

BS Computer Science

Revised Curriculum 2023

* This document is prepared as per revised NCEAC curriculum 2023.

This document is revised as per NCEAC revised curriculum w.e.f. Fall-23 and onward batches.

Generic Structure for Computing Disciplines:

Areas	Credit Hours	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 [GE]	30	12
Mandatory Internship	03**	01
Totals	133	45

* FYP is offered in place of Capstone Project having 3 Credit Hours. FYP is composed of 6 Credit Hours and divided in 3 semesters rather 2 semesters.

** 3 Credit Hours Internship course is offered in summer semester (8 Weeks)

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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.	CS130	Database Systems		3-0-3
	CS130L	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.	CS215	Information Security	-	2-0-2
	CS215L	Information Security Lab	-	0-1-1
7.	CS260	Computer Networks		2-0-2
	CS260L	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	CS325	Operating Systems		2-0-2
	CS325L	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
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Domain Core (06 Courses)				
1	CS333	Theory of Automata	-	3-0-3
2	CS330	Advanced Database Management Systems	CS130, CS130L	2-0-2
	CS330	Advanced Database Management Systems Lab	CS130, CS130L	0-1-1

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3	CS426	Parallel and Distributed Computing	CS325, CS325L	2-0-2
	CS426L	Parallel and Distributed Computing Lab	CS325, CS325L	0-1-1
4	CS434	Compiler Construction	CS333	2-0-2
	CS434L	Compiler Construction Lab	CS333	0-1-1
5	CS424	Computer Architecture	CS226, CS226L	2-0-2
	CS424L	Computer Architecture Lab	CS226, CS226L	0-1-1
6	CS474	HCI & Computer Graphics		2-0-2
	CS474L	HCI & Computer Graphics Lab		0-1-1
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Domain Electives (07 Courses)

Sr. #	Course Code	Course Title	Pre-req	Cr. Hrs.
1	CS284	Visual Programming	CS112, CS112L	2-0-2
	CS284L	Visual Programming Lab	CS112, CS112L	0-1-1
2	CS281	Mobile Computing	-	2-0-2
	CS281L	Mobile Computing Lab	-	0-1-1
3	CS301	Full stack web development	CS112, CS112L	2-0-2
	CS301L	Full stack web development Lab	CS112, CS112L	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
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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
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Elective Supporting Courses (01 Course)

1	MK101	Principles of Marketing		3-0-3
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General Education Requirement as per HEC Education policy (12 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	EL170	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
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Scheme of Studies BS Computer Science

Applicable from Fall-2023 Intake & Onwards

SEMESTER-I

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	EL170	Functional English	-	3-0-3
2.	PH111	Applied Physics	-	2-0-2
3.	PH111L	Applied Physics Lab	-	0-1-1
4.	HU405	Ideology and Constitution of Pakistan	-	2-0-2
5.	CS181	Application of Information and Communication Technologies	-	2-0-2
6.	CS181L	Application of Information and Communication Technologies Lab	-	0-1-1
7.	CS111	Programming Fundamentals	-	3-0-3
8.	CS111L	Programming Fundamentals Lab	-	0-1-1
9.	MA 114	* Foundational Mathematics (Non - Credit)	-	3-0-3
			Total	12-3-15 ✓
		Total Contact Hours=21		

* Pre-medical students only.

SEMESTER-II

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	EL271	Expository Writing	EL170	3-0-3
2.	CS112	Object Oriented Programming	CS111, CS111L	3-0-3
3.	CS112L	Object Oriented Programming Lab	CS111, CS111L	0-1-1
4.	MA216	Discrete Structures	-	3-0-3
5.	EE123	Digital Logic Design	-	2-0-2
6.	EE123L	Digital Logic Design Lab	-	0-1-1
7.	CS130	Database Systems		3-0-3
8.	CS130L	Database Systems Lab		0-1-1
9.	MA118	* Pre-Calculus (Non - Credit)	-	3-0-3
			Total	14-3-17
		Total Contact Hours=23		

* Pre-medical students only.

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SEMESTER-III

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	MA301	Probability and Statistics	-	3-0-3
2.	CS216	Data Structures	CS112, CS112L	3-0-3
3.	CS216L	Data Structures Lab	CS112, CS112L	0-1-1
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
7.	CS215	Information Security	-	2-0-2
8.	CS215L	Information Security Lab	-	0-1-1
			Total	13-3-16 ✓
		Total Contact Hours=22		

SEMESTER-IV

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	MA105	Multivariable Calculus	MA110	3-0-3
2.	CS260	Computer Networks		2-0-2
3.	CS260L	Computer Networks Lab		0-1-1
4.	CS226	Computer Organization and Assembly Language	EE 123, EE123L	2-0-2
5.	CS226L	Computer Organization and Assembly Language Lab	EE 123, EE123L	0-1-1
6.	CS2XX	Domain Elective-II	-	2-0-2
7.	CS2XXL	Domain Elective-II Lab	-	0-1-1
8.	CS305	Software Engineering		3-0-3
9.	HU411	Civics and Community Engagement		2-0-2
			Total	14-3-17
		Total Contact Hours=23		

SEMESTER-SUMMER*

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	CS490	Internship		3-0-3

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

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SEMESTER-V

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	BA152	Introduction to Management	-	2-0-2
2.	CS332	Design and Analysis of Algorithms	CS216, CS216L	3-0-3
3.	CS325	Operating Systems		2-0-2
4.	CS325L	Operating Systems Lab		0-1-1
5.	CS3XX	Domain Elective -III		2-0-2
6.	CS3XXL	Domain Elective -III Lab		0-1-1
7.	MA201	Linear Algebra		3-0-3
8.	CS344	Artificial Intelligence		2-0-2
9.	CS344L	Artificial Intelligence Lab		0-1-1
			Total	14-3-17
		Total Contact Hours=23		

SEMESTER-VI

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	EL400	Technical & Business Writing		3-0-3
2.	CS333	Theory of Automata	-	3-0-3
3.	CSXXX	Domain Elective-IV		2-0-2
4.	CSXXXL	Domain Elective -IV Lab		0-1-1
5.	CSXXX	Domain Elective-V		2-0-2
6.	CSXXXL	Domain Elective-V Lab		0-1-1
7.	CS330	Advanced Database Management Systems	CS130, CS130L	2-0-2
8.	CS330	Advanced Database Management Systems Lab	CS130, CS130L	0-1-1
9.	HU124	Islamic Studies & Ethics	-	2-0-2
10.	CS491	Final Year Project – I	List A	0-1-1
			Total	14-4-18
		Total Contact Hours=23 * 1 FYP		

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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.	CS130	Database Systems	3-0-3
	CS130L	Database Systems Lab	0-1-1
5.	CS305	Software Engineering	3-0-3
6.	CS325	Operating Systems	3-0-3
	CS325L	Operating Systems Lab	0-1-1

SEMESTER-SUMMER*

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1.	CS490	Internship		3-0-3

* 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.
1.	CSXXX	Domain Elective-VI		2-0-2
2.	CSXXXL	Domain Elective -VI Lab		0-1-1
3.	CS426	Parallel and Distributed Computing	CS325, CS325L	2-0-2
4.	CS426L	Parallel and Distributed Computing Lab	CS325, CS325L	0-1-1
5.	CSXXX	Domain Elective-VII		2-0-2
6.	CSXXXL	Domain Elective- VII Lab		0-1-1
7.	MK101	Principles of Marketing		3-0-3
8.	CS470	Professional Practices	-	2-0-2
9.	CS492	Final Year Project - II	CS491	0-2-2
10.	BA353	Entrepreneurship		2-0-2
			Total	13-5-18
		Total Contact Hours=22 * 2 FYP		

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SEMESTER-VIII

Sr. #	Course Code	Course Title	Pre-Req	Cr. Hrs.
1	CS434	Compiler Construction	CS333	2-0-2
2	CS434L	Compiler Construction Lab	CS333	0-1-1
3	CS424	Computer Architecture	CS226 CS226L	2-0-2
4	CS424L	Computer Architecture Lab	CS226 CS226L	0-1-1
5	CS474	HCI & Computer Graphics		2-0-2
6	CS474L	HCI & Computer Graphics Lab		0-1-1
7	CS493	Final Year Project – III	CS492	0-3-3
8				
			Total	6-6-12
		Total Contact Hours=15 *3 FYP		
			Grand Total	133

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List of Elective Courses

Sr. #	Course Code	Course Title	Pre-req	Cr. Hrs.
1	CS284	Visual Programming	CS112, CS112L	2-0-2
	CS284L	Visual Programming Lab	CS112, CS112L	0-1-1
2	CS281	Mobile Computing	-	2-0-2
	CS281L	Mobile Computing Lab	-	0-1-1
3	CS301	Full stack web development	CS112, CS112L	2-0-2
	CS301L	Full stack web development Lab	CS112, CS112L	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		Big Data Analytics		2-0-2
		Big Data Analytics Lab		0-1-1
9		Natural Language Processing		2-0-2
		Natural Language Processing Lab		0-1-1
10		Computer Vision		2-0-2
		Computer Vision Lab		0-1-1
11		Data Mining		2-0-2
		Data Mining Lab		0-1-1
12		Deep Learning		2-0-2
		Deep Learning Lab		0-1-1
13		Distributed Databases		2-0-2
		Distributed Databases Lab		0-1-1
14		Machine Learning		2-0-2
		Machine Learning Lab		0-1-1
15		Block Chain		2-0-2
		Block Chain Lab		0-1-1
16		ML Ops		2-0-2
		ML Ops Lab		0-1-1
17		Data Science		2-0-2
		Data Science Lab		0-1-1
18		Web Technologies		2-0-2
		Web Technologies Lab		0-1-1

* Codes of SNO 8-18 will be finalized by HoD Cs.

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

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