



Scheme of Studies (SoS)

BS Computer Science

Department of Computer Science
Faculty of Computing and Artificial Intelligence (FCAI)
Air University, Islamabad

BS Computer Science

Revised Curriculum 2025

This document will be implemented w.e.f. Fall-25 and onward batches.

Generic Structure for Computing Disciplines:

Areas	Credit Hours (Cr.Hrs.)	Courses
Computing Core	46	14*
Domain Core	18	06
Domain Elective	21	07
Mathematics & Supporting Courses	12	04
Elective Supporting Courses	03	01
General Education Requirement	34*** ++	15
Mandatory Internship	03**	01
Total	137	48

* FYP is offered in place of Capstone Project having 3 Credit Hours. FYP is composed of 6 Credit Hours and divided into three semesters rather than two.

** 03 Credit Hours Internship course is offered in summer semester (6-8 Weeks)

*** 02 Credit Hours Fehm-e-Quran has been added as per HEC letter No. HEC/Curri/Fehm-e-Quran/2025/7708.

++ 02 Credit Hours Course in General Education Category (Arts & Humanities) for non-Muslim students in lieu of Fehm-e-Quran I & II.

***02 Credit Hours Pakistan Studies course has been added as per HEC letter No. HEC/ACAD/UGEP/2024/6537.

Outcome Based Education (OBE)

The Department of Computer Science is following OBE for all its UG degree programs including the BS Computer Science program.

Vision of Air University

Air University aspires to be recognized globally in innovative research, transformative education, and sustainable development. It aims to foster a culture of creativity, inclusivity, and collaboration, preparing graduates to become ethical leaders and change-makers in a rapidly evolving world.

Mission of Air University

Air University's mission is to deliver world-class education and research that addresses global challenges and drives societal progress. It nurtures intellectual growth, ethical values, and prepares graduates to excel professionally, become self-sustained entrepreneurs, and lead with integrity and compassion. Through interdisciplinary research and collaboration with industry, government, and international partners, the university aims to contribute towards economic, technological, and social development while promoting diversity, equity, and inclusion.

Mission of the Department of Computer Science

The department's mission is to provide quality education and produce highly skilled professionals in the areas of CS, IT, and Bioinformatics. The graduates are proficient at solving the local and global research and development problems effectively with social responsibility. The department stands committed to creating a strong relationship with industry and society to address contemporary and future challenges.

BS Computer Science Program Objectives (POs)

PO 1 – Computing Professionals:

Demonstrate computing knowledge and skills with a strong focus on innovation, entrepreneurship, and life-long learning.

PO 2 – Socially Responsible and Ethical Contributors:

Have ethical and moral values along with a keen sense of social responsibility.

PO 3 – Collaborative, Communicative, and Lifelong Learning:

Have effective communication skills required in the computing profession, as a team player or a leader for industry and society.

Graduate Attributes (GAs) – Based on Seoul Accord

1. **Academic Education:** Prepare graduates having educational depth and breadth knowledge and prepare Computing professionals.
2. **Knowledge for Solving Computing Problems:** Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
3. **Problem Analysis:** Identify, 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 Teamwork** Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.: An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems.
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. **Life-long Learning:** Recognize the need and have the ability to engage in independent learning for continual development as a computing professional.

Mapping of POs to GAs

POs	Description	GAs
PO 1	Competent Computing Professionals	1, 2, 3, 4, 5, 10
PO 2	Socially Responsible and Ethical Contributors	8, 9, 10
PO 3	Collaborative, Communicative, and Lifelong Learning	6, 7

**The minimum attainment criteria of KPI are 50% which is mapped and obtained automatically from the AU CMS.*

Program Structure for BS Computer Science Program as per revised NCEAC-23 Criteria

Core Computing (14 Courses)				
Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	CS111	Programming Fundamentals	-	3-0-3
	CS111L	Programming Fundamentals Lab	-	0-1-1
2.	CS112	Object Oriented Programming	CS111 CS111L	3-0-3
	CS112L	Object Oriented Programming Lab	CS111 CS111L	0-1-1
3.	EE123	Digital Logic Design	-	2-0-2
	EE123L	Digital Logic Design Lab	-	0-1-1
4.	CS230	Database Systems	-	3-0-3
	CS230L	Database Systems Lab	-	0-1-1
5.	CS216	Data Structures	CS112 CS112L	3-0-3
	CS216L	Data Structures Lab	CS112 CS112L	0-1-1
6.	CS315	Information Security	-	2-0-2
	CS315L	Information Security Lab	-	0-1-1
7.	CS363	Computer Networks	-	2-0-2
	CS363L	Computer Networks Lab	-	0-1-1
8.	CS226	Computer Organization and Assembly Language	EE 123 EE123L	2-0-2
	CS226L	Computer Organization and Assembly Language Lab	EE 123 EE123L	0-1-1
9.	CS228	Operating Systems	-	2-0-2
	CS228L	Operating Systems Lab	-	0-1-1
10.	CS332	Design and Analysis of Algorithms	CS216 CS216L	3-0-3
11.	CS344	Artificial Intelligence	-	2-0-2
	CS344L	Artificial Intelligence Lab	-	0-1-1
12.	CS 305	Software Engineering	-	3-0-3
13.	CS491	Final Year Project – I	List A	0-1-1
14.	CS492	Final Year Project – II	CS491	0-2-2
	CS493	Final Year Project – III	CS492	0-3-3
				46
Domain Core (06 Courses)				
1.	CS333	Theory of Automata	-	3-0-3
2.	CS430	Advanced Database Management Systems	CS230 CS230L	2-0-2
	CS430	Advanced Database Management Systems Lab	CS230 CS230L	0-1-1
3.	CS426	Parallel and Distributed Computing	CS228 CS228L	2-0-2

	CS426L	Parallel and Distributed Computing Lab	CS228 CS228L	0-1-1
4.	CS434	Compiler Construction	CS333	2-0-2
	CS434L	Compiler Construction Lab	CS333	0-1-1
5.	CS227	Computer Architecture	CS226 CS226L	2-0-2
	CS227L	Computer Architecture Lab	CS226 CS226L	0-1-1
6.	CS372	HCI & Computer Graphics	-	2-0-2
	CS372L	HCI & Computer Graphics Lab	-	0-1-1
				18
Domain Electives (07 Courses)				
Sr. #	Course Code	Course Title	Pre-req	Cr. Hrs.
1.	CS284	Visual Programming	-	2-0-2
	CS284L	Visual Programming Lab	-	0-1-1
2.	CS281	Mobile Computing	-	2-0-2
	CS281L	Mobile Computing Lab	-	0-1-1
3.	CS301	Full stack web development	-	2-0-2
	CS301L	Full stack web development Lab	-	0-1-1
4.	CS485	Fundamentals of Quantum Communication	-	2-0-2
	CS485L	Fundamentals of Quantum Communication Lab	-	0-1-1
5.	CS384	Quantum Computing	-	2-0-2
	CS384L	Quantum Computing Lab	-	0-1-1
6.	CS344	Digital Image Processing	-	2-0-2
	CS344L	Digital Image Processing Lab	-	0-1-1
7.	CS402	Data Science	-	2-0-2
	CS402L	Data Science Lab	-	0-1-1
				21
Mathematics and Supporting Courses (04 Courses)				
1.	MA105	Multivariable Calculus	MA110	3-0-3
2.	MA201	Linear Algebra	-	3-0-3
3.	MA301	Probability and Statistics	-	3-0-3
4.	EL400	Technical and Business Writing	-	3-0-3
				12
Elective Supporting Courses (01 Course)				
1.	MK101	Principles of Marketing	-	3-0-3
2.	MGXXX	Financial Accounting	-	3-0-3
3.	MGXXX	Financial Management	-	3-0-3
				03

General Education Requirement as per HEC Education Policy (15 Courses)				
1.	CS 181	Application of Information and Communication Technologies	-	2-0-2
	CS 181L	Application of Information and Communication Technologies Lab	-	0-1-1
2.	EL 170	Functional English	-	3-0-3
3.	EL 271	Expository Writing	EL 170	3-0-3
4.	MA 216	Discrete Structures)	-	3-0-3
5.	MA 110	Calculus and Analytic Geometry	-	3-0-3
6.	HU 124	Islamic Studies & Ethics	-	2-0-2
7.	HU 405	Ideology and Constitution of Pakistan	-	2-0-2
8.	BA 152	Introduction to Management)	-	2-0-2
9.	PH 111	Applied Physics	-	2-0-2
	PH 111L	Applied Physics Lab	-	0-1-1
10.	CS 470	Professional Practices	-	2-0-2
11.	HU 411	Civics and Community Engagement	-	2-0-2
12.	BA 353	Entrepreneurship	-	2-0-2
13.	HU115	Pakistan Studies	-	2-0-2
14.	FQ100	Fehm-e-Quran I	-	0-1-1
15.	FQ101	Fehm-e-Quran II	FQ100	0-1-1
				34
Industry Internship				
1.	CS490	Internship		3-0-3
				03

Scheme of Studies
BS Computer Science
Applicable from Fall-2025 Intake & Onwards

SEMESTER-I

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	EL170	Functional English	-	3-0-3	7, 8
2.	PH111	Applied Physics	-	2-0-2	2, 3
3.	PH111L	Applied Physics Lab	-	0-1-1	5, 3
4.	HU115	Pakistan Studies	-	2-0-2	8, 10
5.	CS181	Application of Information and Communication Technologies	-	2-0-2	2, 4
6.	CS181L	Application of Information and Communication Technologies Lab	-	0-1-1	2, 5
7.	CS111	Programming Fundamentals	-	3-0-3	1, 2, 3
8.	CS111L	Programming Fundamentals Lab	-	0-1-1	3, 4
9.	FQ100	Fehm-e-Quran I	-	0-1-1	1, 9
10.	MA 114	* Foundational Mathematics (Non - Credit)	-	3-0-3	-
			Cr.Hrs.	12-4-16	
		Total Contact Hours=24			
		* Pre-medical students only			

SEMESTER-II

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	EL271	Expository Writing	EL170	3-0-3	7, 8
2.	CS112	Object Oriented Programming	CS111 CS111L	3-0-3	2, 3, 4
3.	CS112L	Object Oriented Programming Lab	CS111 CS111L	0-1-1	3, 4
4.	MA216	Discrete Structures	-	3-0-3	2, 3
5.	EE123	Digital Logic Design	-	2-0-2	2, 3
6.	EE123L	Digital Logic Design Lab	-	0-1-1	3, 4
7.	BA152	Introduction to Management	-	2-0-2	7, 8, 9
8.	HU411	Civics and Community Engagement	-	2-0-2	8, 9
9.	FQ101	Fehm-e-Quran II	FQ100	0-1-1	1, 9
10.	MA118	* Pre-Calculus (Non - Credit)	-	3-0-3	-
			Cr.Hrs.	15-3-18	
		Total Contact Hours: 24			
		* Pre-medical students only			

SEMESTER-III

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	MA301	Probability and Statistics	-	3-0-3	2, 3
2.	CS216	Data Structures	CS112 CS112L	3-0-3	2, 3
3.	CS216L	Data Structures Lab	CS112 CS112L	0-1-1	3, 4
4.	CS2XX	Domain Elective-I	-	2-0-2	-
5.	CS2XXL	Domain Elective-I Lab	-	0-1-1	-
6.	MA110	Calculus and Analytical Geometry	-	3-0-3	2, 3
7.	CS226	Computer Organization and Assembly Language	EE 123 EE123L	2-0-2	1, 2, 3
8.	CS226L	Computer Organization and Assembly Language Lab	EE 123 EE123L	0-1-1	4, 5
9.	HU124	Islamic Studies & Ethics	-	2-0-2	6, 8
			Cr.Hrs.	15-3-18	
		Total Contact Hours: 24			

SEMESTER-IV

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	MA105	Multivariable Calculus	MA110	3-0-3	1, 2
2.	CS230	Database Systems	-	3-0-3	2,3,4
3.	CS230L	Database Systems Lab	-	0-1-1	4,5
4.	CS228	Operating Systems	-	2-0-2	2, 3
5.	CS228L	Operating Systems Lab	-	0-1-1	3, 4
6.	CS2XX	Domain Elective-II	-	2-0-2	-
7.	CS2XXL	Domain Elective-II Lab	-	0-1-1	-
8.	CS227	Computer Architecture	CS226 CS226L	2-0-2	2, 3, 4
9.	CS227L	Computer Architecture Lab	CS226 CS226L	0-1-1	3, 4
			Cr.Hrs.	12-4-16	
		Total Contact Hours: 24			

SEMESTER-SUMMER*

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	CS490	Internship	-	3-0-3	4, 5, 7, 10

* Students can apply for 6-8 weeks supervised internship course

SEMESTER-V

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	CS305	Software Engineering	-	3-0-3	1, 2, 3
2.	CS363	Computer Networks	-	2-0-2	1, 3, 4
3.	CS363L	Computer Networks Lab	-	0-1-1	3, 4
4.	CS3XX	Domain Elective -III	-	2-0-2	-
5.	CS3XXL	Domain Elective -III Lab	-	0-1-1	-
6.	MA201	Linear Algebra	-	3-0-3	2, 3
7.	CS333	Theory of Automata	-	3-0-3	2, 4
8.	CS372	HCI & Computer Graphics	-	2-0-2	2, 4, 9
9.	CS372L	HCI & Computer Graphics Lab	-	0-1-1	4, 5
			Cr.Hrs.	15-3-18	
		Total Contact Hours: 24			

SEMESTER-VI

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	EL400	Technical and Business Writing	-	3-0-3	6, 7
2.	CS332	Design and Analysis of Algorithms	CS216 CS216L	3-0-3	2, 3, 4
3.	CSXXX	Domain Elective-IV	-	2-0-2	-
4.	CSXXXL	Domain Elective –IV Lab	-	0-1-1	-
5.	CS315	Information Security	-	2-0-2	2, 3, 5
6.	CS315L	Information Security Lab	-	0-1-1	3, 5
7.	CS344	Artificial Intelligence	-	2-0-2	2, 3, 4
8.	CS344L	Artificial Intelligence Lab	-	0-1-1	4, 5
9.	HU405	Ideology and Constitution of Pakistan	-	2-0-2	8, 9, 10
10.	CS494	Final Year Project – I	List A	0-1-1	1, 2, 3, 4
			Cr.Hrs.	14-4-18	
		Total Contact Hours: 23 *1 FYP			

SEMESTER-SUMMER*

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	CS490	Internship		3-0-3	4, 5, 7, 10

* Student who did not avail internship **must** apply for 6-8 weeks supervised internship course

SEMESTER-VII

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	CS430	Advanced Database Management Systems	CS230 CS230L	2-0-2	2, 3, 4
2.	CS430L	Advanced Database Management Systems Lab	CS230 CS230L	0-1-1	4, 5
3.	CSXXX	Domain Elective-V	-	2-0-2	-
4.	CSXXXL	Domain Elective -V Lab	-	0-1-1	-
5.	CSXXX	Domain Elective-VI	-	2-0-2	-
6.	CSXXXL	Domain Elective -VI Lab	-	0-1-1	-
7.	XXXXX	Elective Supporting Course	-	3-0-3	-
8.	CS470	Professional Practices	-	2-0-2	8, 9
9.	BA353	Entrepreneurship	-	2-0-2	2, 8, 4
10.	CS495	Final Year Project - II	CS494	0-2-2	4, 5, 6, 7
			Cr.Hrs.	13-5-18	
		Total Contact Hours: 22 * 2 FYP			

SEMESTER-VIII

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.	GA
1.	CS434	Compiler Construction	CS333	2-0-2	2, 3, 4
2.	CS434L	Compiler Construction Lab	CS333	0-1-1	3, 4
3.	CSXXX	Domain Elective-VII	-	2-0-2	-
4.	CSXXXL	Domain Elective- VII Lab	-	0-1-1	-
5.	CS426	Parallel and Distributed Computing	CS228 CS228L	2-0-2	2, 3, 4
6.	CS426L	Parallel and Distributed Computing Lab	CS228 CS228L	0-1-1	4, 5
7.	CS496	Final Year Project – III	CS495	0-3-3	4, 5, 6, 7, 8, 9, 10
			Cr.Hrs.	6-6-12	
		Total Contact Hours: 15 *3 FYP			
			Grand Total	137	

List A (Pre-requisites for FYP-I registration)

S#	Course Code	Course Title	Credit Hours
1.	CS111	Programming Fundamentals	3-0-3
	CS111L	Programming Fundamentals Lab	0-1-1
2.	CS112	Object Oriented Programming	3-0-3
	CS112L	Object Oriented Programming Lab	0-1-1
3.	CS216	Data Structures	3-0-3
	CS216L	Data Structures Lab	0-1-1
4.	CS230	Database Systems	3-0-3
	CS230L	Database Systems Lab	0-1-1
5.	CS305	Software Engineering	3-0-3
6.	CS228	Operating Systems	2-0-2
	CS228L	Operating Systems Lab	0-1-1

List of Elective Courses

Sr. #	Course Code	Course Title	Pre-req	Cr.Hrs
1	CS284	Visual Programming	-	2-0-2
	CS284L	Visual Programming Lab	-	0-1-1
2	CS281	Mobile Computing	-	2-0-2
	CS281L	Mobile Computing Lab	-	0-1-1
3	CS301	Full stack web development	-	2-0-2
	CS301L	Full stack web development Lab	-	0-1-1
4	CS485	Fundamentals of Quantum Communication	-	2-0-2
	CS485L	Fundamentals of Quantum Communication Lab	-	0-1-1
5	CS384	Quantum Computing	-	2-0-2
	CS384L	Quantum Computing Lab	-	0-1-1
6	CS344	Digital Image Processing	-	2-0-2
	CS344L	Digital Image Processing Lab	-	0-1-1
7	CS402	Data Science	-	2-0-2
	CS402L	Data Science Lab	-	0-1-1
8	CSXXX	Big Data Analytics	-	2-0-2
	CSXXXL	Big Data Analytics Lab	-	0-1-1
9	CSXXX	Natural Language Processing	-	2-0-2
	CSXXXL	Natural Language Processing Lab	-	0-1-1
10	CSXXX	Computer Vision	-	2-0-2
	CSXXXL	Computer Vision Lab	-	0-1-1
11	CSXXX	Data Mining	-	2-0-2
	CSXXXL	Data Mining Lab	-	0-1-1
12	CSXXX	Deep Learning	-	2-0-2
	CSXXXL	Deep Learning Lab	-	0-1-1
13	CSXXX	Distributed Databases	-	2-0-2
	CSXXXL	Distributed Databases Lab	-	0-1-1
14	CSXXX	Machine Learning	-	2-0-2
	CSXXXL	Machine Learning Lab	-	0-1-1
15	CSXXX	Blockchain	-	2-0-2
	CSXXXL	Blockchain Lab	-	0-1-1
16	CSXXX	MLOps	-	2-0-2
	CSXXXL	MLOps Lab	-	0-1-1
17	CSXXX	Data Science	-	2-0-2
	CSXXXL	Data Science Lab	-	0-1-1
18	CSXXX	Web Technologies	-	2-0-2
	CSXXXL	Web Technologies Lab	-	0-1-1

*Elective courses can be added as per availability of faculty and market trends.

*Students may take two electives from other departments of FCAI with the approval of Chair Department.