

**Scheme of Study for Master of Science in Computer Science MS (CS)**  
**2-year programme (4 semesters)**

#	Category	# of Courses	Credit Hours
<b>1</b>	<b>Computer Science Courses</b>	<b>8</b>	<b>24</b>
	CS Core Courses (CS-Core)	2	6
	CS Elective Courses (CS-Elec)	6	18
<b>2</b>	<b>Thesis</b>	<b>1</b>	<b>6</b>
	<b>Total</b>	<b>9</b>	<b>30</b>

**Semester-I: (9 Credit Hours)**

#	Course Code	Category	Course Title	Credit Hours	Prerequisites
1	CS 501	CS-Core	Advanced Theory of Computation	3 (3,0)	Theory of Automata
2	CS 503	CS-Core	Advanced Algorithm Analysis	3 (3,0)	Data Structures and Algorithms
3	CS 505	CS-Elec	CS Elective-1	3 (3,0)	

**Semester-II: (9 Credit Hours)**

#	Course Code	Category	Course Title	Credit Hours	Prerequisites
1	CS 502	CS-Elec	CS Elective-2	3	
2	CS 504	CS-Elec	CS Elective-3	3	
3	CS 506	CS-Elec	CS Elective-4	3	

**Semester-III: (9 Credit Hours)**

#	Course Code	Category	Course Title	Credit Hours	Prerequisites
1	CS 601	Thesis	Thesis (partial registration)	3 (0,3)	
2	CS 602	CS-Elec	CS Elective-5	3	
3	CS 603	CS-Elec	CS Elective-6	3	

**Semester-IV: (3 Credit Hours)**

#	Course Code	Category	Course Title	Credit Hours	Prerequisites
1	CS 601	Thesis	Thesis (full registration)	3 (0,3)	

**List of Electives for MS(CS)**  
(Extendable)

#	Category	Course Title	Cr Hrs	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 & Comp Networks
5	CS-Elec	Parallel and Distributed Computing	3 (3,0)	Data Comm & Comp 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 & Comp Networks
9	CS-Elec	Network Security	3 (3,0)	Data Comm & Comp Networks
10	CS-Elec	Topics in Computer Networking	3 (3,0)	Data Comm & Comp Networks
11	CS-Elec	Network Administration	3 (3,0)	Data Comm & Comp Networks
12	CS-Elec	Wireless Networks	3 (3,0)	Data Comm & Comp Networks
13	CS-Elec	Network Performance Evaluation	3 (3,0)	Data Comm & Comp 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 & Algorithms
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 Structures
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 & 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
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)	Intro to Databases
32	CS-Elec	Text Mining	3 (3,0)	Intro to Databases
33	CS-Elec	Virtual & Augmented Reality Systems	3 (3,0)	Data Structures & Algorithms
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 & Comp Networks
45	CS-Elec	Agent-Based Modeling	3 (3,0)	Data Comm & Comp Networks
46	CS-Elec	Information Security and Assurance	3 (3,0)	Data Comm & Comp Networks
47	CS-Elec	Mobile and Wireless Networks	3 (3,0)	Data Comm & Comp 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 & Comp Networks
50	CS-Elec	Telecommunications Management	3 (3,0)	Data Comm & Comp 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 Engg
56	CS-Elec	Mobile and Pervasive Computing	3 (3,0)	Operating Systems, Web Engg
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 & Comp Networks
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 & Comp Networks
65	CS-Elec	Telecommunication Systems	3 (3,0)	Data Comm & Comp Networks
66	CS-Elec	Principles of Multimedia Systems	3 (3,0)	Data Comm & Comp Networks
67	CS-Elec	Advanced Multimedia Systems	3 (3,0)	Principles of Multimedia Sys.
68	CS-Elec	Principles of Soft Computing	3 (3,0)	Artificial Intelligence
69	CS-Elec	Web Semantics	3 (3,0)	Web Engineering
70	CS-Elec	Semantic Grid	3 (3,0)	Web Engineering
71	CS-Elec	Cryptography and Network Security	3 (3,0)	Data Comm & Comp Networks
72	CS-Elec	Digital Forensics	3 (3,0)	Data Comm & Comp Networks
73	CS-Elec	Ethical Hacking	3 (3,0)	Data Comm & Comp Networks
74	CS-Elec	Reverse Engineering/Malware Analysis	3 (3,0)	Data Comm & Comp Networks
75	CS-Elec	Digital Image Processing	3 (3,0)	Data Structures & Algorithms
76	CS-Elec	Advanced Formal Methods in Software Engineering	3 (3,0)	Discrete Structures

The detailed course outline for the majority of 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)”