Program Structure:

BS Computer Science

Computer science is the study of the theory, experimentation, and engineering that form the basis for the design and use of computers. It is the scientific and practical approach to computation and its applications and the systematic study of the feasibility, structure, expression, and mechanization of the methodical procedures (or algorithms) that underlie the acquisition, representation, processing, storage, communication of, and access to information [ref WordNet Princeton definition].

Computer Science is the application of a systematic, disciplined and quantifiable approach to the design, development, operation, and maintenance of software systems. It is in fact the practice of designing and implementing large, reliable, efficient and economical software by applying the principles and practices of engineering. The program aims to train students in all aspects of software life cycle from specification through analysis and design to testing, maintenance and evaluation of software product.

Coverage of ACM Knowledge Areas

Computer Science curriculum is designed keeping in view following identified knowledge areas of ACM [ref # ACM 2013 curriculum report]. It has been tried to reasonably cover all knowledge areas without compromising the flexibility needed for a national model curriculum.

- AL - Algorithms and Complexity
- AR - Architecture and Organization
- CN - Computational Science
- DS - Discrete Structures
- GV - Graphics and Visual Computing
- HCI - Human-Computer Interaction
- IAS - Information Assurance and Security
- IM - Information Management
- IS - Intelligent Systems
- NC - Networking and Communications
- OS - Operating Systems
- PBD - Platform-based Development
- PD - Parallel and Distributed Computing
- PL - Programming Languages
- SDF - Software Development Fundamentals
- SE - Software Engineering
- SF - Systems Fundamentals
- SP - Social Issues and Professional Issues

Proposed Curriculum for BS-CS

Table 1.2: Areas Covered in BS programs

Course Group	Credit hours	% age
General Education	19	15%
University Electives	12	9%
Mathematics & Science Foundation	12	9%
Computing – Core	39	30%
Common courses	**82**	**63%**
Domain CS		
Domain CS Core	24	18%
Domain CS Electives	15	12%
Domain CS Supporting	9	7%
Domain courses	**48**	**37%**
TOTAL	**130**	**100%**

Courses common for all computing BS programs – 82 Credits

Computing Core Courses

Course Title	Credit hours
Programming Fundamentals	3-1
Object Oriented Programming	3-1
Data Structures & Algorithms	3-1
Discrete Structures	3-0
Operating Systems	3-1
Database Systems	3-1
Software Engineering	3-0
Computer Networks	3-1
Information Security	3-0
Final Year Project	0-6
Total	**39 (27-12)**

General Education Courses

Course Title	Credit hours
English Composition & Comprehension	3
Technical & Business Writing	3
Communication & Presentation Skills	3
Professional Practices	3
Intro to Info. & Comm. Technologies	2-1
Pakistan Studies	2
Islamic Studies/ Ethics	2
Total	**18-1**

University Elective Courses

(Not limited to the list below, Universities may add more courses)

Course Title	Credit hours
Foreign Language	2-0
Social Service	1-0
Management Related	3-0
Social Science Related	3-0
Economy Related	3-0
Total	**12-**0

Mathematics and Science Foundation Courses

Course Title	Credit hours
Calculus & Analytical Geometry	3-0
Probability & Statistics	3-0
Linear Algebra	3-0
Applied Physics	3-0
Total	**12-0**

Domain Courses for BS (COMPUTER SCIENCE)

Computer Science CORE (Compulsory) courses

Course Title	Credit hours
Compiler Construction	3-0
Comp. Organization & Assembly Language	3-1
Digital Logic Design	3-1
Design & Analysis of Algorithms	3-0
Parallel & Distributed Computing	3-0
Artificial Intelligence	3-1
Theory of Automata	3-0
Total	**24 (21-3)**

Computer Science SUPPORTING courses (ANY 3 from following list)

Coverage of relevant pre-requisite must be ensured while offering any of the following courses from this category

Course Title	Credit hours
Differential Equations	3-0
Multi-variate Calculus	3-0
Graph Theory	3-0
Theory of Programming Languages	3-0
Numerical Computing	3-0
Total (Any three of the above)	**9-**0

Computer Science ELECTIVE courses

Course Title	Credit hours
CS Elective – 1	3
CS Elective – 2	3
CS Elective – 3	3
CS Elective – 4	3
CS Elective – 5	3
Total	**15**

Proposed Study Plan for BS (Computer Science)

4-Year Program (8 Regular Semesters of 18 weeks each)

Course Codes have been assigned as an example only. The purpose is to indicate pre-requisite courses for studying advanced courses.

Semester - I

Code	Course Title	Credit Hours	Pre-requisite
CS 1x1	Introduction to ICT	3-0	
CS 1x2	Programming Fundamentals	3-1	
HU 1x1	English Composition & Comprehension	3-0	
MT 1x1	Calculus & Analytical Geometry	3-0	
NS 1x1	Applied Physics	3-0	
	Total	15-1	

Semester - II

Code	Course Title	Credit Hours	Pre-requisite
CS 1x3	Digital Logic Design	3-1	Applied Physics
CS 1x4	Object Oriented Programming	3-1	Programming Fundamentals
HU 1x2	Communication & Presentation Skills	3-0	English Composition & Comprehension
MT 1x2	Probability & Statistics	3-0	
UE 1x1	University Elective – 1	3-0	
	Total	15-2	

Semester - III

Code	Course Title	Credit Hours	Pre-requisite
CS 2x1	Comp Organization & Assembly Lang.	3-1	
CS 2x2	Data Structures & Algorithms	3-1	Object-Oriented Programming
CS 2x3	Discrete Structures	3-0	
HU 2x1	Professional Practices	3-0	
SC 2x1	CS Supporting – 1	3-0	
	Total	15-2	

Semester - IV

Code	Course Title	Credit Hours	Pre-requisite
CS 2x4	Design & Analysis of Algorithms	3-0	Data Structures & Algorithms
CS 2x5	Theory of Automata	3-0	
CS 2x6	Database Systems	3-1	Data Structures & Algorithms
MT 2x1	Linear Algebra	3-0	
UE 2x1	University Elective – 2	3-0	
	Total	15-1	

Semester - V

Code	Course Title	Credit Hours	Pre-requisite
CS 3x1	Compiler Construction	3-0	Theory of Automata
SC 3x1	CS Supporting – 2	3-0	
CS 3x2	Operating Systems	3-1	Data Structures and Algorithms
CS 3x3	Software Engineering	3-0	
SC 3x2	CS Supporting – 3	3-0	
	Total	15-1	

Semester - VI

Code	Course Title	Credit Hours	Pre-requisite
CS 3x4	Artificial Intelligence	3-1	Discrete Structures
CS 3x5	Computer Networks	3-1	
CS 3x6	CS Elective – 1	3-0	
CS 3x7	CS Elective – 2	3-0	
HU 3x1	Technical & Business Writing	3-0	
	Total	15-2	

Semester - VII

Code	Course Title	Credit Hours	Pre-requisite
CS 4x1	CS Elective – 3	3-0	
CS 4x2	CS Elective – 4	3-0	
CS 4x3	Final Year Project – I	0-3	
UE 4x1	University Elective – 3	3-0	
CS 4x4	Parallel & Distributed Computing	3-0	Operating Systems
HU 4x1	Pakistan Studies	2-0	
	Total	14-3	

Semester - VIII

Code	Course Title	Credit Hours	Pre-requisite
CS 4x5	CS Elective – 5	3-0	
UE 4x2	University Elective – 4	3-0	
CS 4x6	Final Year Project – II	0-3	
CS 4x7	Information Security	3-0	
HU 4x2	Islamic Studies/ Ethics	2-0	
	Total	11-3	

(Universities may use their own course coding scheme)