

## **Department of Computer Science**

### **BS Computer Science Program**

#### **Program Educational Objectives (PEOs)**

**PEO1:** Our graduates will have professional career in industry, academia, R&D organizations or in a self-initiated entrepreneurial undertaking.

**PEO2:** Our graduates will be able to analyze problems and create sustainable solutions using their domain knowledge and modern IT tools. Also, they will have the ability to adapt to the changes in technology and the needs of society.

**PEO3:** Our graduates will continue to seek knowledge for professional advancement and enhanced awareness about safe computing practices and environmental concerns.

**PEO4:** Our graduates will manage assigned projects as individuals or as part of an interdisciplinary team. They will be effective communicators and will conduct themselves with integrity, upholding the principles of ethics and social responsibility.

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## BS Computer Science Program

### Student Outcomes (SOs):

Computing programs prepare students to attain educational objectives by ensuring that students demonstrate achievement of the following outcomes.

<b>1. Academic Education</b>	To prepare graduates as computing professionals
<b>2. Knowledge for Solving Computing Problems</b>	Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the 16 abstraction and conceptualization of computing models from defined problems and requirements
<b>3. Problem Analysis</b>	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
<b>4. Design/ Development of Solutions</b>	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
<b>5. Modern Tool Usage</b>	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
<b>6. Individual and Team Work</b>	Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings
<b>7. Communication</b>	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
<b>8. Computing Professionalism and Society</b>	Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
<b>9. Ethics</b>	Understand and commit to professional ethics, responsibilities, and norms of professional computing practice
<b>10. Life-long Learning</b>	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional

## Course Learning Outcomes

Course learning outcome is developed using Bloom's Taxonomy that involves three learning domains: cognitive, affective, and psychomotor which has six cognitive levels, five affective levels and seven psychomotor levels

Learning Domain	Learning Level	Level Attributes	Keywords
<b>Cognitive</b>	C1 Knowledge	Rote memorization, recognition, or recall of facts.	Find, define, label, describe, memorize, locate, recognize, identify, record, name, tell, list, recite, select, relate
	C2 Comprehension	Understanding what the facts mean.	Convert, transform, examples, match, restate, paraphrase, change, rewrite, give, express, illustrate, extend, generalize, summarize, interpret, compare, explain, predict
	C3 Application	Correct use of the facts, rules, or ideas.	Use, apply, change, solve, choose, sketch, modify, make, dramatize, discover, classify, prepare, show, produce, construct, paint, demonstrate, illustrate
	C4 Analysis	Breaking down information into component parts.	Analyze, classify, survey, separate, distinguish, infer, categorize, subdivide, inquire, differentiate, probe, attributes, investigate, select, experiment, point out, compare, contrast

	C5 Synthesis	Combining parts to make a new whole.	Plan, role-play, compose, invert, hypothesis, design, revise, construct, develop, collect, predict, formulate, create, organize, originate, combine, arrange
	C6 Evaluation	Judging the value or worth of information or ideas.	Appraise, deduce, critique, defend, recommend, conclude, decide, criticize, evaluate, consider, weight, judge, support, rate
<b>Affective</b>	A1 Receiving phenomena	Willingness to receive information.	Ask, choose, identify, point out, reply, select, name, give, follow, hold, use, describe
	A2 Responding phenomena	Individual actively participating in his or her own learning.	Read, answer, select, recite, discuss, write, greet, present, form, help, practice, perform, conform, comply, aid, assist, read
	A3 Valuing	The ranges from simple acceptance of a value to one of commitment.	Work, justify, differentiate, invite, initiate, study, join, share, propose, report, select, explain, demonstrate
	A4 Organizing values	Individuals go through as they bring together different values, resolve conflicts among them and start to internalize the values.	Integrate, relate, complete, organize, defend, identify, synthesize, modify, generalize, formulate, prepare, compare, combine, adhere, arrange
	A5 Internalizing value	Individual has a value system in terms of their beliefs, ideas and attitudes that control their behavior in a consistent and predictable manner	Display, discriminate, verify, modify, revises, serve, listen, practice, influence
<b>Psych</b>	P1 Perception	The ability to use observed cues to guide physical activity.	Detect, describe, differentiate, isolate, distinguish, choose, select, relate, identify

	P2 Set	The readiness to take a particular course of action	Begin, explain, show, volunteering, proceed, move, state, display
	P3 Guided Response	The trial-an-error attempts at acquiring a physical skill. With practice, this leads to better performance.	Copy, trace, react, response, reproduce, follow
	P4 Mechanism	Learned responses become more habitual and movements can be performed with some confidence and level of proficiency.	Mix, assemble, measure, dismantle, construct, calibrate, grind, fix, fasten, mend, sketch, manipulate, heat, display
	P5 Complex Overt Response	Responses are automatic and proficiency is indicated by accurate and highly coordinated performance with a minimum of wasted effort.	Build, organize, mend, sketch, manipulate, heat, display
	P6 Adaptation	Skills are well developed and the individual can modify movements to deal with problem situations or to fit special requirements.	Adapt, change, reorganize, alter, vary, rearrange, reorganize, revise
	P7 Origination	The skills are so highly developed that creativity for special situations is possible.	Arrange, originate, create, design, initiate, compose, combine

## BS Computer Science Courses

BS Computer Science Courses			Academic Education	Knowledge for Solving Computing Problems	Problem Analysis	Design/ Development of Solutions	Modern Tool Usage	Individual and Team Work	Communication	Computing Professionalism and Society	Ethics	Life-long Learning
Sr. No.	Course Code	Course Title	SO-1	SO-2	SO-3	SO-4	SO-5	SO-6	SO-7	SO-8	SO-9	SO-10
1	CS-101	Introduction to Information and Communication Technologies	✓		✓		✓					
2	CS-102	Programming Fundamentals		✓		✓	✓	✓				
3	HS-101	English							✓			✓
4	MT-101	Calculus & Analytical Geometry		✓	✓							
5	IS-211	Islamic Studies						✓			✓	
6	CS-103	Discrete Structures	✓	✓	✓	✓						
7	MT-203	Liner Algebra		✓	✓							
8	HS-102	Pakistan Studies								✓		
9	HS-401	Professional Values and Ethics								✓	✓	
10	CS-104	Object Oriented Programming	✓	✓	✓		✓	✓				
11	BS-105	Applied Physics	✓	✓			✓					
12	EC-121	Digital Logic Design	✓		✓	✓	✓	✓				
13	MT-103	Differential Equations		✓	✓							
14	HS-403	Management and Entrepreneurship							✓			✓
15	CS-201	Data Structures and Algorithms	✓	✓	✓		✓					
16	CS-204	Software Engineering		✓	✓	✓						
17	HS-402	Economics		✓								✓
18	HS-201	Technical Report Writing						✓				✓



48	CS-402	Information Security		✓	✓	✓						
49	CS-405	Numerical Computing		✓	✓	✓						
50	CS-407	Fundamentals of Data Mining		✓	✓							
51	CS-410	Artificial Neural Network		✓	✓	✓	✓					
52	CS-431	Big Data Programming		✓			✓	✓				
53	CS-413	Fuzzy Logic Systems		✓	✓	✓	✓					
54	CS-414	Computational Intelligence		✓	✓	✓						
55	CS-307	Visual Programming		✓		✓	✓					
56	CS-426	Computer Security			✓	✓	✓					
56	CS-499	Final Year Project		✓	✓	✓	✓	✓	✓	✓		✓
Total Subjects Targeting Each SOs			21	39	41	27	27	12	6	6	2	7
			(SO 1)	(SO 2)	(SO 3)	(SO 4)	(SO 5)	(SO 6)	(SO 7)	(SO 8)	(SO 9)	(SO 10)