

DEPARTMENT OF SOFTWARE ENGINEERING

The focus of BS software engineering program is to train the students to apply the software engineering principles by demonstrating competence in communication, planning, analysis, design, construction, testing and development of software systems. Our software engineering program places a great emphasis on hands-on training along with theory classes, the students learn the current tools and technologies used in

software industry. In addition to the technical skills and knowledge, the program also focuses on ethical and societal aspects through courses on humanities, personal grooming, and professional ethics. After successful completion of BS software engineering degree, the students can assume the role of software engineer, designer, developer or tester in any reputable organization.



BS Software Engineering

■ Program Educational Objectives (PEOs)

The BS(SE) program aims to produce leading professionals who will:

- (i) Contribute competently in the software industry by applying requisite technical skills.
- (ii) Demonstrate advancement in software engineering profession by enhancing their knowledge and skills.
- (iii) Demonstrate ethical values and contribute positively towards the society.

■ Program Learning Outcomes (PLOs)

At the time of graduation, the graduates of BS(SE) program will possess the following attributes

- (i) **Academic Education:** To prepare graduates as computing professionals.
- (ii) **Knowledge for Solving Computing Problems:** Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the 16 abstraction and conceptualization of computing models from defined problems and requirements .
- (iii) **Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

- (iv) **Design/ Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- (v) **Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
- (vi) **Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
- (vii) **Communication:** Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
- (viii) **Computing Professionalism and Society:** Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
- (ix) **Ethics:** Understand and commit to professional ethics, responsibilities, and norms of professional computing practice.
- (x) **Life-long Learning:** Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

■ Admission Requirements

- (i) Higher Secondary School Certificate or equivalent securing at least 50% marks in aggregate with Mathematics
- (ii) CUST Admission Test/HEC Approved Test

■ Degree Requirements

Each candidate for the BS Software Engineering degree is required to successfully earn 133 credit hours as per the following detail:

Area	Cr. Hrs.
a) General Education	30
b) Major Courses	73
c) Allied Courses	12
d) Electives	09
e) Capstone Project	06
f) Internship	03
Total	133

■ General Education (30 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Functional English	SEG1113	3
Expository Writing	SEG1123	3
Islamic Studies/Ethics	SEG1012	2
Ideology and Constitution of Pakistan	SEG1022	2
Personal Grooming	SEG2212	2
Applied Physics	SEG1312	2
Applied Physics Lab	SEG1311	1
Sociology	SEG1412	2
Calculus and Analytical Geometry	SEG1513	3
Discrete Structures	SEG1573	3
Applications of Information and Communication Technologies	SEG1612	2

Applications of Information and Communication Technologies Lab	SEG1611	1
Entrepreneurship	SEG2712	2
Civics and Professional Ethics	SEG2812	2

■ Major Courses (73 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Introduction to Programming	SE1133	3
Introduction to Programming Lab	SE1131	1
Object Oriented Programming	SE1143	3
Object Oriented Programming Lab	SE1141	1
Data Structures	SE2143	3
Data Structures Lab	SE2141	1
Database Systems	SE2313	3
Database Systems Lab	SE2311	1
Software Engineering	SE2223	3
Operating Systems	SE2412	2
Operating Systems Lab	SE2411	1
Computer Networks	SE2772	2
Computer Networks Lab	SE2771	1
Software Requirement Engineering	SE2262	2
Software Requirement Engineering Lab	SE2261	1
Information Security	SE3712	2
Information Security Lab	SE3711	1
Software Design and Architecture	SE3313	3
Analysis of Algorithms	SE3163	3
Digital Logic Design	SE2512	2
Digital Logic Design Lab	SE2511	1
Computer Organization and Assembly Language	SE3522	2
Computer Organization and Assembly Language Lab	SE3521	1
Artificial Intelligence	SE3812	2
Artificial intelligence Lab	SE3811	1

Parallel and Distributed Computing	SE3432	2
Parallel and Distributed Computing Lab	SE3431	1
HCI and Computer Graphics	SE3272	2
HCI and Computer Graphics Lab	SE3271	1
Software Quality Engineering	SE3612	2
Software Quality Engineering Lab	SE3611	1
Software Construction & Development	SE3512	2
Software Construction & Development Lab	SE3511	1
Web Engineering	SE3522	2
Web Engineering Lab	SE3521	1
Software Project Management	SE4272	2
Software Project Management Lab	SE4271	1
Data Science	SE4882	2
Data Science Lab	SE4881	1
Financial Accounting	ACSE4003	3
Mobile Application Development	SE4192	2
Mobile Application Development Lab	SE4191	1

■ Allied Courses (12 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Linear Algebra	MTSE1033	3
Probability and Statistics	MTSE2063	3
Multivariable Calculus	MTSE2053	3
Technical and Business Writing	HMSE4033	3

■ Electives Courses (9 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Elective-I (Automated Software Testing)	SE3343	3
Elective-II (Internet of Things)	SE4743	3
Elective-III (Blockchain Technology)	SE4573	3

■ Capstone Project (6 Cr. Hrs.)

After the completion of 90 Cr. Hrs. the students are required to demonstrate their practical skills in the field of Software Engineering by designing and implementing a design project worth 6 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title	Code	Cr. Hrs.
Design Project Part-I	SE4912	2
Design Project Part-II	SE4924	4

■ Internship

It is mandatory for every student to participate in a 6-8 weeks summer internship program following their 6th semester or after the completion of 90 Cr. Hrs.

Course Title	Code	Cr. Hrs.
Internship	SE4103	3

■ Community Service (VIS4000)

Each student is required to complete 65 hours community work, usually after 1st semester which would be a prerequisite to clear the student for the award of degree.

■ CGPA Requirement

A student is required to earn a minimum 2.00/4.00 CGPA on the completion of his/her degree requirements.

■ Program Duration

This is a four-year degree program comprising of 8 semesters with minimum of 133 semester credit hours (Cr. Hrs). There will be a Fall and a Spring semester in each year. The Summer semester will be utilized for internships or deficiency courses. The maximum duration to complete BS is 7 years.

Note: Degree requirements may be modified from time to time as per the directions of the concerned regulatory body.

SCHEME OF STUDIES

BS Software Engineering

□ Semester-I (18 Cr. Hrs.)

Course Code	Course Title	Cr. Hrs.
SE1133	Introduction to Programming	3
SE1131	Introduction to Programming Lab	1
SEG1612	Applications of Information and Communication Technologies	2
SEG1611	Applications of Information and Communication Technologies Lab	1
SEG1312	Applied Physics	2
SEG1311	Applied Physics Lab	1
SEG1513	Calculus and Analytical Geometry	3
SEG1022	Ideology and Constitution of Pakistan	2
SEG1113	Functional English	3

□ Semester-II (17 Cr. Hrs)

Course Code	Course Title	Cr. Hrs.
SE1143	Object Oriented Programming	3
SE1141	Object Oriented Programming Lab	1
SEG1573	Discrete Structures	3
SEG1123	Expository writing	3
MTSE1033	Linear Algebra	3
SEG1012	Islamic Studies/Ethics	2
SEG1412	Sociology	2

□ Semester-III (18 Cr. Hrs)

Course Code	Course Title	Cr. Hrs.
SE2143	Data Structures	3
SE2141	Data Structures Lab	1
SE2313	Database Systems	3
SE2311	Database Systems Lab	1

SE2223	Software Engineering	3
SEG2212	Personal Grooming	2
SEG2712	Entrepreneurship	2
MTSE2063	Probability and Statistics	3

□ Semester-IV (17 Cr. Hrs)

Course Code	Course Title	Cr. Hrs.
SEG2812	Civics and Professional Ethics	2
SE2512	Digital Logic Design	2
SE2511	Digital Logic Design Lab	1
SE2412	Operating Systems	2
SE2411	Operating Systems Lab	1
SE2772	Computer Networks	2
SE2771	Computer Networks Lab	1
SE2262	Software Requirement Engineering	2
SE2261	Software Requirement Engineering Lab	1
MTSE2053	Multivariable Calculus	3

□ Semester-V (18 Cr. Hrs)

Course Code	Course Title	Cr. Hrs.
SE3712	Information Security	2
SE3711	Information Security Lab	1
SE3313	Software Design and Architecture	3
SE3163	Analysis of Algorithms	3
SE3522	Computer Organization and Assembly Language	2
SE3521	Computer Organization and Assembly Language Lab	1
SE3432	Parallel and Distributed Computing	2
SE3431	Parallel and Distributed Computing Lab	1
SE3272	HCI and Computer Graphics	2
SE3271	HCI and Computer Graphics Lab	1

□ Semester-VI (15 Cr. Hrs)

Course Code	Course Title	Cr. Hrs.
SE3612	Software Quality Engineering	2
SE3611	Software Quality Engineering Lab	1
SE3512	Software Construction & Development	2
SE3511	Software Construction & Development Lab	1
SE3522	Web Engineering	2
SE3521	Web Engineering Lab	1
SE3343	Elective-I (Automated Software Testing)	3
SE3812	Artificial Intelligence	2
SE3811	Artificial Intelligence Lab	1

□ Semester-VII (17 Cr. Hrs)

Course Code	Course Title	Cr. Hrs.
SE4272	Software Project Management	2
SE4271	Software Project Management Lab	1
SE4882	Data Science	2
SE4881	Data Science Lab	1
HMSE4033	Technical & Business Writing	3
SE4912	Design Project-I	2
SE4743	Elective-II (Internet of Things)	3
SE4192	Mobile Application Development	2
SE4191	Mobile Application Development Lab	1

□ Semester-VIII (10 Cr. Hrs)

Course Code	Course Title	Cr. Hrs.
SE4573	Elective-III (Blockchain Technology)	3
ACSE4003	Financial Accounting	3
SE4924	Design Project Part -II	4

