Annexure – A

Proposed Scheme of Studies for BS in Computer Science (Fall-2020—Spring-2024)

Structure of BS (CS) Program

Areas BS CS Course Group	Credit hours	*Covered in program*
General Education	16	
University Electives	09	
Mathematics & Science Foundation	12	
Computing – Core	39	
Common courses 76 CH (63-13)		
Domain (CS)		
Domain Core (CS)	24	
Domain Supporting (CS)	09	
Domain Electives (CS)	21	
Domain courses (54 CH)		
TOTAL	**130**	

- **General Education**

General Education Courses (Credit Hours: 16)				
#	Code	Course Title	Credit Hours	Proposed Semester
1	HUM-101	Islamic Studies/Ethics	2 (2 + 0)	Semester-I
2	HUM-102	Pakistan Studies	2 (2 + 0)	Semester-I
3	ENG-101	English Composition & Comprehension	3 (3 + 0)	Semester-I
4	ENG-150	Communication and Presentation Skills	3 (3 + 0)	Semester-II
5	ENG-201	Technical Writing	3 (3 + 0)	Semester-IV
6	CSC-101	Introduction to Information and Communication Technology (ICT)	3 (2 + 1)	Semester-I
		Total	**16**	

- **University Elective Courses**

University Elective Courses (Required Credit Hours: 09)		
#	Course Title	Credit Hours
1.	Principles of Management	3 (3 + 0)
2.	E-Business Management	3 (3 + 0)
3.	Technology Entrepreneurship	3 (3 + 0)
4.	Professional Practices	3 (3 + 0)
5.	Financial Accounting	3 (3 + 0)
6.	Research Methods in Computer Science	3 (3 + 0)
7.	Management Information Systems	3 (3 + 0)
8.	Organizational Behavior	3 (3 + 0)
9.	Human Resource Management	3 (3 + 0)
10.	Financial Accounting	3 (3 + 0)

University Elective Courses (Required Credit Hours: 09)		
11.	Financial Management	3 (3 + 0)
12.	Principles of Marketing	3 (3 + 0)
13.	Introduction to Economics	3 (3 + 0)
14.	Psychology	3 (3 + 0)
15.	International Relations	3 (3 + 0)
16.	Foreign/Regional Language (French, German, Sindhi, Punjabi, Urdu etc.)	3 (3 + 0)
17.	Philosophy	3 (3 + 0)
18.	System Analysis & Design	3 (3 + 0)

- **Mathematics and Science Foundation:**

Mathematics and Science Foundation Courses (Credit Hours: 12)				
#	Code	Course Title	Credit Hours	Proposed Semester
1	PHY-150	Applied Physics	3 (2 + 1)	Semester-II
2	MTS-150	Calculus and Analytic Geometry	3 (3 + 0)	Semester-II
3	MTS-250	Linear Algebra	3 (3 + 0)	Semester-IV
4	MTS-302	Probability and Statistics	3 (3 + 0)	Semester-V
5	MTS-101	Precalculus	Non-Credit	Semester-I
		Total	**12**	

- **Computing Core**

Computing Core Courses (Credit Hours: 39)				
#	Code	Course Title	Credit Hours	Proposed Semester
1	CSC-102	Programming Fundamentals	4 (3 + 1)	Semester-I
2	CSC-151	Discrete Structures	3 (3 + 0)	Semester-II
3	CSC-150	Object-Oriented Programming	4 (3 + 1)	Semester-II
4	CSC-201	Data Structures	4 (3 + 1)	Semester-III
5	SWE-201	Software Engineering	3 (3 + 0)	Semester-III
6	CSC-252	Operating Systems	4 (3 + 1)	Semester-IV
7	CSC-302	Computer Networks	4 (3 + 1)	Semester-V
8	CSC-251	Database Systems	4 (3 + 1)	Semester-IV
9	CSC-353	Information Security	3 (3 + 0)	Semester-VI
10	FYP-401	Project-I	3 (0 + 3)	Semester-VII
11	FYP-451	Project-II	3 (0 + 3)	Semester-VIII
		Total	**39**	

- **Computer Science Core**

Computer Science Core Courses (Credit Hours: 24)				
#	Code	Course Title	Credit Hours	Proposed Semester
1	CSC-250	Computer Organization and Assembly Language	4 (3 + 1)	Semester-IV
2	CSC-352	Theory of Automata	3 (3 + 0)	Semester-VI
3	CSC-351	Design and Analysis of Algorithms	3 (3 + 0)	Semester-VI
4	CSC-350	Artificial Intelligence	4 (3 + 1)	Semester-VI
5	CSC-402	Compiler Construction	3 (3 + 0)	Semester-VII
6	ESE-201	Digital Logic Design	4 (3 + 1)	Semester-III
7	CSC-452	Parallel & Distributed Computing	3 (3 + 0)	Semester-VIII

Total	**24**	

- **Computer Science SUPPORTING**

Computer Science SUPPORTING Courses (Credit Hours: 09)				
#	Code	Course Title	Credit Hours	Proposed Semester
1	MTS-201	Multivariate Calculus	3 (3 + 0)	Semester-III
2	MTS-301	Differential Equations	3 (3+ 0)	Semester-V
3	CSC-403	Graph Theory	3 (3 + 0)	Semester-VI
		Total	**09**	

- **Computer Science Elective**

Computer Science ELECTIVE Courses (Required Credit Hours: 21)		
#	**Course Title**	**Credit Hours**
1	Numerical Computing	3 (3 + 0)
2	Computer Graphics and Animations	3 (2 + 1)
3	Software Project and Quality Management	3 (3 + 0)
4	Multimedia Technologies	3 (3 + 0)
5	Grid Computing	3 (3 + 0)
6	Broadband Communication Networks	3 (3 + 0)
7	Error Correction and Coding Techniques	3 (3 + 0)
8	Cloud Computing	3 (3 + 0)
9	Mobile Application Development	3 (2 + 1)

Computer Science ELECTIVE Courses (Required Credit Hours: 21)		
#	Course Title	Credit Hours
10	Emerging Trends in Computing	3 (3 + 0)
11	Independent Study	3 (3 + 0)
12	Soft Computing	3 (3 + 0)
13	Machine Learning	3 (3 + 0)
14	Scientific Computing	3 (3 + 0)
15	Digital Signal Processing	3 (3 + 0)
16	Computer Vision	3 (3 + 0)
17	Data and Network Security	3 (3 + 0)
18	Wireless Networks	3 (3 + 0)
19	Social Computing	3 (3 + 0)
20	Data Mining	***3 (3 + 0)***
21	Expert Systems	3 (3 + 0)
22	Artificial Neural Network	3 (3 + 0)
23	Fuzzy Logic	3 (3 + 0)
24	Computational Intelligence	3 (3 + 0)
25	Multi Agent System	3 (3 + 0)
26	Natural Language Processing	3 (3 + 0)
27	Game Development	3 (3 + 0)

Computer Science ELECTIVE Courses (Required Credit Hours: 21)		
#	**Course Title**	**Credit Hours**
28	Logical paradigms of computing	3 (3 + 0)
29	Formal Methods for Software Engineering	3 (3 + 0)
30	Visual Programming	3(2+1)
31	Software Verification and Validation	3 (3 + 0)
32	Web Engineering (CSC-352)	3 (2 + 1)
33	Network Security and Cryptography	3 (3 + 0)
34	Complex Networks	3 (3 + 0)
35	Information System Audit and Control	3 (3 + 0)
36	Object Oriented Analysis and Design	3 (2 + 1)
37	Big Data Analytics	3 (3 + 0)
38	Business Intelligence	3 (3 + 0)
39	Sensing Technologies	3 (3 + 0)
40	Introduction to Semantic Web	3 (3 + 0)
41	Social Network Analysis	3 (3 + 0)
42	Pervasive and Ubiquitous computing	3 (3 + 0)
43	Data Warehousing	3 (3 + 0)
44	Deep Learning	3 (3 + 0)
45	Blockchain	3 (3 + 0)

Computer Science ELECTIVE Courses (Required Credit Hours: 21)		
#	**Course Title**	**Credit Hours**
46	Software Design & Architecture	3 (3 + 0)
47	Human Computer Interaction	3 (3 + 0)

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DEPARTMENT OF COMPUTER SCIENCE

Study Schema of BS Computer Science Program

Semester Wise Study Plan - BS Computer Science

Semester I (Credit Hours: 14)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite
1	CSC-101	Introduction to Information and Communication Technology (ICT)	General Education 1	3 (2 + 1)	-NONE-
2	CSC-102	Programming Fundamentals	Computing Core 1	4 (3 + 1)	-NONE-
3	ENG-101	English Composition and Comprehension	General Education 2	3 (3 + 0)	-NONE-
4	MTS-101	Precalculus	Maths & Science 1	Non - Credit	-NONE-
5	HUM-101	Islamic Studies/Ethics	General Education 3	2 (2 + 0)	-NONE-
6	HUM-102	Pakistan Studies	General Education 4	2 (2 + 0)	-NONE-
			Total Credit Hours	**14**	

Semester II (Credit Hours: 16)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite	
					Code	Course
1	CSC-150	Object-Oriented Programming	Computing Core 2	4 (3 + 1)	CSC-102	Programming Fundamentals
2	MTS-150	Calculus and Analytic Geometry	Maths & Science 2	3 (3 + 0)	None	
3	ENG-150	Communication and Presentation Skills	General Education 5	3 (3 + 0)	None	
4	CSC-151	Discrete Structures	Computing Core 3	3 (3 + 0)	-NONE-	
5	PHY-150	Applied Physics	Maths & Science 3	3 (2 + 1)	-NONE-	
			Total Credit Hours	**16**		

Semester III (Credit Hours: 17)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite	
					Code	Course
1	CSC-201	Data Structures	Computing Core 4	4 (3 + 1)	CSC-102	Programming Fundamentals
2	ESE-201	Digital Logic Design	CS Core 1	4 (3 + 1)	-NONE	
3	MTS-201	Multivariate Calculus	CS Support 1	3 (3 + 0)	MTS-150	Calculus and Analytic Geometry
4	SWE-201	Software Engineering	Computing Core 5	3 (3 + 0)	-NONE-	
5	xxx-xxx	Uni – Elective – I	Uni – Elective 1	3 (3 + 0)	-NONE-	
Total Credit Hours				**17**		

Semester IV (Credit Hours: 18)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite	
					Code	Course
1	CSC-250	Computer Architecture & Assembly Language	CS Core 2	4 (3 + 1)	CSC-102	Programming Fundamentals
2	CSC-251	Database Systems	Computing core 6	4 (3 + 1)	-NONE-	
3	CSC-252	Operating Systems	Computing Core 7	4 (3 + 1)	-NONE-	
4	MTS-250	Linear Algebra	Maths & Science 4	3 (3+ 0)	NONE-	
5	ENG-201	Technical Writing	General Education 6	3 (3 + 0)	-NONE-	
Total Credit Hours				**18**		

Semester V (Credit Hours: 19)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite	
					Code	Course
1	xxx-xxx	CS Elective – I	CS Elective 1	3 (3 + 0)	-None-	
2	MTS-301	Differential Equations	CS Support 2	3 (3 + 0)	MTS-150	Calculus and Analytic Geometry
3	MTS-302	Probability and Statistics	Maths & Science 5	3 (3 + 0)	-NONE-	
4	xxx-xxx	Uni – Elective - II	Uni Elective 2	3 (3 + 0)	-NONE-	
5	CSC-301	Computer Networks	Computing Core 8	4 (3 + 1)	-NONE-	
6	xxx-xxx	CS – Elective II	CS Elective 2	3 (3 + 0)	-NONE-	
Total Credit Hours				**19**		

Semester VI (Credit Hours: 16)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite	
					Code	Course
1	CSC-350	Artificial Intelligence	CS Core 3	4 (3 + 1)	-NONE-	
2	CSC-351	Design and Analysis of Algorithms	CS Core 4	3 (3 + 0)	CSC-201	Data Structures
3	***CSC-353***	***Information Security***	***Computing Core 9***	***3 (3 + 0)***	***-NONE-***	
4	***CSC-352***	***Theory of Automata***	***CS Core 5***	***3 (3 + 0)***	***None***	
5	xxx-xxx	CS-Elective-IV	CS Elective 4	3 (3 + 0)	---	
Total Credit Hours				**16**		

Semester VII (Credit Hours: 15)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite	
					Code	Course
1	CSC-402	Compiler Construction	CS Core 6	3 (3 + 0)	CSC-352	Theory of Automata
2	xxx-xxx	CS-Elective-III	CS Elective 3	3 (3 + 0)	---	
3	xxx-xxx	Uni – Elective - III	Uni Elective 3	3 (3 + 0)	-NONE-	
4	CSC-403	Graph Theory	Computing Support 3	3 (3 + 0)	--	
5	FYP-401	Project-I	Computing Core 10	3 (0 + 3)	-NONE-	
Total Credit Hours				**15**		

Semester VIII (Credit Hours: 15)

#	Code	Course Name	Category	Credit Hours	Pre-Requisite	
					Code	Course
1	xxx-xxx	CS Elective-V	CS Elective 5	3 (3 + 0)	---	
2	xxx-xxx	CS Elective-VI	CS Elective 6	3 (3 + 0)	---	
3	xxx-xxx	CS-Elective-VII	CS Elective 7	3 (3 + 0)	--	
4	***CSC-450***	***Parallel & Distributed Computing (Cloud Computing)***	***CS Core 7***	***3 (3 + 0)***	CSC-252	Operating Systems
5	FYP-451	Project-II	Computing Core 11	3 (0 + 3)	FYP-401	
Total Credit Hours				**15**		