

Scheme of Study for PhD Computer Science

1-year Coursework (2 semesters)

#	Category	# of Courses	Credit Hours
1	Courses	6	18

Semester-I: (9 Credit Hours)

#	Course Code	Category	Course Title	Credit Hours	Prerequisites
1	CS 701	CS-Elec	CS-Elective-1	3 (3,0)	
2	CS 703	CS-Elec	CS-Elective-2	3 (3,0)	
3	CS 705	CS-Elec	CS-Elective-3	3 (3,0)	

Semester-II: (9 Credit Hours)

#	Course Code	Category	Course Title	Credit Hours	Prerequisites
1	CS 702	CS-Elec	CS-Elective-4	3 (3,0)	
2	CS 704	CS-Elec	CS-Elective-5	3 (3,0)	
3	CS 706	CS-Elec	CS-Elective-6	3 (3,0)	

A list of elective courses is given on the next pages.

The HEC and Bahauddin Zakariya University Rules and Regulations are to be followed regarding comprehensive exam after coursework, starting PhD research, thesis submission & evaluation, open defense and other formalities for the completion of degree.

Electives for PhD (CS)
(Extendable)

#	Category	Course Title	Credit Hours	Prerequisites
1	CS-Elec	Advanced Operating Systems	3 (3,0)	Operating Systems
2	CS-Elec	Research Methods	3 (3,0)	Probability & Statistics
3	CS-Elec	Advanced Computer Architecture	3 (3,0)	Computer Architecture
4	CS-Elec	Digital Signal Processing	3 (3,0)	Data Comm & Computer Networks
5	CS-Elec	Parallel and Distributed Computing	3 (3,0)	Data Comm & Computer Networks
6	CS-Elec	Control Systems and Robotics	3 (3,0)	Artificial Intelligence
7	CS-Elec	Real Time Operating Systems	3 (3,0)	Operating Systems
8	CS-Elec	Advanced Networking	3 (3,0)	Data Comm & Computer Networks
9	CS-Elec	Network Security	3 (3,0)	Data Comm & Computer Networks
10	CS-Elec	Topics in Computer Networking	3 (3,0)	Data Comm & Computer Networks
11	CS-Elec	Network Administration	3 (3,0)	Data Comm & Computer Networks
12	CS-Elec	Wireless Networks	3 (3,0)	Data Comm & Computer Networks
13	CS-Elec	Network Performance Evaluation	3 (3,0)	Data Comm & Computer Networks
14	CS-Elec	Theory of Programming Languages	3 (3,0)	Programming Fundamentals
15	CS-Elec	Advanced Compiler Design I	3 (3,0)	Compiler Construction
16	CS-Elec	Advanced Compiler Design II	3 (3,0)	Compiler Construction
17	CS-Elec	Intelligent User Interfaces	3 (3,0)	HCI
18	CS-Elec	Multimedia Databases	3 (3,0)	Database Systems
19	CS-Elec	Computer Vision	3 (3,0)	Data Structures & Algo.
20	CS-Elec	Rich Internet Applications	3 (3,0)	Programming Fundamentals
21	CS-Elec	Machine Learning	3 (3,0)	Artificial Intelligence
22	CS-Elec	Advanced Optimization Methods	3 (3,0)	Discrete Mathematics
23	CS-Elec	Robotics	3 (3,0)	Artificial Intelligence
24	CS-Elec	Intelligent Planning	3 (3,0)	Artificial Intelligence
25	CS-Elec	Fuzzy Systems	3 (3,0)	Discrete Mathematics
26	CS-Elec	Intelligent Probabilistic Data Modeling	3 (3,0)	Probability & Statistics
27	CS-Elec	Logic Programming and Automated Reasoning	3 (3,0)	Discrete Structures
28	CS-Elec	Evolutionary Computations/Algorithms	3 (3,0)	Data Structures & Algo.
29	CS-Elec	Visualization in Medicine	3 (3,0)	Probability & Statistics, Graph Theory

#	Category	Course Title	Credit Hours	Prerequisites
30	CS-Elec	Advanced Database Systems	3 (3,0)	Intro to Databases
30	CS-Elec	Distributed Databases	3 (3,0)	Intro to Databases
31	CS-Elec	Web Mining	3 (3,0)	
32	CS-Elec	Text Mining	3 (3,0)	
33	CS-Elec	Virtual & Augmented Reality Systems	3 (3,0)	
34	CS-Elec	Knowledge Management	3 (3,0)	Artificial Intelligence
35	CS-Elec	Decision Theory	3 (3,0)	Probability & Statistics
36	CS-Elec	Requirements Engineering	3 (3,0)	
37	CS-Elec	Software Quality Assurance	3 (3,0)	Intro to Software Engg.
38	CS-Elec	Software System Architecture	3 (3,0)	Intro to Software Engg.
39	CS-Elec	Software Risk Management	3 (3,0)	Intro to Software Engg.
40	CS-Elec	Software Measurement & Metrics	3 (3,0)	Intro to Software Engg.
41	CS-Elec	Software Configuration Management	3 (3,0)	Intro to Software Engg.
42	CS-Elec	Component-Based Software Engineering	3 (3,0)	Intro to Software Engg.
43	CS-Elec	Decision Patterns	3 (3,0)	
44	CS-Elec	Complex Networks	3 (3,0)	Data Comm. & Computer Networks
45	CS-Elec	Agent-Based Modeling	3 (3,0)	
46	CS-Elec	Information Security and Assurance	3 (3,0)	Data Comm. & Computer Networks
47	CS-Elec	Mobile and Wireless Networks	3 (3,0)	Data Comm. & Computer Networks
48	CS-Elec	Adv. Web Systems and Technologies	3 (3,0)	Web Engineering
49	CS-Elec	Information Technology Infrastructure	3 (3,0)	Data Comm. & Computer Networks
50	CS-Elec	Telecommunications Management	3 (3,0)	Data Comm. & Computer Networks
51	CS-Elec	Data Warehousing: Trends & Issues	3 (3,0)	Intro to Databases
52	CS-Elec	Data Mining: Trends & Issues	3 (3,0)	Intro to Databases
53	CS-Elec	Adv. Business Intelligence & Analytics	3 (3,0)	Data Mining
54	CS-Elec	Information Retrieval Systems	3 (3,0)	
55	CS-Elec	Cloud Computing	3 (3,0)	Operating Systems, Web systems & technologies
56	CS-Elec	Mobile and Pervasive Computing	3 (3,0)	Operating Systems, Web systems & technologies
57	CS-Elec	Enterprise Data Center: Design & Methodology	3 (3,0)	Intro to Databases
58	CS-Elec	Data Center Network Design, Implementation and Security	3 (3,0)	Intro to Databases
59	CS-Elec	Virtualized Data Center	3 (3,0)	Intro to Databases
60	CS-Elec	Integrated Services over Packet Networks	3 (3,0)	Data Comm. & Computer Networks

#	Category	Course Title	Credit Hours	Prerequisites
61	CS-Elec	Stochastic Systems	3 (3,0)	Probability & Statistics
62	CS-Elec	Stochastic Processes	3 (3,0)	Probability & Statistics
63	CS-Elec	Knowledge-Based Systems	3 (3,0)	Artificial Intelligence
64	CS-Elec	Advanced Telecommunication Networks	3 (3,0)	Data Comm. & Computer Networks
65	CS-Elec	Telecommunication Systems	3 (3,0)	Data Comm. & Computer Networks
66	CS-Elec	Principles of Multimedia Systems	3 (3,0)	
67	CS-Elec	Advanced Multimedia Systems	3 (3,0)	Principles of Multimedia Systems
68	CS-Elec	Principles of Soft Computing	3 (3,0)	Artificial Intelligence

The detailed course outline for the above courses is provided in the following document of the Higher Education Commission (HEC) of Pakistan.

“Curriculum of Computer Science, Information Technology, and Software Engineering BS/MS (Revised 2013)”