

## Proposed Curriculum for BS-SE

### Areas Covered in BS programs

Course Group	Credit hours	% age
General Education	19	15%
University Electives	12	9%
Mathematics & Science Foundation	12	9%
Computing – Core	39	30%
<b>Common courses</b>	<b>82</b>	<b>63%</b>
Domain SE (Domain SE Core)	24	18%
Domain SE Electives	15	12%
Domain SE Supporting	9	7%
<b>Domain courses</b>	<b>48</b>	<b>37%</b>
<b>TOTAL</b>	<b>130</b>	<b>100%</b>

**Courses common for all computing BS programs – 82 Credits**  
**Computing Core Courses**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit hours</b>
BSE-112	Programming Fundamentals	4(3,1)
BSE-121	Object Oriented Programming	4(3,1)
BSE-231	Data Structures & Algorithms	4(3,1)
BSE-233	Discrete Structures	3(3,0)
BSE-241	Operating Systems	4(3,1)
BSE-242	Database Systems	4(3,1)
BSE-234	Software Engineering	3(3,0)
BSE-243	Computer Networks	4(3,1)
BSE-472	Information Security	3(3,0)
BSE-473	Final Year Project I	3(0,3)
BSE-481	Final Year Project II	3(0,3)
	<b>Total</b>	<b>39 (27,12)</b>

**General Education Courses**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit hours</b>
ENG-102	Introduction to Grammar	3

ENG-202	Technical & Business Writing	3
ENG-201	English Language Skills	3
BSE-482	Professional Practices	3
BSE-111	Introduction to Information & Communication Technologies	3(2,1)
GEN-101	Pakistan Studies	2
IST/ETH-101	Islamic Studies/ Ethics	2
	<b>Total</b>	<b>19 (18,1)</b>

**University Elective Courses**  
(Not limited to the list below, university may add more courses)

Course Title	Credit hours
Foreign Language	3(3,0)
Chinese Language	3(3,0)
Arabic Language	3(3,0)
Psychology	3(3,0)
Social Service	3(3,0)
Management Related	3(3,0)
Principles of Management	3(3,0)
Human Resource Management	3(3,0)

Economics	3(3,0)
Accounting and Finance	3(3,0)
Organizational Behavior	3(3,0)
Intellectual Property Rights	3(3,0)
Social Science Related	3(3,0)
Social Work	3(3,0)
Sociology	3(3,0)
Economy Related	3(3,0)
Bioinformatics	3(3,0)
English Literature	3(3,0)
Graphics & Arts	3(3,0)
<b>Total</b>	<b>12 (12,0)</b>

### Mathematics and Science Foundation Courses

Course Code	Course Title	Credit hours
MTH-106	Mathematics-I	Zero Credit
MTH-107	Mathematics-II	Zero Credit
MTH-104	Calculus & Analytical Geometry	3(3,0)
STA-204	Probability & Statistics	3(3,0)
MTH-203	Linear Algebra	3(3,0)
PHY-113	Applied Physics	3(3,0)
	<b>Total</b>	<b>12 (12,0)</b>

### Domain Courses for BS-SE

#### Software Engineering CORE (Compulsory) courses

Course Code	Course Title	Credit hours
BSE-353	Human Computer Interaction	3(3,0)
BSE-361	Software Construction & Development	3(2,1)
BSE-352	Software Design & Architecture	3(2,1)
BSE-475	Software Project Management	3(3,0)
BSE-471	Software Quality Engineering	3(3,0)
BSE-483	Software Re-Engineering	3(3,0)

BSE-244	Software Requirements Engineering	3(3,0)
BSE-362	Web Engineering	3(3,0)
	<b>Total</b>	24(22,2)

**Software Engineering SUPPORTING courses**

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
MTH-111	Multivariate Calculus	3(3,0)
BSE-XXX	Business Process Engineering	3(3,0)
BSE-XXX	Formal Methods in Software Engineering	3(3,0)
BSE-XXX	Operations Research	3(3,0)
BSE-XXX	Simulation and Modelling	3(3,0)
BSE-XXX	Stochastic Processes	3(3,0)
	<b>Total (Any THREE of the above)</b>	<b>9(9,0)</b>

Software Engineering ELECTIVE courses  
(Select any FIVE courses from the following list)

<b>Computer Science Electives</b>			
<b>S. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Credit hours</b>
1.	BSE-354	Mobile Application Development	3(3,0)
2.	BSE-474	Object-oriented Analysis & Design	3(3,0)
3.	BSE-475	Modern Programming Languages	3(3,0)
4.	BSE-368	Software Packages	3(3,0)
5.	CSC-116	Introduction to Computing	3(3,0)
6.	BSE-306	Theory of Programming Language	3(3,0)

7.	BSE-307	Advanced Database Systems	3(3,0)
8.	BSE-308	Formal Methods	3(3,0)
9.	BSE-309	Logical Paradigms of Computing	3(3,0)
10.	BSE-310	Game Development	3(3,0)
11.	BSE-311	Fundamentals of Data Mining	3(3,0)
12.	BSE-312	Data Warehousing	3(3,0)
13.	BSE-313	Web Design & Development	3(3,0)
14.	BSE-314	Search Engine Optimization	3(3,0)
15.	BSE-315	System Programming	3(3,0)
16.	BSE-316	Visual Programming	3(3,0)
17.	BSE-317	Computer Graphics	3(3,0)
18.	BSE-318	Database Administration & Management	3(3,0)
19.	BSE-319	Cyber Security	3(3,0)
20.	BSE-320	Agent-based Software Engineering	3(3,0)
21.	BSE-321	Big Data Analytics	3(3,0)
22.	BSE-322	Cloud Computing	3(3,0)
23.	BSE-323	Data Encryption and Security	3(3,0)
24.	BSE-324	E-Commerce	3(3,0)
25.	BSE-325	Global Software Development	3(3,0)



26.	BSE-326	Information Systems Audit	3(3,0)
27.	BSE-408	Management Information Systems	3(3,0)
28.	BSE-409	Multimedia Communication	3(3,0)
29.	BSE-410	Real Time Systems	3(3,0)
30.	BSE-411	Semantic Web	3(3,0)
31.	BSE-412	Software Engineering Economics	3(3,0)
32.	BSE-413	Software Metrics	3(3,0)
33.	BSE-414	Systems Programming	3(3,0)
34.	BSE-415	Topics in Software Engineering	3(3,0)
35.	BSE-416	Web System & Technology	3(3,0)
36.	BSE-244	Artificial Intelligence	3(3,0)
37.	BSE-355	Computer Vision	3(3,0)
38.	BSE-356	Digital Image Processing	3(3,0)
39.	BSE-476	Fuzzy Logic Systems	3(3,0)
40.	BSE-477	Computational Intelligence	3(3,0)
41.	BSE-357	Natural Language Processing	3(3,0)
42.	BSE-363	Deep Learning	3(3,0)
43.	BSE-364	Machine Learning	3(3,0)
44.	BSE-365	Data Analytics	3(3,0)

45.	BSE-417	Expert Systems	3(3,0)
46.	BSE-418	Artificial Neural Networks	3(3,0)
47.	BSE-366	Internet of Things	3(3,0)
48.	BSE-479	Sensor Networks	3(3,0)
49.	BSE-478	Wireless Networking	3(3,0)
50.	BSE-358	Networking Strategies	3(3,0)
51.	BSE-359	Network Optimization	3(3,0)
52.	BSE-419	Network Security	3(3,0)

Total (Any FIVE of the Above), 15-0 Proposed Study Plan for BS (Software Engineering) 4-Year Program (8 Regular Semesters of 18 weeks each)

## Proposed Study Plan for BS (Software Engineering) Semester Wise

### Semester - I

Code	Course Title	Credit Hours	Pre-requisite
BSE-101	Introduction to Information and Communication Technologies	3(2,1)	
BSE-102	Programming Fundamentals	4(3,1)	
ENG-102	English Composition & Comprehension / Introduction to Grammar	3(3,1)	
MTH-104	Calculus & Analytical Geometry	3(3,1)	
ISL/ETH-101	Islamic Studies/ Ethics	2(2,0)	
PHY-113	Applied Physics	3(3,1)	
<b>Total</b>		<b>18(16,2)</b>	

### Semester – II

Code	Course Title	Credit Hours	Pre-requisite
XXX-XXX	University Elective-I	3(3,1)	
BSE-103	Object Oriented Programming	4(3,1)	BSE-102 Programming Fundamentals
ENG-201	Communication & Presentation Skills / English Language Skills	3(3,1)	
MTH-111	Multivariate Calculus (SE Supporting I)	3(3,1)	MTH-104 Calculus & Analytical Geometry
STA-204	Probability and Statistics	3(3,1)	

GEN-101	Pakistan Studies	2(2,0)	
<b>Total</b>		<b>18(17,1)</b>	

### Semester – III

Code	Course Title	Credit Hours	Pre-requisite
BSE-201	Data Structures & Algorithms	4(3,1)	BSE-103 Object Oriented Programming
BSE-XXX	SE Elective I	3(3,1)	
BSE-202	Discrete Structures	3(3,1)	
BSE-203	Software Engineering	3(3,1)	
XXX-XXX	University Elective - II	3(3,1)	
<b>Total</b>		<b>16(15,1)</b>	

### Semester – IV

Code	Course Title	Credit Hours	Pre-requisite
BSE-204	Operating Systems	4(3,1)	BSE-201 Data Structures & Algorithms
BSE-205	Database Systems	4(3,1)	BSE-201 Data Structures & Algorithms
BSE-206	Computer Networks	4(3,1)	
MTH-203	Linear Algebra	3(3,1)	
BSE-207	Software Requirements Engineering	3(3,1)	BSE-203 Software Engineering
<b>Total</b>		<b>18(15,3)</b>	

**Semester – V**

<b>Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Pre-requisite</b>
XXX-XXX	University Elective – III	3(3,1)	
BSE-301	Human Computer Interaction	3(3,1)	BSE-203 Software Engineering
BSE-302	Software Design & Architecture	3(2,1)	BSE-207 Software Requirement Engineering
BSE-303	SE Elective II (General Elective) Mobile Application Development	3(3,1)	
BSE-XXX	SE Supporting II	3(3,1)	
BSE-XXX	SE Elective III	3(3,1)	
<b>Total</b>		<b>18(17,1)</b>	

**Semester – VI**

<b>Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Pre-requisite</b>
BSE-XXX	SE Supporting III	3(3,1)	
BSE-304	Software Construction and Development	3(2,1)	BSE-203 Software Engineering
ENG-202	Technical & Business Writing	3(3,1)	
XXX-XXX	University Elective – IV	3(3,1)	
BSE-305	Web Engineering	3(3,1)	
BSE-XXX	SE Elective - IV	3(3,1)	

<b>Total</b>	<b>18(17,1)</b>	
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**Semester – VII**

<b>Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Pre-requisite</b>
BSE-401	Software Quality Engineering	3(3,1)	BSE-203 Software Engineering
BSE-402	Information Security	3(3,1)	
BSE-XXX	SE Elective V	3(3,1)	
BSE-403	Software Project Management	3(3,1)	BSE-203 Software Engineering
BSE-404	Final Year Project-I	3(0,3)	
<b>Total</b>		<b>15(12,3)</b>	

**Semester – VIII**

<b>Code</b>	<b>Course Title</b>	<b>Credit Hours</b>	<b>Pre-requisite</b>
BSE-405	Professional Practices	3(3,1)	
BSE-406	Software Re-Engineering	3(3,1)	BSE-304 Software Construction & Development
BSE-407	Final Year Project-II	3(0,3)	BSE-404 FYP-I
<b>Total</b>		<b>9(6,3)</b>	