BS Computer Science

The Department of Computer Science offers a 4-year BS Computer Science program that follows the latest HEC and NCEAC-approved curriculum. This curriculum provides not only a strong foundation in computer science but also equips students with the knowledge and skills necessary to excel as competent computing professionals. In addition to theoretical knowledge, the program emphasizes hands-on experience, enabling students to analyze and solve real-world problems effectively.
As part of their training, students are also encouraged to participate in internships, gaining practical exposure to digitizing real-world challenges. BSCS graduates are well-prepared to secure positions in the software industry, including roles such as full-stack developers, DevOps engineers, network administrators, and quality assurance specialists.

The department has already secured accreditation for the Fall 2020 batch of the BS Computer Science program, and the accreditation process for other batches is currently in progress.

Program Mission for BS Computer Science

The mission of the Bachelor of Computer Science (CS) program is to provide a quality education that equips students with both technical expertise and essential transferable skills. The program aims to cultivate graduates who are proficient in Computer Science, demonstrate social and ethical responsibility, and are committed to ongoing professional development and career advancement.

Program Educational Objectives (PEOs) for BSCS

Program Educational Objectives (PEOs) are the attributes and abilities that the graduates are expected to demonstrate within a few years after graduation. The PEOs are a direct translation of program mission and are derived involving all stakeholders aligned with University and Institute missions. Department of Computer Science has defined and established its PEOs keeping in view the desirable attributes of our graduates.

The Program Educational Objectives (PEOs) are focused on to produce BS CS graduates who are:

PEO 1: Competent and knowledgeable computer scientists, equipped with strong analytical and problem-solving skills to meet the demands of modern computing practices and the software industry.

PEO 2: Effective in communication with strong interpersonal skills, upholding high professional and ethical standards in their work.

PEO 3: Lifelong learners, committed to acquiring new skills and knowledge of emerging technologies for continuous professional development and contributing to research and innovation in the field.

2.3 Graduate Attributes (GAs) for BS Computer Science

The Graduate Attributes (GA) are statements that describe the set of skills, knowledge, and attitude that university expects from its graduates. The GAs broadly describes the knowledge, skills, and behaviors the students acquire in their program of study that is intended to foster the achievement of Program Educational Objectives (PEOs). The following GAs for undergraduate computing programs has been adopted from the Seol Accord as recommended by the National Computing Education Accreditation Council (NCEAC). By the time of graduation, the program enables students to:

1. Academic Education: Completion of an accredited program of study designed to prepare graduates as computing professionals.

2. Knowledge for Solving Computing Problems: Apply knowledge of computing fundamentals, knowledge of a computing specialization, mathematics, and appropriate domain knowledge to the real-world problems and requirements.

3. Problem Analysis: Identity, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

4. Design/ Development of Solutions: Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

5. Modern Tool Usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

6. Individual and Team Work: Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.

7. Communication: Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

8. Computing Professionalism and Society: Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

9. Ethics: Understand and commit to professional ethics, responsibilities, and norms of professional computing practice.

10. Lifelong Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

Mapping of PEOs to GAs

S.No.	Graduate Attributes (GAs)	Program Education Objectives (PEOs)		
		PEO-1	PEO-2	PEO-3
1.	Academic Education	✓		
2.	Knowledge for Solving Computing Problems	✓		
3.	Problem Analysis	✓		
4.	Design/ development of Solutions	✓		
5.	Modern Tool Usage	✓		
6.	Individual and Team Work		✓	
7.	Communication		✓	
8.	Computing Professionalism and Society		✓	
9.	Ethics		✓	
10.	Life-long Learning			✓

Eligibility Criteria, Duration of the Program and Award of Degree

- The minimum requirements for admission in BS Computer Science is F.Sc Pre-Engineering OR Equivalent, F.Sc. Pre-Medical, FCS/F.Sc Computer Science, DAE with at least 50% marks.
- The students who have not studied Mathematics at intermediate level have to pass deficiency courses of Mathematics (06 credits) in the first two semesters.
- At minimum 130 credit hours are required for award of BS degrees in any computing discipline mentioned in this document.
- The minimum duration for completion of BS Computing degrees is four years. The HEC allows maximum period of seven years to complete BS degree requirements.
- A minimum 2.0 CGPA (Cumulative Grade Point Average) on a scale of 4.0 is required for award of BS Computing Degree.
- The students after successful completion of 04 semesters in BS Computing Programs may exit with Associate Degree in Computing subject to completion of all requirements for the award of associate degree, i.e., Credit Hours, CGPA, and compulsory courses.

Curriculum Model for Bachelor of Science in Computer Science

The generic structure for the computing degree program given before is mapped with the BSCS program in the following tables.

Program Generic Structure

		NCEAC/HEC Proposed		ICP BS CS Program	
Categories (Cat)	Cat Code	No. of Courses	Credit Hours	No. of Courses	Credit Hours
Computing Core (CC)	1	14	46	14	46
Domain Core (DC)	2	6	18	6	18
Domain Elective (DE)	3	7	21	7	21
General Education Requirements (GER)	4	15	34	15	34
Mathematics & Supporting Courses (MSC) or Interdisciplinary Courses	5	4	12	4	12
Elective Supporting Courses (ESC)	6	1	3	1	3
Field Experience/Internship	7	01	03	01	03
Total		48	137	48	137

Proposed Semester/Study Plan for BS Computer Science (CS)

4-Year Program (8 Regular Semesters of 16 weeks each)

Semester 1 (18 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-140	Application of Information and Communication Technologies	3 (2-1)	GER	
CSC-110	Programming Fundamentals (PF)	4 (3-1)	CC	
	Islamic Studies	2 (2-0)	GER	
	Natural Sciences Elective (Applied Physics)	3 (3-0)	GER	
	Functional English (FE)	3 (3-0)	GER	
	Pakistan Studies	2 (2-0)	GER	
	Understanding of Holy Quran-I	1 (1-0)	GER	
	*Pre-Calculus-I	Non-Credit		
	Semester Total	**18 (16-2)**		
* Non-Credit course. Students with pre-medical, have to pass deficiency courses of Mathematics of 6 credit hours; preferably within first year of enrolment in the program.				

Semester 2 (18 Credit Hours)				
Course Code	Course Title	Cr.Hr	Domain	Pre-Requisite
CSC-143	Discrete Structures	3 (3-0)	GER	
	Expository Writing (EW)	3 (3-0)	GER	FE
CSC-111	Object Oriented Programming (OOP)	4 (3-1)	CC	PF
	Ideology and Constitution of Pakistan	2 (2-0)	GER	
CSC-113	Digital Logic Design	3 (3-0)	CC	
	Social Science Elective (Introduction to Psychology)	2 (2-0)	GER	
	Understanding of Holy Quran-II	1 (1-0)	GER	
	* Pre-Calculus-II	Non-Credit		
	Semester Total	**18 (17-1)**		

Semester 3 (18 Credit Hours)				
Course Code	Course Title	Cr.Hr	Domain	Pre-Requisite
CSC-218	Software Engineering	3 (3-0)	CC	
CSC-214	Data Structures	4 (3-1)	CC	OOP
CSC-212	Database Systems (DB)	4 (3-1)	CC	
	Calculus and Analytic Geometry (CAG)	3 (3-0)	GER	
CSC-249	Arts & Humanities (Professional Practices)	2 (2-0)	GER	
CSC-2410	Civics and Community Engagement	2 (2-0)	GER	
	Semester Total	**18 (16-2)**		

Semester 4 (18 Credit Hours)				
Course Code	Course Title	Cr.Hr	Domain	Pre-Requisite
CSC-217	Computer Networks	3 (2-1)	CC	
CSC-219	Computer Organization & Assembly Language (COAL)	3 (2-1)	CC	DLD
CSC-2111	Analysis of Algorithms	3 (3-0)	CC	DS
	Linear Algebra	3 (3-0)	MSC	CAG
CSC-216	Artificial Intelligence	3 (2-1)	CC	
	Probability & Statistics	3 (3-0)	MSC	
	Semester Total	**18 (15-3)**		

Semester 5 (17 Credit Hours)				
Course Code	Course Title	Cr.Hr	Domain	Pre-Requisite
	Multivariable Calculus	3 (3-0)	MSC	CAG
CSC-320	Theory of Automata (TA)	3 (3-0)	DC	
CSC-323	Computer Architecture	3 (3-0)	DC	COAL
CSC-3110	Operating Systems (OS)	3 (2-1)	CC	
	Domain Elective 1	3 (2-1)	DE1	
CSC-3411	Entrepreneurship	2 (2-0)	GER	
	Semester Total	**17 (15-2)**		

Semester 6 (18 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-322	Computer Graphics	3 (2-1)	DC	
	Domain Elective 2	3 (2-1)	DE2	
	Domain Elective 3	3 (2-1)	DE3	
CSC-321	Advanced Database Management Systems	3 (2-1)	DC	DB
CSC-315	Information Security	3 (3-0)	CC	
CSC-353	Technical and Business Writing	3 (3-0)	MSC	EW
	Semester Total	**18 (14-4)**		

Semester 7 (15 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-424	Compiler Construction	3 (3-0)	DC	TA
	Domain Elective 4	3 (3-0)	DE4	
	Domain Elective 5	3 (3-0)	DE5	
CSC-464	Digital Marketing	3 (3-0)	ESC	
CSC-4112	Final Year Project-1	3 (0-3)	CC	
	Semester Total	**15 (12-3)**		

Semester 8 (12 Credit Hours)				
Course Code	**Course Title**	**Cr.Hr**	**Domain**	**Pre-Requisite**
CSC-425	Parallel and Distributed Computing	3 (2-1)	DC	OS
	Domain Elective 6	3 (2-1)	DE6	
	Domain Elective 7	3 (2-1)	DE7	
CSC-4113	Final Year Project-II	3 (0-3)	CC	FYP-I
	Seerat Un Nabi	Non-Credit		
	Semester Total	**12 (6-6)**		

Summary of Total Credit Hours for BS (CS) Program

Semesters	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**Total**
Credit Hours	18	18	18	18	17	18	15	12	137