

Scheme of Study

BS Computer Engineering

Semester 1

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	ISLS-1112	Islamic Studies/Ethics	Humanities	2
2	ENGL-1118	Functional English	Humanities	3
3	MATH-1100	Calculus	Natural Sciences	3
4	PHYS-1123	Engineering Physics	Natural Sciences	2
5	PHYS-1223	Engineering Physics Lab	Natural Sciences	1
6	CPEN-1114	Introduction to Computing	Computing	2
7	CPEN-1214	Introduction to Computing Lab	Computing	1
8	ELEN-1201	Workshop practice	Engineering Foundation	1
Credit Hours			15	

Semester 2

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	PAKS-1113	Pakistan Studies	Humanities	2
2	CPEN-1122	Intensive Programming	Computing	3
3	CPEN-1122	Intensive Programming	Computing	1
4	MATH-2103	Linear Algebra	Natural Sciences	3
5	CPEN-1121	Circuit Analysis	Engineering Foundation	3
6	CPEN-1221	Circuit Analysis Lab	Engineering Foundation	1
7	ENGL-1119	Communication Skills	Humanities	3
8	ELEN-2201	Computer Aided Engineering Drawing	Engineering Foundation	1
Credit Hours			17	

Semester 3

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	CPEN-2120	Digital Logic Design	Engineering Foundation	3
2	CPEN-2220	Digital Logic Design Lab	Engineering Foundation	1
3	CPEN-2123	Object Oriented Programming	Engineering Foundation	3
4	CPEN-2223	Object Oriented Programming Lab	Engineering Foundation	1
5	CPEN-2110	Discrete structures	Computing	3
6	CPEN-2122	Electronic Devices and Circuits	Engineering Foundation	3
7	CPEN-2222	Electronic Devices and Circuits Lab	Engineering Foundation	1
8	MATH-2122	Differential Equations	Natural Sciences	3
Credit Hours			18	

Semester 4

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	STAT-2104	Probability & Statistics	Natural Sciences	3
2	CPEN-2124	Computer Organization & Architecture	Engineering Foundation	3
3	CPEN-2224	Computer Organization & Architecture Lab	Engineering Foundation	1
4	ENGL-2121	Technical Report Writing Skills	Core (Breadth)	2
5	CPEN-2121	Data Structures and Algorithms	Engineering Foundation	3
6	CPEN-2221	Data Structures and Algorithms Lab	Engineering Foundation	1
7	CPEN-2125	Signals & Systems	Engineering Foundation	3
8	CPEN-2225	Signals & Systems Lab	Engineering Foundation	1
Credit Hours			17	

Semester 5

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	MSCI-XXXX	Management Elective-I	Management Science	3
2	CPEN-3131	Operating Systems	Core (Breadth)	3
3	CPEN-3231	Operating Systems Lab	Core (Breadth)	1
4	CPEN-3132	Microprocessors and Microcontroller Interfacing	Core (Breadth)	3
5	CPEN-3232	Microprocessors and Microcontroller Interfacing Lab	Core (Breadth)	1
6	MATH-3116	Numerical Analysis	Core (Breadth)	3
7	CPEN-3134	Digital Signal Processing	Core (Breadth)	3
8	CPEN-3234	Digital Signal Processing Lab	Core (Breadth)	1
Credit Hours			18	

Semester 6

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	CPEN-314X	CE Depth Elective-I	Major Based Core (Depth)	3
2	CPEN-3135	Data Communication & Computer Networks	Core (Breadth)	3
3	CPEN-3235	Data Communication & CompNet Lab	Core (Breadth)	1
4	SWEN-1111	Software Engineering	Core (Breadth)	3
5	CPEN-3130	Digital System Design	Core (Breadth)	3
6	CPEN-3230	Digital System Design Lab	Core (Breadth)	1
7	SWEN-3111	Database Systems	Computing	3
8	SWEN-3211	Database Systems Lab	Computing	1
Credit Hours			18	

Semester 7

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	CPEN-314X	CE Depth Elective- II	Major Based Core (Depth)	3
2	CPEN-4390	FYP-I	Senior Design project	3
3	CPEN-415X	IDEE-I	IDEE (Breadth)	3
4	CPEN-4140	CE Depth Elective-III	Major Based Core (Depth)	3
5	CPEN-415X	IDEE-II	IDEE (Breadth)	3
6	SSCI-3120	Constitution and Legal System of Pakistan	Humanities	2
Credit Hours			17	

Semester 8

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	MSCI-XXXX	Management elective-II	Management Sciences	2
2	CPEN-4391	FYP-II	Senior Design project	3
3	CPEN-415X	IDEE-III	IDEE (Breadth)	3
4	CPEN-414X	CE Depth Elective-IV	Major Based Core (Depth)	3
5	HLTH-1113	Basic Health Awareness	Humanities	2
6	SSCI-2111	Professional Ethics	Humanities	2
Credit Hours			15	

GRAND TOTAL

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BS Software Engineering

Semester 1

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	ISLS-1112	Islamic Studies/Ethics	General Education	2
2	ENGL-1118	Functional English	General Education	3
3	MATH-1100	Calculus	Math & Science Foun	3
4	PHYS-1123	Engineering Physics	Math & Science Foun	2
5	PHYS-1223	Engineering Physics Lab	Math & Science Foun	1
6	CPEN-1114	Introduction to Computing	General Education	2
7	CPEN-1214	Introduction to Computing Lab	General Education	1
8	MSCI-2116	Principles of Accounting	Management Sciences	3
Credit Hours			17	

Semester 2

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	PAKS-1113	Pakistan Studies	General Education	2
2	CPEN-1122	Intensive Programming	Computing Core	3
3	CPEN-1222	Intensive Programming Lab	Computing Core	1
4	SWEN-1111	Software Engineering	Computing Core	3
5	ENGL-1119	Communication Skills	General Education	3
6	MATH-2103	Linear Algebra	Math & Science Foun	3
7	ENGL-2121	Technical Report Writing Skills	General Education	2
Credit Hours			17	

Semester 3

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	CPEN-2110	Discrete Structures	Computing Core	3
2	CPEN-2123	Object Oriented Programming	Computing Core	3
3	CPEN-2223	Object Oriented Programming Lab	Computing Core	1
4	SWEN-2113	Software Requirement Eng	SE Core	3
5	MATH-2122	Differential Equations	Math and Science Foun	3
6	CPEN-2120	Digital Logic Design	Computing Core	3
7	CPEN-2220	Digital Logic Design Lab	Computing Core	1
Credit Hours			17	

Semester 4

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	STAT-2104	Probability and Statistics	Math and Science Foun	3
2	SWEN-2112	Software Design & Architecture	SE Core	2
3	SWEN-2212	Software Design & Architecture Lab	SE Core	1
4	SWEN-3111	Database Systems	Computing Core	3
5	SWEN-3211	Database Systems Lab	Computing Core	1
6	SWEN-XXXX	SE Supporting-I	SE Supporting	3
7	CPEN-2121	Data Structure & Algorithm	Computing Core	3
8	CPEN-2221	Data Structure & Algorithm Lab	Computing Core	1
Credit Hours			17	

Semester 5

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	SSCI-3120	Constitution and Legal System of Pakistan	University Elective	2
2	CPEN-3131	Operating Systems	Computing Core	3
3	CPEN-3231	Operating Systems Lab	Computing Core	1
4	SWEN-3132	Mobile Application Development	SE Core	3
5	SWEN-3115	Web Engineering	SE Core	3
6	SWEN-3113	Software Construction and Development	SE Core	2
7	SWEN-3212	Software Construction and Deve	SE Core	1
8	SWEN-XXXX	Lab	SE Supporting	3
Credit Hours			18	

Semester 6

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	SWEN-3114	Software Quality Engineering	SE Core	3
2	SWEN-3112	Information Security	Computing Core	3
3	CPEN-3135	Data Communication & Comp Networks	Computing Core	3
4	CPEN-3235	Data Communication & Comp Networks Lab	Computing Core	1
5	SWEN-XXXX	SE Elective I	SE Elective	3
6	SWEN-XXXX	SE Supporting III	SE Supporting	3
7	SSCI-3120	Professional Ethics	General Education	2
Credit Hours			18	

Semester 7

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	SWEN-4113	Software Project Management	SE Core	3
2	SWEN-4114	Software Re – Engineering	SE Core	3
3	SWEN-XXXX	SE Elective II	SE Elective	3
4	SWEN-XXXX	SE Elective III	SE Elective	3
5	MSCI-XXXX	Management elective-I	Management Sciences	3
6	SWEN-4391	Final year Project I	Computing Core	3
Credit Hours			18	

Semester 8

S. No.	Course Code	Course Title	Knowledge Area	Credit Hrs.
1	SWEN-2111	Human Computer Interaction	SE Core	3
2	SWEN-XXXX	SE Elective IV	SE Elective	3
3	SWEN-XXXX	SE Elective V	SE Elective	3
4	SWEN-4392	Final Year Project-II	Computing Core	3
5	MSCI-XXXX	Management elective-II	Management Sciences	3
6	HLTH-1113	Basic Health Awareness	University Elective	2
Credit Hours			17	

GRAND TOTAL

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“Some people remain deprived of knowledge due to their poor ability to remain silent”

- Ibn Al-Qayyim (RA)

MS Computer Engineering

Semester 1

S. No.	Course Code	Course Title	Credit Hrs.
1	CPEN- XXXX	Core – I	3
2	CPEN- XXXX	Core – II	3
3	XXXX-XXXX	Elective – I	3
4	CPEN-XXXX	Elective – II	3
Total Credit Hours			12

Semester 2

S. No.	Course Code	Course Title	Credit Hrs.
1	CPEN- XXXX	Core – III	3
2	CPEN-XXXX	Elective – III	3
3	CPEN-XXXX	Elective – IV	3
4	CPEN-XXXX	Elective – V	3
Total Credit Hours			12

Semester 3 & 4

S. No.	Course Code	Course Title	Credit Hrs.
1	CPEN-6691	Thesis	12
Total Credit Hours			12

MS Software Engineering

Semester 1

S. No.	Course Code	Course Title	Credit Hrs.
1	SWEN- XXXX	Core – I	3
2	SWEN- XXXX	Core – II	3
3	XXXX-XXXX	Elective – I	3
4	SWEN-XXXX	Elective – II	3
Total Credit Hours			12

Semester 2

S. No.	Course Code	Course Title	Credit Hrs.
1	SWEN- XXXX	Core – III	3
2	SWEN-XXXX	Elective – III	3
3	SWEN-XXXX	Elective – IV	3
4	SWEN-XXXX	Elective – V	3
Total Credit Hours			12

Semester 3 & 4

S. No.	Course Code	Course Title	Credit Hrs.
1	SWEN-6691	Thesis	12
Total Credit Hours			12

BS Computer Engineering List of Courses

Major Based Depth Electives

S. No.	Course Code	Course Title
1	CPEN-6111	Advanced Computer Architecture
2	CPEN-3136	Control Engineering
3	CPEN-3137	Parallel and Distributed Computing
4	CPEN-3138	Wireless and Mobile Networks
5	CPEN-3139	Artificial Intelligence
6	CPEN-3140	Digital Image Processing
7	CPEN-3141	Data Warehousing and Mining
8	CPEN-3142	Embedded Systems
9	CPEN-3143	VLSI Design
10	CPEN-3144	Introduction to Data Science
11	CPEN-3145	Introduction Machine Learning
12	CPEN-5116	System on Chip Design
13	SWEN-3114	Software Quality Engineering
14	SWEN-4113	Software Project Management

Inter-Disciplinary Engineering

S. No.	Course Code	Course Title
1	CPEN-4101	Communication Systems
2	CPEN-4102	Fault Tolerant Computing
3	CPEN-4103	Neural Networks and Fuzzy Logic
4	CPEN-4104	Robotics
5	CPEN-4105	System Programming
6	CPEN-4106	Multimedia Systems
7	CPEN-4107	Speech Signal Processing
8	CPEN-4108	Power Electronics
9	CPEN-4109	Opto-Electronics
10	CPEN-4110	Computer Vision
11	CPEN-4111	Integrated Circuit Design
12	CPEN-4112	Electromagnetic Interference
13	CPEN-4113	Biomedical Engineering/Bioinformatics
14	SWEN-3132	Mobile Application Development
15	SWEN-4123	Computer Graphics
16	SWEN-4126	Game Application Development
17	SWEN-4131	Natural Language Processing
18	SWEN-4132	Real Time Systems

Management Electives

S. No.	Course Code	Course Title
1	MSCI-XXXX	Entrepreneurship
2	MSCI-XXXX	Business Management
3	MSCI-XXXX	Technology Startups
4	MSCI-XXXX	Quality Management
5	MSCI-XXXX	Engineering Management
6	MSCI-XXXX	Technology Management
7	MSCI-XXXX	Manufacturing Management
8	MSCI-XXXX	Software Management/Information System
9	MSCI-XXXX	Knowledge Management
10	MSCI-XXXX	Supply Chain Management
11	MSCI-XXXX	Project Management

BS Software Engineering List of Courses

Computing Core Courses

S. No.	Course Code	Course Title
1	CPEN-1122	Intensive Programming
2	CPEN-2123	Object Oriented Programming
3	CPEN-2121	Data Structures & Algorithms
4	CPEN-2110	Discrete Structures
5	CPEN-3131	Operating Systems
6	SWEN-3111	Database Systems
7	SWEN-1111	Software Engineering
8	CPEN-3135	Data Communications & Computer Networks
9	SWEN-3112	Information Security
10	CPEN-2120	Digital Logic Design
11	SWEN-4391-4392	Final Year Project

Software Engineering CORE (Compulsory) courses

S. No.	Course Code	Course Title
1	SWEN-2111	Human Computer Interaction
2	SWEN-2113	Software Requirements Engineering
3	SWEN-2112	Software Design & Architecture
4	SWEN-3113	Software Construction & Development
5	SWEN-4113	Software Project Management
6	SWEN-3114	Software Quality Engineering
7	SWEN-4114	Software Re-Engineering
8	SWEN-3115	Web Engineering
9	SWEN-3132	Mobile Application Development

General Education Courses

S. No.	Course Code	Course Title
1	ENGL-1118	Functional English
2	ENGL-1119	Communication Skills
3	ENGL-2121	Technical Report Writing Skills
4	SSCI-3120	Professional Ethics
5	CPEN-1114	Introduction to Computing
6	PAKS-1113	Pakistan Studies
7	ISLS-1112	Islamic Studies/ Ethics

University Elective Courses

S. No.	Course Code	Course Title
1	MSCI-XXXX	Social Service
2	HLTH-1113	Basic Health Awareness
3	SSCI-3120	Constitution and Legal System of Pakistan
4	MSCI-XXXX	Entrepreneurship
5	MSCI-2111	Engineering Economics
6	MSCI-2111	Engineering Economics and Management

MS Computer Engineering List of Courses

Core Courses

S. No.	Course Code	Course Title
1	CPEN-6111	Advanced Computer Architecture
2	CPEN-6112	Advanced Digital Systems Design
3	CPEN-6113	Advanced Digital Signal Processing
4	CPEN-6110	Advanced Operating Systems
5	COSC-5101	Advanced Algorithms Analysis & Design
6	CPEN-6122	Information Theory and Coding
7	COSC-5108	Advanced Database Systems
8	SWEN-6100	Advanced Software Engineering

Specialization Electives

S. No.	Course Code	Course Title
1	CPEN-5118	Advanced Digital Image Processing
2	COSC-6109	Deep learning
3	CPEN-5122	Medical Image Processing and Analysis
4	CPEN-5123	Image and Video Coding
5	COSC-6121	Advanced Data Mining
6	CPEN-5113	Multimedia Systems
7	COSC-5112	Machine Learning

S. No.	Course Code	Course Title
8	CPEN-6114	Robotics Vision
9	CPEN-6115	Big Data Analytics
10	COSC-6120	Internet of Things
11	CPEN-6116	Advanced Embedded System Design
12	CPEN-5114	VLSI Principles and Applications
13	CPEN-5115	Advanced Microprocessor Design
14	CPEN-6117	Design of Analog CMOS Integrated Circuits
15	CPEN-6118	Digital IC Design
16	CPEN-6119	Fault Diagnosis and Testing
17	CPEN-6120	Design of Fault Tolerant Digital Systems
18	CPEN-6121	Low Power Chip Design Techniques
19	CPEN-5116	System on Chip Design
20	ELEN-6201	Antenna and Wave Propagation
21	ELEN-6202	Advanced Wireless Communications
22	ELEN-6203	Advanced Digital Communications Systems
23	ELEN-6210	Advanced Optical Communications
24	ELEN-6211	Microwave Devices and Circuits
25	COSC-6121	Advanced Computer Networks

S. No.	Course Code	Course Title
26	CPEN-6123	Advanced Engineering Electromagnetics
27	CPEN-5122	Radar Engineering
28	CPEN-5123	Wireless Sensor Networks
29	SWEN -5101	Advanced Requirement Engineering
30	SWEN -5102	Advanced Software System Architecture
31	SWEN-5103	Software Testing and Quality Assurance
32	SWEN-5110	Object Oriented Software Engineering
33	COSC-5103	Semantic Web
34	SWEN-6101	Reliability Engineering
35	SWEN-6102	Agile Software Development Methods
36	SWEN-6103	Advanced Human Computer Interaction

General Electives

S. No.	Course Code	Course Title
1	CPEN-6124	Mathematical Optimization
2	CPEN-5151	Stochastic Processes
3	CPEN-6125	Advanced Topics in Computer Engineering
4	MSCI-6102	Research Methodology (University Mandatory)

“Patience is a pillar of Faith”

- Hazrat Umar Ibn Al-Khattab (RA)

MS Software Engineering List of Courses

Core Courses

S. No.	Course Code	Course Title
1	SWEN-5101	Advanced Requirements Engineering
2	SWEN-5102	Advanced Software System Architecture
3	SWEN-5103	Software Testing and Quality Assurance
4	COSC-5101	Advanced Algorithms Analysis & Design
5	COSC-5108	Advanced Database Systems
6	SWEN-6100	Advanced Software Engineering
7	SWEN-6102	Agile Software Development Methods
8	SWEN-5111	Advanced Software Development
9	SWEN-5112	Model Driven Software Engineering
10	COSC-5103	Semantic Web
11	COSC-5105	Advanced Computer Networks
12	COSC-5106	Wireless Networks and Mobile Computing
13	COSC-5109	Distributed Database Systems
14	COSC-5111	Information Retrieval Techniques
15	COSC-5112	Machine Learning
16	COSC-5113	Multi-Agent Systems
17	COSC-5117	Knowledge-Based Systems
18	SWEN-6101	Reliability Engineering
19	SWEN-6103	Advanced Human Computer Interaction
20	SWEN-6104	Advanced Software Project Management
21	SWEN-6105	Formal Methods
22	SWEN-6106	Model Checking
23	SWEN-6107	Advanced Topics in Software Engineering
24	COSC-6108	Natural Language Processing
25	COSC-6110	Theory of Programming Languages

Elective Courses

S. No.	Course Code	Course Title
1	SWEN-5104	Software Risk Management
2	SWEN-5105	Software Measurement and Metrics
3	SWEN-5106	Software Configuration Management
4	SWEN-5107	Component Based Software Engineering
5	SWEN-5108	Empirical Software Engineering
6	SWEN-5109	Agent Oriented Software Engineering
7	SWEN-5110	Object Oriented Software Engineering
27	COSC-6120	Internet of Things
34	COSC-6123	NoSQL Databases
35	COSC-6124	Big Data Analytics
36	SWEN-6108	Initiating and Planning Projects
37	SWEN-6109	Project Risks and Change
38	SWEN-6110	Project Management in IT Security
39	COSC-5118	Advanced Digital Image Processing
40	COSC-6109	Deep learning
41	COSC-6121	Advanced Data Mining
42	CPEN-5113	Multimedia Systems
43	CPEN-6119	Fault Diagnosis and Testing

General Elective Courses

S. No.	Course Code	Course Title
1	CPEN-5124	Stochastic Processes
2	MSCI-6102	Research Methodology
3	CPEN-6124	Mathematical Optimization