Bachelor of Science in Computer Science (BSCS) Scheme of Study (Fall 2024 onwards)

1. Introduction

This is the BS Computer Science (133 Cr. Hrs.) scheme of study, applicable to all BSCS batches inducted in FALL 2024 semester and onwards. This scheme conforms to HEC's National Curriculum of Computer Science, Software Engineering, and Information Technology revised in year 2023.

1.1. Eligibility Criteria

The requirements for admission in the Bachelor of Computer Science are: the candidate has secured at least 50% marks in Intermediate (HSSC) examination with at least one of the following condition(s):

1. Intermediate with Mathematics OR
2. Intermediate with Pre-Medical background (with additional Mathematics) OR are required to pass the deficiency courses of Mathematics of 6 credit hours within one year of their regular studies as per the National Computing Education Accreditation Council (NCEAC) vide notification No. NCEAE/HEC/General/3-20, dated 20th March 2020 OR
3. Equivalent foreign qualification with Mathematics certified by Inter Board Committee of Chairmen (IBCC).

1.2. Degree Requirements

To become eligible for award of BSCS degree, a student must satisfy the following requirements:

1. Must have studied and passed all the offered courses as per the scheme of study, totaling at least 133 credit hours.
2. Must have studied and passed all courses with letter grade D.
3. Must have successfully completed and passed the Non-Credit Hours Internship.
4. Must have earned CGPA (Cumulative Grade Point Average) of at least 2.0 on a scale of 4.0 for entire degree.
5. Must have passed University Hifz test as required by International Islamic University Islamabad (IIUI).

1.3. Course Registration Requirements

During registration of course(s), the passing of pre-requisite course(s) must be ensured.

1. A core course is an essential course of the degree and must be studied and passed. In case a student has failed a core course he/she may not be allowed to study an alternative course against it and must register and pass the same (failed) core course.
2. A student who has failed an elective course may study an alternative elective course (from the elective list) provided that department offers that course to complete the number of credit hours in that course group.
3. A course that is passed with grade D/D+ cannot be registered or studied again for improvement of the grade **until and unless the CGPA is less than 2.0 only** to enable the student to become eligible for the award of the degree **within the degree duration.**
4. For the Fall / Spring semesters the student is not allowed to register and study more than a total of nineteen (19) credit hours of courses in any case. However, in the last semester of the degree a student is allowed to register maximum of 24 credit hours including Final Year Project with the approval of Director (Acad & Exams).
5. For the Summer semester, a student is allowed to register only those courses that they have failed in

previous semesters or have D/D+ grades (provided CGPA is less than 2.0), up to a maximum of nine (09) credit hours only if offered by the department. Only studied and failed courses are allowed. Dropped or Lab-Based courses are not allowed in summer semester.

6. Students are eligible to register for a course offered by another department at IIUI, only if the desired course is not offered within the parent department, provided that the subject matter of the course aligns with majority of the contents covered in the parent department's subject.
7. No course can be registered in tutorship/supervisory mode during any semester due to the technical nature of the Computer Science degree**.**

1.4. Computer Science Courses

The degree program has two major course groups, Computer Science Courses and General Education Courses. The course division conforms the revised National Curriculum of Computer Science stipulated by HEC. Courses to study are categorized with credit hours as following:

Category	Areas	Type	Credit Hours	Courses
Computing Courses	Computing Core	Core	46	14
Computer Science Courses	Domain Core	Dom Core	18	6
	Domain Elective	Dom Elective	21	7
General Education Courses	Mathematics & Supporting Courses	Math & Supp.	12	4
	Elective Supporting Courses	Elec Supp.	3	1
	General Education Requirement	GEC	30	12
University Required Courses	UR	UR	03	01
Non-credit	Internship	Non-credit	0	
		Total	**133**	**45**

1.4.1. Computing - Core Courses (46 credit hours – 14 courses)

An enrolled student is required to study and pass all the listed courses with at least a letter grade (D) from this group. The pre-requisite courses must be passed before the next course can be registered.

S-No.	Course Code	Courses Title	Credit Hours	Contact Hours	Pre-Requisite
1	AI 201	Artificial Intelligence	2	2	Object Oriented Programming (CS212+CS212L)
	AI 201 L	Artificial Intelligence Lab	1	3	
2	CS 111	Programming Fundamentals	3	3	
	CS 111 L	Programming Fundamentals Lab	1	3	
3	CS 141	Digital Logic Design	2	2	
	CS 141 L	Digital Logic Design Lab	1	3	
4	CS 212	Object Oriented Programming	3	3	Programming Fundamental (CS111+CS111L)
	CS 212 L	Object Oriented Programming Lab	1	3	
5	CS 221	Data Structures	3	3	Object Oriented Programming (CS212+CS212L)
	CS 221 L	Data Structures Lab	1	3	
6	CS 231	Database Systems	3	3	
	CS 231 L	Database Systems Lab	1	3	
7	CS 251	Computer Networks	2	2	-

	CS 251 L	Computer Networks Lab	1	3	
8	CS 322	Analysis of Algorithms	3	3	Data Structures (CS221+CS221L)
9	CS 342	Operating Systems	2	2	-
	CS 342 L	Operating Systems Lab	1	3	
10	CS 443	Computer Organization & Assembly Language	2	2	Digital Logic Design (CS141+CS141L)
	CS 443 L	Computer Organization & Assembly Language Lab	1	3	
11	CS 352	Information Security	2	2	-
	CS 352 L	Information Security Lab	1	3	
12	SE 211	Software Engineering	3	3	
13	CS 483	Final Year Project – I	2(0-6)		Can only be registered after passing a minimum of 90 credit hours and all offered core courses must be passed with minimum Grade Letter D
14	CS 484	Final Year Project – II	4(0-12)		FYP-I (CS 483)

1.4.2. Computer Science Courses – Domain Core (18 credit hours – 6 courses)

Enrolled student has to pass all the listed courses with at least the letter grade D from this group. The pre-requisite courses must be passed before the next course can be studied/registered.

S-No.	Course Code	Courses Title	Credit Hours	Contact Hours	Pre-Requisite
1	CS 323	Theory of Automata	3	3	
2	CS 332	Advanced Database Management System	2	2	Database Systems (CS231+CS231L)
	CS 332 L	Advanced Database Management System Lab	1	3	
3	CS 344	Computer Architecture	2	2	COAL (CS424+CS424L)
	CS 344 L	Computer Architecture Lab	1	3	
4	CS 424	Compiler Construction	2	2	Theory of Automata (CS323)
	CS 424 L	Compiler Construction Lab	1	3	
5	IT 331	Parallel & Distributed Computing	2	2	Operating Systems (CS342+CS342L)
	IT 331 L	Parallel & Distributed Computing Lab	1	3	
6	SE 371	HCI & Computer Graphics	2	2	
	SE 371 L	HCI & Computer Graphics Lab	1	3	
		Total Credit Hours	**18**		

1.4.3. Computer Science Courses-Domain Electives (21 credit hours – 7 courses)

An enrolled student has to pass a minimum of 21 credit hours from the listed courses of this group. The pre-requisite courses must be passed before the next course can be registered. A 3-credit hour course may be taken in place of a 3-credit hour course. Department may announce a pre-requisite course for any elective course based on its contents. This is a not an exhaustive list of elective courses and the Department can/may offer other elective courses as per requirement and demand of Market.

S-No.	Course Code	Courses Title	Credit Hours	Contact Hours	Pre-Requisite
1	AI 211	Introduction to Machine Learning	2	2	
	AI 211 L	Introduction to Machine Learning Lab	1	3	
2	CS 313	Advanced Programming	2	2	OOP (CS212+CS212L)& Database Systems (CS231+CS231L)
	CS 313 L	Advanced Programming Lab	1	3	
3	CS 341	Database Technologies	2	2	Database Systems (CS231+CS231L)
	CS 341 L	Database Technologies Lab	1	3	
4	CS 381	Introduction to Digital Image Processing	2	2	
	CS 381 L	Introduction to Digital Image Processing Lab	1	3	
5	CS 414	Full Stack Web Development	2	2	Advanced Programming (CS313+CS313L)
	CS 414 L	Full Stack Web Development Lab	1	3	
6	CS 425	Numerical Analysis	2	2	
	CS 425 L	Numerical Analysis Lab	1	3	
7	CS 453	Data Encryption and Security	2	2	Information Security (CS352+CS352L)
	CS 453 L	Data Encryption and Security Lab	1	3	
8	DS 321	Introduction to Data Mining	2	2	
	DS 321 L	Introduction to Data Mining Lab	1	3	
9	DS 341	Big Data Analytics	2	2	-
	DS 341 L	Big Data Analytics Lab	1	3	
10	DS 371	Natural Language Processing	2	2	-
	DS 371 L	Natural Language Processing Lab	1	3	
11	IT 321	Web Technologies	2	2	-
	IT 321 L	Web Technologies Lab	1	3	
12	IT 322	Web Engineering	2	2	-
	IT 322 L	Web Engineering Lab	1	3	
13	IT 351	Enterprise Systems	2	2	-
	IT 351 L	Enterprise Systems Lab	1	3	
14	IT 352	Information System Audit	2	2	-
	IT 352 L	Information System Audit Lab	1	3	

15	IT 412	Cyber Security	2	2	Information Security (CS352+CS352L)
	IT 412 L	Cyber Security Lab	1	3	
16	IT 433	Cloud Computing	2	2	-
	IT 433 L	Cloud Computing Lab	1	3	
17	SE 232	Object Oriented Analysis & Design	2	2	OOP(CS212+CS212L)
	SE 232 L	Object Oriented Analysis & Design Lab	1	3	
18	SE 321	Software Project Management	2	2	Web Technologies (CS321+CS321L)
	SE 321 L	Software Project Management Lab	1	3	
19	SE 333	Software Design & Architecture	2	2	-
	SE 333 L	Software Design & Architecture Lab	1	3	
20	SE 361	Software Quality Engineering	2	2	-
	SE 361 L	Software Quality Engineering Lab	1	3	
21	SE 362	Software Verfication & Validaion	2	2	-
	SE 362 L	Software Verfication & Validaion Lab	1	3	
22	SE 373	E-Commerce	3	3	
23	SE 375	Real Time Systems	3	3	SE (SE211)
24	SE 481	Mobile Application Development	2	2	
	SE 481 L	Mobile Application Development Lab	1	3	
		Total Credit Hours	**21**		

1.4.4 Mathematics & Supporting Courses (12 Credit Hours)

Enrolled students are required to study and pass all the prescribed courses from the course list given below.

S-No.	Code	Course Title	Credit Hours	Contact Hours	Pre-requisite
1	GEC 306	Technical & Business Writing	3	3	GEC 102
2	MAT 122	Calculus II (Multivariable Calculus)	3	3	GEC 215
3	MAT 211	Introduction to Linear Algebra	3	3	GEC 215
4	ASE 211	Probability & Statistics	3	3	-
		Total Credit Hours	**12**		

1.4.5 Elective supporting Courses (03 Credit Hours 1 Course)

An Enrolled student is required to study and pass a minimum of 03 credit hours from the listed courses of this group:

S-No.	Course Code	Course Title	Credit Hours	Contact Hours	Pre-Requisite
1	FBF 251	Business Finance	3	3	
2	KDM 323	Digital Marketing	3	3	
3	PSY 106	Introduction to Psychology	3	3	
4	URC 201	Functional Arabic	3	3	

1.4.6 General Education Requirement Courses (31 Credit Hours 12 Courses)

An enrolled student has to study and pass minimum of 30 credits hours from the courses list given below. This is not an exhaustive list and the Department may offer other courses as General Education.

S-No.	Course Code	Course Title	Credit Hours	Contact Hours	Pre-requisite
1	GEC 101	Introduction to Arts & Humanities (Professional Practices)	2	2	
2	GEC 102	Functional English	3	3	
3	GEC 103 *OR* GEC 104	Islamic Studies *OR* Ethics (for Non-Muslims)	2	2	
4	GEC 112	Introduction to Social Sciences (e.g. Intro to Management)	2	2	
5	GEC 113	Quantitative Reasoning I (Discrete Structures)	3	3	
6	GEC 114	Application of Information & Communication Technologies	2	2	
	GEC 114 L	Application of Information & Communication Technologies Lab	1	3	
7	GEC 205	Expository Writing	3	3	
8	GEC 206	Ideology and Constitution of Pakistan	2	2	
9	GEC 207	Civics and Community Engagement	2	2	
10	GEC 215	Calculus and Analytical Geometry	3	3	
11	GEC 216	Entrepreneurship	2	2	
12	PHY 251	Basic Electronics	2	2	
	PHY 251 L	Basic Electronics Lab	1	3	
		Total Credit Hours	**30**		

1.4.7 University Required Course

Following university required course is mandatory.

Course Code	Course Title	Credit Hours	Contact Hours
URC 302	Understanding Quran	3	3
	Total Credit Hours	**3**	

1.4.8 Non-Credit Courses

A student with Pre-Medical background in intermediate is required to study the following two courses. These two courses will not be counted towards degree and must be studied within one the first year of their regular studies.

Course Code	Course Title	Credit Hours	Contact Hours	Remarks
M 101	Mathematics – I	3	3	Only Pre-Medical Students
M 102	Mathematics – II	3	3	Only Pre-Medical Students
	Total Credit Hours	**6**		

1.4.9 Field Experience / Internship (Non Credit)

The field experience of eight weeks (preferably undertaken during summer break) must be graded by a faculty member in collaboration with the supervisor in the field. This is a mandatory degree award requirement for BSCS degree program.

2. Tentative Semester Wise Course Offering Plan

Tentative course offering plan for BS in Computer Science degree offered from Fall 2024 is given below in a semester wise format. This may differ in actual offering to any particular batch.

1st Semester – FALL

Course Code	Course Title	Domain	Credit Hours	Contact Hours	Workload	Pre-requisite
GEC 102	Functional English	GEC1	3(3-0)	3	3	None
GEC 113	Discrete Structure (QR-I)	GEC2	3(3-0)	3	3	None
GEC 114	Application of Information & Communication Technologies (Old ICT)	GEC3	3(2-3)	2	5	None
GEC 114 L	Application of Information & Communication Technologies Lab			3		
GEC 215	Calculus & Analytical Geometry (QR-II)	GEC4	3(3-0)	3	3	None
PHY 251	Applied Physics (Basic Electronics)	GEC5	3(2-3)	2	5	None
PHY 251 L	Applied Physics (Basic Electronics) Lab			3		
M 101	Mathematics – I (Only for Pre-medical students)	NC				
	Total		**15**	**19**		

2nd Semester – SPRING

Course Code	Course Title	Domain	Credit Hours	Contact Hours	Workload	Pre-requisite
CS 111	Programming Fundamentals	Core1	4(3-3)	3	6	None
CS 111 L	Programming Fundamentals Lab			3		
CS 141	Digital Logic Design	Core2	3(2-3)	2	5	None
CS 141 L	Digital Logic Design Lab			3		
URC 201	Functional Arabic	Elec Supp.1	3(3-0)			
GEC 205	Expository Writing	GEC6	3(3-0)	3	3	Functional English
MAT 122	Multivariable Calculus	Math & Supp.1	3(3-0)	3	3	CAG
GEC 103	Islamic Studies	GEC	2(2-0)	2	2	None
M 102	Mathematics – II (Only for Pre-medical students)	NC				M 101
	Total		**18 (16-6)**	**22**		

3rd Semester – FALL

Course Code	Course Title	Domain	Credit Hours	Contact Hours	Workload	Pre-requisite
CS 212	Object Oriented Programming	Core3	4(3-3)	3	6	CS 111 PF
CS 212 L	Object Oriented Programming Lab			3		
URC 302	Understanding Quran	UR1	3(3-0)	3	3	

GEC 112	Introduction to Social Sciences (Intro to Management)	GEC8	2(2-0)	2	2	None
MAT 221	Linear Algebra	Math & Supp.2	3(3-0)	3	3	
SE 111	Software Engineering	Core4	3(3-0)	3	3	None
	Total		**15 (14-3)**	**17**		

4th Semester – SPRING

Course Code	Course Title	Domain	Credit Hours	Contact Hours	Workload	Pre-requisite
CS 221	Data Structures	Core5	4(3-3)	3	6	CS 212 OOP
CS 221 L	Data Structures Lab			3		
CS 251	Computer Networks	Core6	3(2-3)	2	5	None
CS 251 L	Computer Networks Lab			3		
CS 231	Database Systems	Core7	4(3-3)	3	6	None
CS 231 L	Database Systems Lab			3		
SE 232	Object Oriented Analysis & Design	Dom Elec1	3(2-3)	2	5	
SE 232 L	Object Oriented Analysis & Design Lab			3		
ASE 211	Probability & Statistics	Math & Supp.3	3(3-0)	3	3	None
	Total		**17 (13-12)**	**25**		

5th Semester - FALL

Course Code	Course Title	Domain	Credit Hours	Contact Hours	Workload	Pre-requisite
CS 313	Advance Programming	Dom Elec2	3(2-3)	2	5	OOP
CS 313 L	Advance Programming Lab			3		
CS 322	Analysis of Algorithms	Core8	3(3-0)	3	3	CS 221 DS
CS 342	Operating Systems	Core9	3(2-3)	2	5	
CS 342 L	Operating Systems Lab			3		
CS 352	Information Security	Core10	3(2-3)	2	5	None
CS 352 L	Information Security Lab			3		
CS 332	Advance Database Management Systems	DC1	3(2-3)	2	5	Database System
CS 332 L	Advance Database Management Systems Lab			3		
CS 344	Computer Architecture	DC4	3(2-3)	2	5	
CS 344 L	Computer Architecture Lab			3		
	Total		**18(13-15)**	**28**		

6th Semester – SPRING

Course Code	Course Title	Domain	Credit Hours	Contact Hours	Workload	Pre-requisite
AI 201	Artificial Intelligence	Core12	3(2-3)	2	5	OOP
AI 201 L	Artificial Intelligence Lab			3		
CS 323	Theory of Automata	DC2	3(3-0)	3	3	None
GEC 306	Technical & Business Writing	Math & Supp.4	3(3-0)	3	3	GEC 205 - EW
SE 481	Mobile Application Development	Dom Elec3	3(2-3)	2	5	
SE 481 L	Mobile Application Development Lab			3		

IT 321	Web Technologies	Dom Elec4	3(2-3)	2	5	
IT 321 L	Web Technologies Lab			3		
IT 331	Parallel & Distributed Computing	DC3	3(2-3)	2	5	
IT 331 L	Parallel & Distributed Computing Lab			3		
	Total		**18 (13-12)**	**26**		

SUMMER Semester (Between 6th and 7th Semester)

Course Code	Course Title	Credit Hours	Pre-requisite
TBD by University	Internship (UR)	Non-Credit	

7th Semester - FALL

Course Code	Course Title	Domain	Credit Hours	Contact Hours	Workload	Pre-requisite
CS 443	Computer Organization & Assembly Language	Core11	3(2-3)	2	5	CS 141 DLD
CS 443 L	Computer Organization & Assembly Language Lab			3		
CS 424	Compiler Construction	DC5	3(2-3)	2	5	Theory of Automata
CS 424 L	Compiler Construction Lab			3		
IT 433	Cloud Computing	Dom Elec5	3(2-3)	2	5	
IT 433 L	Cloud Computing Lab			3		
SE 371	HCI & Computer Graphics	DC6	3(2-3)	2	5	
SE 371 L	HCI & Computer Graphics Lab			3		
SE 362	Software Verification & Validation	Dom Elec6	3(2-3)	2	5	
SE 362 L	Software Verification & Validation Lab			3		
CS 483	Final Year Project-I	Core13	2(0-6)	2	2	Can only be registered after passing a minimum of 92 credit hours and all Information technology Core and Computing Core courses must be passed with grade D.
	Total		**17 (11-21)**	**24**		

8th Semester - SPRING

Course Code	Course Title	Domain	Credit Hours	Contact Hours	Workload	Pre-requisite
IT 412	Cyber Security	Dom Elec7	3(2-3)	2	5	Information Security
IT 412 L	Cyber Security Lab			3		
GEC 101	Introduction to Arts & Humanities (Professional Practices)	GEC9	2(2-0)	2	2	
GEC 206	Ideology and Constitution of Pakistan	GEC10	2(2-0)	2	2	
GEC 207	Civics and Community Engagement	GEC11	2(2-0)	2	2	

GEC 216	Entrepreneurship	GEC12	2(2-0)	2	2	
CS 484	Final Year Project-II	Core14	4(0-12)	4	4	FYP-I
	Total		**15 (11-15)**	**17**		

* In Last semester the reason to offer less courses is to put less pressure on students so that they may work properly on their FYP. Moreover if any student has 1 or 2 failed courses then he/she can take those courses in last semester (provided the said course is offered in that semester).