19
Semester-II		
BNB-302	Molecular Biology	4(3-1)
BIT-304	Physical Biology	3(3-0)
BIT-306	Biodiversity and Systematics	3(3-0)
BCH-322	Biochemistry-I	3(2-1)
ENG-322	English Comprehension and Composition	3(3-0)
ISL-321	Islamic Studies/Ethics	2(2-0)
Semester Credit Hours		18
Semester-III		
BNB-401	Fundamentals of Microbiology	4(3-1)
BNB-403	Molecular Genetics	4(3-1)
BNB-405	Introduction to Biotechnology	3(2-1)
BIT-407	Molecular Pathology	3(3-0)
BCH-421	Biochemistry-II	3(2-1)
PST-321	Pakistan Studies	2(2-0)
Semester Credit Hours		19
Semester-IV		
BNB-404	Molecular Evolution	3(3-0)
BNB-406	Biostatistics	4(3-1)
BIT-402	Bioinformatics for Biotechnologists	4(3-1)
BIT-408	Biosafety	2(2-0)
BIT-410	Cell and Tissue Culture	3(2-1)
BIT-412	Microbial Biotechnology	3(2-1)
Semester Credit Hours		19

Semester-V		
BIT-501	Sequence Analysis, Alignment and Phylogenetics	4(3-1)
BIT-503	Recombinant DNA Technology	4(3-1)
BIT-505	General Virology	3(3-0)
BIT-507	Techniques in Biotechnology	3(2-1)
BIT-509	Health Biotechnology	3(3-0)
BIT-511	Forensic Serology and DNA Typing	3(3-0)
Semester Credit Hours		20
Semester-VI		
BNB-502	Proteomics	3(2-1)
BNB-504	Genomics	3(3-0)
BIT-502	Nanobiotechnology	3(3-0)
BIT-504	Agriculture Biotechnology	3(2-1)
BIT-506	Social, Ethical and Legal Aspects of Biotechnology	3(3-0)
BIT-508	Animal Biotechnology	3(3-0)
Semester Credit Hours		18
Semester-VII		
BIT-601	Cell Signaling	3(3-0)
BIT-603	Industrial Biotechnology	3(2-1)
BIT-605	Food and Bioprocess Technology	3(2-1)
BIT-607	Literature Survey and Research Project Management	2(2-0)
BIT-609	Environmental Biotechnology	3(3-0)
MIC-401	Immunology	3(3-0)
Semester Credit Hours		17
Semester-VIII		
BNB-602	Research Methodologies	3(0-3)
BNB-604	Recent Trends in Biotechnology and Bioinformatics	3(3-0)
OR		
BNB-631	Project	6(0-6)
Semester Credit Hours		06
Total Credit Hours = 136		

SYLLABUS FOR MSc BIOTECHNOLOGY
(2-YEAR DEGREE PROGRAMME)

Course Code	Course Title	Credit Hrs.
Semester-I		
BIT-551	Cell Biology	3(2-1)
BIT-553	Molecular Genetics	3(2-1)
BIT-555	Molecular Biology	3(3-0)
BIT-557	General Chemistry	3(3-0)
BIT-559	Introduction to Biotechnology	3(3-0)
ENG-321	Functional English	3(3-0)
Semester Credit Hours		18
Semester-II		
BIT-552	Biochemistry	3(3-0)
BIT-554	Fundamentals of Microbiology	3(2-1)
BIT-556	Immunology	3(3-0)
BIT-558	Recombinant DNA Technology	3(2-1)
BIT-560	Bioinformatics	3(2-1)
BIT-562	Statistical Methods in Biotechnology	3(2-1)
Semester Credit Hours		18
Semester-III		
BIT-651	Molecular Evolution	3(3-0)
BIT-653	Techniques in Biochemistry and Biotechnology	3(1-2)
BIT-655	General Virology	3(3-0)
BIT-657	Proteomics	3(2-1)
BIT-659	Industrial and Environmental Biotechnology	3(3-0)
BIT-661	Agriculture Biotechnology	3(2-1)
Semester Credit Hours		18
Semester-IV		
BIT-652	Genomics	3(3-0)
BIT-654	Medical Biotechnology	3(3-0)
BIT-656	Research Methodologies	3(0-3)
BIT-658	Recent Trends in Biotechnology	3(3-0)
	OR	
BIT-681	Project	6(0-6)
Semester Credit Hours		12
Total Credit Hours = 66		

SYLLABUS FOR MS BIOINFORMATICS
(2-YEAR DEGREE PROGRAMME)

Course Code	Course Title	Credit Hrs.
Semester-I		
BIN-701	Advances in Molecular Biology	3(3-0)
BIN-703	Advances in Bioinformatics	3(2-1)
BIN-705	Artificial Intelligence	3(2-1)
BIN-707	Information Retrieval and Processing	3(2-1)
Semester Credit Hours		12
Semester-II		
	Specialization-I	3
	Specialization-II	3
	Elective-I	3
	Elective-II	3
Semester Credit Hours		12
Semester-III		
BIN-728	Seminar (General)	1(0-1)
BIN-729	Seminar (Research)	1(0-1)
BIN-730	Thesis/Dissertation	6(0-6)
Semester Credit Hours		08
Semester-IV		
BIN-730	Thesis/Dissertation	6(0-6)
Semester Credit Hours		06
Total Credit Hours = 38		

SPECIALIZATION TRACK COURSES

Course Code	Course Title	Credit Hrs.
BIN-702	Statistical Methods for Computational Biology	3(3-0)
BIN-704	Advances in Computational Algorithms	3(2-1)
BIN-706	Advances in Software Engineering	3(1-2)
BIN-708	Research Methods in Biological Sciences	3(3-0)
BIN-710	Advances in Genomics and Proteomics	3(3-0)

ELECTIVE COURSES

Course Code	Course Title	Credit Hrs.
BIN-732	Modern Techniques in Molecular Biology	3(2-1)
BIN-734	Metabolomics	3(3-0)
BIN-736	DNA Microarrays and Integrative Genetics	3(3-0)
BIN-738	Nanotechnology	3(3-0)

SYLLABUS FOR MS BIOTECHNOLOGY (2-YEAR DEGREE PROGRAMME)

COURSE BREAKUP

Course Code	Course Title	Credit Hrs.
Semester-I		
BIT-701	Modern Biotechnology: Principles and Applications	3(3-0)
BIT-703	Genetic Engineering	3(3-0)
BIT-705	Cell and Molecular Biology	3(3-0)
BIT-707	Molecular Data Analyses	3(3-0)
Semester Credit Hours		12
Semester-II		
BIT-702	Techniques in Biotechnology	3(3-0)
BIT-704	Bioresource Technology	3(3-0)
	Elective-I	3(3-0)
	Elective-II	3(3-0)
Semester Credit Hours		12
Semester-III		
BIT-728	Seminar (General)	1(0-1)
BIT-729	Seminar (Research)	1(0-1)
BIT-730	Thesis/Dissertation	6(0-6)
Semester Credit Hours		08
Semester-IV		
BIT-730	Thesis/Dissertation	6(0-6)
Semester Credit Hours		06
Total Credit Hours = 38		

ELECTIVE-1 COURSES

Course Code	Course Title	Credit Hrs.
BIT-706	Molecular Virology	3(3-0)
BIT-708	Plant Molecular Physiology	3(3-0)
BIT-710	Protein Engineering and Enzyme Technology	3(3-0)
BIT-712	Plant-Microbe Interaction	3(3-0)
BIT-714	Molecular Pathology	3(3-0)

ELECTIVE -2 COURSES

Course Code	Course Title	Credit Hrs.
BIT-716	Stem Cell Technology	3(3-0)
BIT-718	Medical Biotechnology	3(3-0)
BIT-720	Plant Biotechnology	3(3-0)
BIT-722	Metabolic Engineering and Biofuels	3(3-0)
BIT-724	Advances in Environmental Biotechnology	3(3-0)

SYLLABUS FOR PhD BIOTECHNOLOGY

(4 to 8-YEAR DEGREE PROGRAMME)

COURSE BREAKUP

Course Code	Course Title	Credit Hrs.
Semester-I		
BIT-781	Recent Trends in Biotechnology	3(3-0)
BIT-783	Advances in Cell and Molecular Biology	3(3-0)
	Elective	3
Semester Credit Hours		9
Semester-II		
BIT-782	Project Planning, Maintenance and Evaluation	3(3-0)
BIT-784	Methods in Biotechnology Research	3(3-0)
	Elective	3
Semester Credit Hours		9
Semester-III		
BIT-758	Seminar (General)	1(0-1)
BIT-759	Seminar (Research)	1(0-1)
BIT-760	Thesis/Dissertation	
Semester-IV to VI		
BIT-760	Thesis/Dissertation	
Total Credit Hours = 20 + Thesis		

ELECTIVE COURSES

Course Code	Course Title	Credit Hrs.
BIT-785	Industrial Microbiology and Biotechnology	3(3-0)
BIT-786	Advances in Medical Biotechnology	3(3-0)
BIT-787	Environmental Biotechnology	3(3-0)
BIT-788	Bio-Energy	3(3-0)
BIT-789	Advances in Plant Biotechnology	3(3-0)
BIT-790	Advances in Food Biotechnology	3(3-0)
BIT-791	Advances in Virology	3(3-0)
BIT-792	Advances in Immunology	3(3-0)
BIT-793	Molecular Toxicology	3(3-0)

DEFICIENCY COURSES

Course Code	Course Title	Credit Hrs.
BIT-795	Cell and Tissue Culture Technology	3(3-0)
BIT-796	Methods in Industrial Biotechnology	3(3-0)

NOTE:

- Candidates for Ph.D in Biotechnology admission must have first class MS/M.Phil degree or equivalent in life sciences. All the students have to take a deficiency of two courses (Cell and Tissue Culture Technology & Methods in Industrial Biotechnology) except those with MS/M.Phil in Biotechnology, Biochemistry or Molecular Biology.
- Admission criteria and degree requirements are as per HEC rules.

