Bachelor of Science in Computer Science (BSCS) Scheme of Study (Fall 2018 onwards)

This is the scheme of study of BS Computer Science (136 Cr. Hrs), applicable on all BSCS batches inducted in Fall 2018 semester and onwards. Upon the recommendation of Board of Studies and Board of Faculty, the Academic Council of the IIUI has approved this scheme in its 75th (Emergency) meeting held on Friday, 25th January 2019.

This new scheme conforms to HEC's National Curriculum of Computer Science, Software Engineering, and Information Technology revised in year 2017.

1.1 Eligibility Criteria

The requirements for admission in the Bachelor of Computer Science degree is that enrolled student has secured at least 50% marks in Intermediate (HSSC) examination with Mathematics or equivalent qualification with Mathematics certified by IBCC.

1.2. Degree Requirements

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

- Must have studied and passed all the prescribed courses, totalling at least 136 credit hours.
- Must have earned CGPA (Cumulative Grade Point Average) of at least 2.0 on a scale of 4.0
- Must have studied and passed all Computing Core, Degree core and Degree Supporting) courses with letter grade C.
- Must have passed University Hifz test as required by IIUI.

1.3. Course Registration Requirements

- The pre-requisite courses must be passed before any course can be registered to study.
- A core course is a course that must be studied. In case a student has failed this course he/she may not be able to study an alternative course against it and must repeat it to improve the grade.
- Students who have failed an elective course may choose to study any other elective from the offered courses (from the given list or recommended by department) to complete the number of credit hours in that course group.
- Any course that has been passed by student in letter grade C cannot be registered again for improvement.
- Senior Design Project I can only be registered if the student has passed all computing core (37 credit hours) courses and has passed a total of 100 credit hours.
- For Fall/Spring semesters, student would not be allowed to register more than a total of twenty one (21) credit hours of workload.
- For Summer semester, student would be allowed to register only those courses that they have failed in previous semesters and up to a maximum of total six (06) credit hours of course load.

- **No course can be registered in tutorship mode (supervisory course) during any semester. Due to technical nature of Computer degree courses, tutorship mode is not appropriate hence discontinued.**

1.4. Computer Science Degree Courses

The degree program has two major course groups, Computer Science Courses and General Education courses. The course division follows HEC's guidelines. Course to study are categorised with credit hours as following:

Category	Grouping	Type	Credit Hours	% of Total Courses
Computer Science Courses	Computing - Core Courses	Core	43	67%
	Computer Science Core Courses	Core	24	
	Computer Science Supporting Courses	Core	9	
	Computer Science Elective Courses	Electives	15	
General Education	University Required Courses (UR)	Core	24	33%
	Science & Mathematics Foundation (SM)	Core	12	
	General Education (GE)	Electives	9	
	Total Credit hours		**136**	

1.4.1 Computing - Core Courses (43 Credit hours)

Enrolled student has to pass all the listed courses with letter grade C from this group. The prerequisite courses must be passed before the course can be studied/registered.

Course Code	Course Title	Cr. Hrs.	Pre-requisite Course	Details
CS 101	Introduction to Computing	4		*With 1 credit hour of laboratory work*
CS 102	Discrete Structures	3		
CS 111	Programming Fundamentals	4	CS 101 Introduction to Computing	*With 1 credit hour of laboratory work*
CS 211	Object Oriented Paradigm	4	CS 111 Programming Fundamentals	*With 1 credit hour of laboratory work*
CS 214	Data Structure and Algorithms	4	CS 211 Object Oriented Paradigm	*With 1 credit hour of laboratory work*
SE 101	Introduction to Software Engineering	3		
CS 224	Operating Systems	4	CS 214 Data Structure and Algorithms	*With 1 credit hour of laboratory work*
CS 242	Introduction to Database Systems	4		*With 1 credit hour of laboratory work*
CS 374	Computer Networks	4		*With 1 credit hour of laboratory work*
CS 375	Information Security	3		
CS 401	Senior Design Project - i	3	*Can only be registered after passing a minimum of 100 credit hours and all core courses must be passed in letter grade C*	
CS 402	Senior Design Project - ii	3	CS 401 Senior Design Project - i	
	Total credit hours	43		

1.4.2 Computer Science - Degree Core Courses (24 Credit hours)

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

Course Code	Course Title	Cr. Hrs.	Pre-requisite Course	Details
CS 213	Design and Analysis of Algorithms	3	CS 214 Data Structure and Algorithms	
CS 225	Digital Logic and Design	4	MS 110 Applied Physics	*With 1 credit hour of laboratory work*
CS 314	Theory of Automata	3		
CS 324	Computer Organization and Assembly Language	4	CS 225 Digital Logic and Design	*With 1 credit hour of laboratory work*
CS 363	Parallel & Distributed Computing	3	CS 224 Operating Systems	
CS 411	Compiler Construction	3	CS 314 Theory of Automata	
CS 453	Artificial Intelligence	4	CS 102 Discrete Structures	*With 1 credit hour of laboratory work*
	Total Credit hours	24		

1.4.3 Computer Science - Degree Supporting Courses (09 Credit hours)

Enrolled student has to pass all the listed courses with letter grade C from this group. The pre-requisite courses must be passed before the course can be studied/registered. The department may **offer any three courses** from the course list below.

Course Code	Course Title	Cr. Hrs.	Pre-requisite Course
CS 201	Differential Equation	3	MS 111 Calculus & Analytical Geometry
CS 301	Multivariate Calculus	3	MS 111 Calculus & Analytical Geometry
CS 362	Simulation and Modelling	3	
CS 364	Operations Research	3	MS 113 Probability and Statistics
CS 365	Stochastic Processes	3	MS 113 Probability and Statistics
CS 411	Numerical Computing	3	
CS 433	Theory of Programming Languages	3	CS 211 Object Oriented Paradigm
CS 475	Graph Theory	3	CS 102 Discrete Structures

1.4.4 Computer Science - Degree Elective Courses (Minimum 15 Credit hours)

Enrolled student has to pass a minimum of 15 credit hours from the listed courses of this group. The pre-requisite courses must be passed before the course can be studied/registered. Department may announce a pre-requisite course for any elective based on its contents. This is a not an exhaustive list of elective courses and Department of CS & SE may offer other courses as electives.

Course Code	Course Title	Cr. Hrs.	Pre-requisite Course/Details
CS 331	Visual Programming	3	
CS 341	Database Technologies	3	
CS 361	Computer Graphics	3	
CS 421	Systems Programming	3	
CS 426	Real Time Systems	3	
CS 432	Web Engineering	3	
CS 434	Natural Language Processing	3	
CS 435	Semantic Web	3	
CS 444	Distributed Database Management Systems	3	
CS 446	Introduction to Data Mining & Warehousing	3	
CS 455	Big Data Analytics	3	
CS 456	Cloud Computing	3	
CS 474	Data Encryption and Security	3	
CS 491	Topics in Computer Science	3	
CS 492	Introduction to Digital Image Processing	3	
IT 184	Information Technology Infrastructure	3	
IT 332	Mobile Application Development	3	
IT 335	Multimedia Communication	3	
IT 341	Management Information Systems	3	
IT 376	Cyber Security	3	
IT 382	Information Technology Project Management	3	
IT 444	Information System Audit	3	
IT 491	Topics in Information Technology	3	
SE 241	Advanced Computer Programming	3	
SE 311	Software Requirements Engineering	3	SE 101 Introduction to Software Engineering
SE 321	Object Oriented Analysis and Design	3	CS 211 Object Oriented Paradigm
SE 331	Software Design and Architecture	3	
SE 337	Physical Computing & IOT	3	
SE 338	Game Application Development	3	
SE 345	Enterprise Systems	3	
SE 346	E-Commerce	3	
SE 359	Software Metrics	3	
SE 361	Software Engineering Economics	3	
SE 381	Distributed Application Development	3	
SE 431	Human Computer Interaction	3	
SE 432	Design Patterns	3	
SE 433	Continuous Integration and DevOPs	3	
SE 453	Business Process Engineering	3	

Course Code	Course Title	Cr. Hrs.	Pre-requisite Course/Details
SE 471	Software Quality Engineering	3	
SE 472	Software Testing	3	
SE 474	Agent Based Software Engineering	3	
SE 477	Global Software Development	3	
SE 481	Software Development Technologies	3	
SE 491	Topics in Software Engineering	3	
LB 111	Lab - Advance Computer Programming	1	*Laboratory work of 1 credit hour. Course can only be registered in conjunction with SE 241 only*
LB 112	Lab - Design Patterns	1	*Laboratory work of 1 credit hour. Course can only be registered in conjunction with SE 432 or SE 331 only*
LB 113	Lab - Project Management Tools	1	*Laboratory work of 1 credit hour. Course can only be registered in conjunction with IT 382 or SE 461 only*
LB 114	Lab - Physical Computing	1	*Laboratory work of 1 credit hour. Course can only be registered in conjunction with SE 337 only*
LB 115	Lab - CASE Tools	1	*Laboratory work of 1 credit hour. Course can only be registered in conjunction with SE 311 only*

1.4.5 University required courses (24 Credit hours)

Enrolled student has to study and pass all the prescribed courses. The pre-requisite courses must be passed before the course can be studied/registered. Non-Muslim students can study Ethics in replacement of Islamic World View & Civilization only.

Course Code	Course Title	Cr. Hrs.	Pre-requisite Course
GC 101	Understanding Quran - i	3	
GC 103	Understanding Quran - ii	3	
GC 106	Islamic World View & Civilization*	3	
GC 102	English Composition & Comprehension	3	
GC 104	Communication & Presentation Skills	3	GC 102 English Composition & Comprehension
GC 120	Technical & Business Writing	3	GC 104 Communication & Presentation Skills
GC 109	Pakistani Culture & Society	3	
GC 108	Professional Practices	3	

1.4.6 Science & Mathematics Foundation courses (12 Credit hours)

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

Course Code	Course Title	Cr. Hrs.
MS 110	Applied Physics	3
MS 111	Calculus & Analytical Geometry	3
MS 112	Linear Algebra	3
MS 113	Probability & Statistics	3
	Total Credit hours	12

1.4.7 General Education courses (Minimum 09 Credit hours)

Enrolled student is required to study and pass a minimum of 09 credit hours from the course list given below. This is a not an exhaustive list and Department of CS & SE may offer other courses as General Education.

Course Code	Course Title	Cr. Hrs.
GC 131	Media Studies	3
GC 132	Intro to Social Media Marketing	3
GC 152	Introduction to Management	3
GC 204	Introduction to Sociology	3
GC 205	Introduction to Psychology	3
GC 210	International Relations	3
GC 211	Engineering Management	3
GC 212	Introduction to Political Science	3
GC 400	Internship	1
GC 401	Entrepreneurship	3
GC 402	Industrial Seminar	1
GC 403	Social Work	1
GC 410	Foreign Language	3

1.5. Tentative Semester wise course offering plan (BSCS)

Tentative course offering plan for BS Computer Science degree offered from Fall 2018 is given below in a semester wise format. It should be noted that this is a tentative plan and may change while offering.

1st Semester - Fall

Course Code	Course Title	CrHrs	Pre-requisite Course
CS 101	Introduction to Computing	4	None
CS 102	Discrete Structures	3	None
GC 102	English Composition & Comprehension	3	None
MS 111	Calculus & Analytical Geometry	3	None
MS 110	Applied Physics	3	None
	Total Credit Hrs	**16**	

2nd Semester - Spring

Course Code	Course Title	CrHrs	Pre-requisite Course
CS 111	Programming Fundamentals	4	CS 101 Introduction to Computing
CS 225	Digital Logic and Design	4	MS 110 Applied Physics
CS 301	Multivariate Calculus	3	MS 111 Calculus & Analytical Geometry
GC 101	Understanding Quran - i	3	None
GC 104	Communication & Presentation Skills	3	GC 102 English Composition & Comprehension
	Total Credit Hrs	**17**	

3rd Semester - Fall

Course Code	Course Title	CrHrs	Pre-requisite Course
CS 211	Object Oriented Paradigm	4	CS 111 Programming Fundamentals
SE 101	Introduction to Software Engineering	3	None
CS 324	Computer Organization and Assembly Language	4	CS 225 Digital Logic and Design
GC 103	Understanding Quran - ii	3	None
MS 112	Linear Algebra	3	None
	Total Credit Hrs	**17**	

4th Semester - Spring

Course Code	Course Title	CrHrs	Pre-requisite Course
CS 214	Data Structure and Algorithms	4	CS 211 Object Oriented Paradigm
CS 374	Computer Networks	4	None
MATH 241	Differential Equation	3	MS 111 Calculus & Analytical Geometry
GC 106	Islamic World View & Civilization*	3	None
	General Education - i	3	
	Total Credit Hrs	**17**	

5th Semester - Fall

Course Code	Course Title	CrHrs	Pre-requisite Course
CS 224	Operating Systems	4	CS 214 Data Structure and Algorithms
CS 242	Introduction to Database Systems	4	None
CS 213	Design and Analysis of Algorithms	3	CS 214 Data Structure and Algorithms
SE 241	Advance Computer Programming (Elective – i)	3	None
MS 113	Probability & Statistics	3	None
	Total Credit Hrs	**17**	

6th Semester - Spring

Course Code	Course Title	CrHrs	Pre-requisite Course
CS 375	Information Security	3	None
CS 453	Artificial Intelligence	4	CS 102 Discrete Structures
CS 314	Theory of Automata	3	None
CS 411	Numerical Computing	3	None
SE 321	Object Oriented Analysis & Design (Elective - ii)	3	CS 211 Object Oriented Paradigm
	Degree Elective - iii	3	
	Total Credit Hrs	**19**	

7th Semester - Fall

Course Code	Course Title	CrHrs	Pre-requisite Course
CS 401	Senior Design Project - i	3	Minimum of 100 credit hours and all core courses must be passed in letter grade C
CS 411	Compiler Construction	3	CS 314 Theory of Automata
CS 363	Parallel & Distributed Computing	3	CS 224 Operating Systems
	Degree Elective - iv	3	
GC 120	Technical & Business Writing	3	GC 104 Communication & Presentation Skills
	General Education - ii	3	
	Total Credit Hrs	**18**	

8th Semester - Spring

Course Code	Course Title	CrHrs	Pre-requisite Course
CS 402	Senior Design Project - ii	3	CS 401 Senior Design Project - i
	Degree Elective - v	3	
GC 109	Pakistani Culture & Society	3	
GC 108	Professional Practices	3	
	General Education - iii	3	
	Total Credit Hrs	**15**	

Total Degree Credit Hrs	**136**

Agenda item no 9, approved by Academic Council in its 75th (Emergency) meeting held on Friday, 25th January, 2019