

**Scheme of Studies**  
**Faculty of Computing and Artificial Intelligence**  
**Department of Creative Technologies**  
**Bachelor of Science in Software Engineering**  
**(Applicable from Fall-2023 Intake & Onwards)**

**Framework of BSSE Program**

Area	Category	Course Code & Title	Cr. Hrs.	%	
Computing	Computing Core	CS111	Programming Fundamentals	3-0-3	~61.4
		CS111L	Programming Fundamentals Lab	0-1-1	
		CS112	Object Oriented Programming	3-0-3	
		CS112L	Object Oriented Programming Lab	0-1-1	
		CS130	Database Systems	3-0-3	
		CS130L	Database Systems Lab	0-1-1	
		EE123	Digital Logic Design	2-0-2	
		EE123L	Digital Logic Design Lab	0-1-1	
		CS216	Data Structures	3-0-3	
		CS216L	Data Structures Lab	0-1-1	
		CS215	Information Security	2-0-2	
		CS215L	Information Security Lab	0-1-1	
		AI232	Introduction to Artificial Intelligence	2-0-2	
		AI232L	Introduction to Artificial Intelligence Lab	0-1-1	
		CS260	Computer Networks	2-0-2	
		CS260L	Computer Networks Lab	0-1-1	
		SE101	Introduction to Software Engineering	3-0-3	
		CS226	Computer Organization and Assembly Language	2-0-2	
		CS226L	Computer Organization and Assembly Language Lab	0-1-1	
		CS325	Operating Systems	2-0-2	
		CS325L	Operating Systems Lab	0-1-1	
		CS332	Design and Analysis of Algorithms	3-0-3	
		SE497	Final Year Project – I	0-1-1	
		SE498	Final Year Project – II	0-2-2	
	SE499	Final Year Project - III	0-3-3		
	Domain Core	SE216	Software Design and Architecture	3-0-3	
		SE200	Software Requirement Engineering	2-0-2	
		SE200L	Software Requirement Engineering Lab	0-1-1	
		SE321	Software Construction and Development	2-0-2	
		SE321L	Software Construction and Development Lab	0-1-1	
		SE343	Software Quality Engineering	2-0-2	
		SE343L	Software Quality Engineering Lab	0-1-1	
		SE353	Software Project Management	2-0-2	
SE353L		Software Project Management Lab	0-1-1		
CS426		Parallel and Distributed Computing	2-0-2		
CS426L	Parallel and Distributed Computing Lab	0-1-1			

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Domain Elective	SEXXX	SE Elective – I	2-0-2
	SEXXXL	SE Elective – I Lab	0-1-1
	SEXXX	SE Elective – II	2-0-2
	SEXXXL	SE Elective – II Lab	0-1-1
	SEXXX	SE Elective – III	2-0-2
	SEXXXL	SE Elective – III Lab	0-1-1
	SEXXX	SE Elective – IV	2-0-2
	SEXXXL	SE Elective – IV Lab	0-1-1
	SEXXX	SE Elective – V	2-0-2
	SEXXXL	SE Elective – V Lab	0-1-1
	SEXXX	SE Elective – VI	2-0-2
	SEXXXL	SE Elective – VI Lab	0-1-1
	SEXXX	SE Elective – VII	2-0-2
	SEXXXL	SE Elective – VII Lab	0-1-1

Total	Number of Computing Core Courses: *14	Cr. Hrs. : 46 (30-16)
	Number of Domain Core Courses: 06	Cr. Hrs. : 18 (13-5)
	Number of Domain Elective Courses: 07	Cr. Hrs. : 21 (14-7)
	<b>Number of Computing Courses: 27</b>	<b>Cr. Hrs. : 85 (56-29)</b>

\* Note: FYP-I, FYP-II, and FYP-III are considered two rather than three courses.

Non-Computing	Mathematics and Supporting Courses	MA105	Multivariable Calculus	3-0-3
		MA201	Linear Algebra	3-0-3
		MA301	Probability and Statistics	3-0-3
		EL400	Technical & Business Writing	3-0-3
	Elective Supporting Courses	XXXXX	Elective Supporting - I	3-0-3
		General Education Requirement Courses	CS181	Applications of Information & Communication Technologies
	CS181L		Applications of Information & Communication Technologies Lab	0-1-1
	EL170		Functional English	3-0-3
	EL271		Expository Writing	3-0-3
	MA216		Quantitative Reasoning – I (Discrete Structures)	3-0-3
	MA110		Quantitative Reasoning – II (Calculus & Analytical Geometry)	3-0-3
	HU124		Islamic Studies & Ethics	2-0-2
	HU405		Ideology and Constitution of Pakistan	2-0-2
	BA152		Social Sciences (Introduction to Management)	2-0-2
	PH111		Natural Sciences (Applied Physics)	2-0-2
	PH111L		Natural Sciences (Applied Physics Lab)	0-1-1
	CS470		Arts & Humanities (Professional Practices)	2-0-2
	HU411	Civics and Community Engagement	2-0-2	
	BA353	Entrepreneurship	2-0-2	

Total	Number of Mathematics and Supporting Courses: 04	Cr. Hrs. : 12 (12-0)
	Number of Elective Supporting Courses: 01	Cr. Hrs. : 3 (3-0)

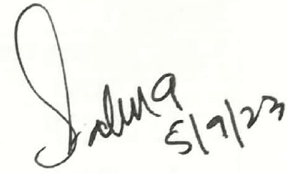
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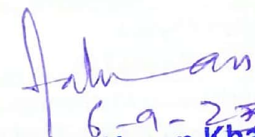
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	Number of General Education Requirement Courses: 12	Cr. Hrs. : 30 (28+2)	
	Number of Computing Courses: 17	Cr. Hrs. : 45 (43-2)	
<b>Grand Total</b>	<b>Total Number of Courses: 44 + Internship</b>		
	<b>Total Cr. Hrs. : 130 (99-31) + Internship (03) = 133</b>		

  
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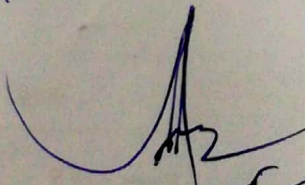
  
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**Semester-Wise Scheme of Studies**  
**Faculty of Computing and Artificial Intelligence**  
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**Bachelor of Science in Software Engineering**  
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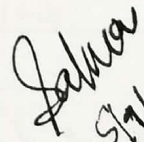
Semester I				
S. No.	Course Code	Course Title	Pre-req.	Cr Hrs.
1.	CS111	Programming Fundamentals	-	3-0-3
2.	CS111L	Programming Fundamentals Lab	-	0-1-1
3.	CS181	Applications of Information & Communication Technologies	-	2-0-2
4.	CS181L	Applications of Information & Communication Technologies Lab	-	0-1-1
5.	EL170	Functional English	-	3-0-3
6.	HU124	Islamic Studies & Ethics	-	2-0-2
7.	PH111	Applied Physics	-	2-0-2
8.	PH111L	Applied Physics Lab	-	0-1-1
9.	*MA114	Foundational Mathematics (Non-Credit for Pre-Medical students only)	-	3-0-3
Total Cr. Hrs.:				<b>12-3-15</b>
Total Contact Hours: 21				

Semester II				
S. No.	Course Code	Course Title	Pre-req.	Cr Hrs.
1.	CS112	Object Oriented Programming	CS111, CS111L	3-0-3
2.	CS112L	Object Oriented Programming Lab	CS111, CS111L	0-1-1
3.	CS130	Database Systems	-	3-0-3
4.	CS130L	Database Systems Lab	-	0-1-1
5.	EE123	Digital Logic Design	-	2-0-2
6.	EE123L	Digital Logic Design Lab	-	0-1-1
7.	SE101	Introduction to Software Engineering	-	3-0-3
8.	MA216	Discrete Structures	-	3-0-3
9.	*MA118	Pre-Calculus (Non-Credit for Pre-Medical Students only)	-	3-0-3
Total Cr. Hrs.:				<b>14-3-17</b>
Total Contact Hours: 23				

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Semester III				
S. No.	Course Code	Course Title	Pre-req.	Cr Hrs.
1.	CS216	Data Structures	CS112, CS112L	3-0-3
2.	CS216L	Data Structures	CS112, CS112L	0-1-1
3.	AI232	Introduction to Artificial Intelligence	-	2-0-2
4.	AI232L	Introduction to Artificial Intelligence Lab	-	0-1-1
5.	CS260	Computer Networks	-	2-0-2
6.	CS260L	Computer Networks Lab	-	0-1-1
7.	MA110	Calculus & Analytical Geometry	-	3-0-3
8.	MA301	Probability and Statistics	-	3-0-3
Total Cr. Hrs.:				<b>13-3-16</b>
Total Contact Hours: 22				

Semester IV				
S. No.	Course Code	Course Title	Pre-req.	Cr Hrs.
1.	CS226	Computer Organization and Assembly Language	EE123, EE123L	2-0-2
2.	CS226L	Computer Organization and Assembly Language Lab	EE123, EE123L	0-1-1
3.	SE216	Software Design & Architecture	SE101	3-0-3
4.	SE200	Software Requirement Engineering	SE101	2-0-2
5.	SE200L	Software Requirement Engineering Lab	SE101	0-1-1
6.	MA105	Multivariable Calculus	MA110	3-0-3
7.	MA201	Linear Algebra	-	3-0-3
8.	SEXXX	Domain Elective - I	-	2-0-2
9.	SEXXXL	Domain Elective - I Lab	-	0-1-1
Total Cr. Hrs.:				<b>15-3-18</b>
Total Contact Hours: 24				

Summer		
SE496	*Internship	03 Cr. Hr.
<p><b>*Internship Requirement:</b> To graduate, every student must complete an internship program of <sup>06</sup>06 weeks duration, after the completion of their 4<sup>th</sup> semester, preferably during the summer break. The performance of the student during the internship will be evaluated and graded as a 03 Credit Hour course, and reflected in the transcript. Under exceptional circumstances, a student may be allowed to undertake the internship after 6<sup>th</sup> semester with the approval of HoD.</p>		

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Semester V			Pre-req.	Cr Hrs.
S. No.	Course Code	Course Title		
1.	CS325	Operating Systems	CS226, CS226L	2-0-2
2.	CS325L	Operating Systems Lab	CS226, CS226L	0-1-1
3.	SE321	Software Construction & Development	SE216	2-0-2
4.	SE321L	Software Construction & Development Lab	SE216	0-1-1
5.	SE343	Software Quality Engineering	SE200, SE200L	2-0-2
6.	SE343L	Software Quality Engineering Lab	SE200, SE200L	0-1-1
7.	SEXXX	Domain Elective - II	-	2-0-2
8.	SEXXXL	Domain Elective - II Lab	-	0-1-1
9.	CS332	Design and Analysis of Algorithms	CS216, CS216L	3-0-3
10.	EL271	Expository Writing	EL170	3-0-3
Total Cr. Hrs.:				14-4-18
Total Contact Hours: 26				

Semester VI				
S. No.	Course Code	Course Title	Pre-req.	Cr Hrs.
1.	SE353	Software Project Management	SE101	2-0-2
2.	SE353L	Software Project Management Lab	SE101	0-1-1
3.	SEXXX	Domain Elective - III	-	2-0-2
4.	SEXXXL	Domain Elective - III Lab	-	0-1-1
5.	EL400	Technical & Business Writing	-	3-0-3
6.	SEXXX	Domain Elective - IV	-	2-0-2
7.	SEXXXL	Domain Elective - IV Lab	-	0-1-1
8.	SEXXX	Domain Elective - V	-	2-0-2
9.	SEXXXL	Domain Elective - V Lab	-	0-1-1
10.	BA353	Entrepreneurship	-	2-0-2
11.	SE497	Final Year Project - I	List-A	0-1-1
Total Cr. Hrs.:				13-5-18
Total Contact Hours: 28				

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Semester VII				
S. No.	Course Code	Course Title	Pre-req.	Cr Hrs.
1.	SE498	Final Year Project - II	SE497	0-2-2
2.	CS215	Information Security	-	2-0-2
3.	CS215L	Information Security Lab	-	0-1-1
4.	SEXXX	Domain Elective - VI	-	2-0-2
5.	SEXXXL	Domain Elective - VI Lab	-	0-1-1
6.	SEXXX	Domain Elective - VII	-	2-0-2
7.	SEXXXL	Domain Elective - VII Lab	-	0-1-1
8.	CS426	Parallel and Distributed Computing	CS325, CS325L	2-0-2
9.	CS426L	Parallel and Distributed Computing Lab	CS325, CS325L	0-1-1
Total Cr. Hrs.:				<b>8-6-14</b>
Total Contact Hours: 26				

Semester VIII				
S. No.	Course Code	Course Title	Pre-req.	Cr Hrs.
1.	SE499	Final Year Project - III	SE498	0-3-3
2.	HU405	Ideology and Constitution of Pakistan		2-0-2
3.	CS470	Professional Practices		2-0-2
4.	HU411	Civics and Community Engagement		2-0-2
5.	XXXXX	Elective Supporting - I		3-0-3
6.	BA152	Introduction to Management		2-0-2
Total Cr. Hrs.:				<b>11-3-14</b>
Total Contact Hours: 20				

Program Total Credit Hours: 130 (99-31) + Internship (03) = 133

### List-A: Pre-Requisite Courses for Final Year Project - I

S. No.	Course Code	Course Title	Cr Hrs.
1.	CS111	Programming Fundamentals	3-0-3
2.	CS111L	Programming Fundamentals Lab	0-1-1
3.	CS112	Object Oriented Programming	3-0-3
4.	CS112L	Object Oriented Programming Lab	0-1-1
5.	CS216	Data Structures	3-0-3
6.	CS216L	Data Structures Lab	0-1-1
7.	SE101	Introduction to Software Engineering	3-0-3
8.	CS130	Database Systems	3-0-3
9.	CS130L	Database Systems Lab	0-0-1

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## List of Domain Elective Courses

**Note:** A student must study 07 domain elective courses, out of which at least 05 courses must be undertaken from the list given below. A student can undertake 02 domain elective courses from other FCAI departments with the permission of respective HoDs.

S. No.	Course Code	Course Title	Cr. Hrs.
1.	SE214	Human Computer Interaction	2-0-2
	SE214L	Human Computer Interaction Lab	0-1-1
2.	SE215	UI/UX Design	2-0-2
	SE215L	UI/UX Design Lab	0-1-1
3.	SE213	Object Oriented Analysis and Design	2-0-2
	SE213L	Object Oriented Analysis and Design Lab	0-1-1
4.	SE305	Software Re-Engineering	2-0-2
	SE305L	Software Re-Engineering Lab	0-1-1
5.	SE306	Formal Methods in Software Engineering	2-0-2
	SE306L	Formal Methods in Software Engineering Lab	0-1-1
6.	SE307	Reliability Engineering	2-0-2
	SE307L	Reliability Engineering Lab	0-1-1
7.	SE311	Database Management Systems	2-0-2
	SE311L	Database Management Systems Lab	0-1-1
8.	SE312	Multimedia Communication	2-0-2
	SE312L	Multimedia Communication Lab	0-1-1
9.	SE322	Full Stack Programming	2-0-2
	SE322L	Full Stack Programming Lab	0-1-1
10.	SE323	Mobile Application Development	2-0-2
	SE323L	Mobile Application Development Lab	0-1-1
11.	SE324	Semantic Web	2-0-2
	SE324L	Semantic Web Lab	0-1-1
12.	SE325	Computer Graphics	2-0-2
	SE325L	Computer Graphics Lab	0-1-1
13.	SE344	Software Risk Management	2-0-2
	SE344L	Software Risk Management Lab	0-1-1
14.	SE345	Software Measurement & Metrics	2-0-2
	SE345L	Software Measurement & Metrics Lab	0-1-1
15.	SE346	Stochastic Processes	2-0-2
	SE346L	Stochastic Processes Lab	0-1-1
16.	SE354	Business Process Engineering	2-0-2
	SE354L	Business Process Engineering Lab	0-1-1
17.	SE402	Agent Based Software Engineering	2-0-2
	SE402L	Agent Based Software Engineering Lab	0-1-1
18.	SE403	Software Engineering Economics	2-0-2
	SE403L	Software Engineering Economics Lab	0-1-1
19.	SE411	Simulation and Visualization	2-0-2
	SE411L	Simulation and Visualization Lab	0-1-1
20.	SE424	Natural Language Processing	2-0-2
	SE424L	Natural Language Processing Lab	0-1-1

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21.	SE425	Data Mining	
	SE425L	Data Mining Lab	2-0-2
22.	SE432	Network Programming	0-1-1
	SE432L	Network Programming Lab	2-0-2
23.	SE433	Systems Programming	0-1-1
	SE433L	Systems Programming Lab	2-0-2
24.	SE434	Unix/Linux Shell Scripting	0-1-1
	SE434L	Unix/Linux Shell Scripting Lab	2-0-2
25.	SE442	Software Testing Strategies and Techniques	0-1-1
	SE442L	Software Testing Strategies and Techniques Lab	2-0-2
26.	SE443	Research Methods	0-1-1
	SE443L	Research Methods Lab	2-0-2
27.	SE444	Operations Research	0-1-1
	SE444L	Operations Research Lab	2-0-2
28.	SE451	DevOps Engineering	0-1-1
	SE451L	DevOps Engineering Lab	2-0-2
29.	SE455	Software Evolution and Maintenance	0-1-1
	SE455L	Software Evolution and Maintenance Lab	2-0-2
30.	SE456	Software Configuration Management	0-1-1
	SE456L	Software Configuration Management Lab	2-0-2

### List of Elective Supporting Courses

S. No.	Course Code	Course Title	Pre-req.	Cr. Hrs.
1.	MK101	Principles of Marketing	-	3-0-3
2.	AF142	Financial Accounting	-	3-0-3

### List of General Education Courses

S. No.	Course Code	Course Title	Pre-req.	Cr. Hrs.
1.	CS181	Application of Information & Communication Technologies	-	2-0-2
	CS181L	Application of Information & Communication Technologies Lab	-	0-1-1
2.	EL170	Functional English	-	3-0-3
3.	EL271	Expository Writing	EL170	3-0-3
4.	MA216	Discrete Structures	-	3-0-3
5.	MA110	Calculus & Analytical Geometry	-	3-0-3
6.	HU124	Islamic Studies & Ethics	-	2-0-2
7.	HU405	Ideology and Constitution of Pakistan	-	2-0-2
8.	BA152	Introduction to Management	-	2-0-2
9.	PH111	Applied Physics	-	2-0-2
	PH111L	Applied Physics Lab	-	0-1-1
10.	CS470	Professional Practices	-	2-0-2
11.	HU411	Civics and Community Engagement	-	2-0-2
12.	BA353	Entrepreneurship	-	2-0-2

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