![SZABIST logo] **SZABIST**
SHAHEED ZULFIKAR ALI BHUTTO INSTITUTE OF SCIENCE & TECHNOLOGY

Discover Yourself

COMPUTER SCIENCE

FALL 2021

KARACHI CAMPUS

BS (COMPUTER SCIENCE)
BS (ARTIFICIAL INTELLIGENCE)
MS (DATA SCIENCE)
MS (COMPUTER SCIENCE)
PHD (COMPUTING)

About SZABIST

Shaheed Zulfikar Ali Bhutto Institute of Science and Technology (SZABIST) is highly ranked and fully chartered institute of Pakistan established through a Legislative Act of Sindh Assembly (Sindh Act No. XI of 1995). It is approved and recognized by the Higher Education Commission (HEC) Pakistan as a degree awarding institution. All the programs offered at SZABIST are consistent with the guidelines laid by HEC and other regulatory bodies, for example, National Business Education Accreditation Council (NBEAC), National Computing Education Accreditation Council (NCEAC), National Accreditation Council for Teacher Education (NACTE), and Pakistan Engineering Council (PEC).

Vision

SZABIST aims to be a globally recognized institute for excellence in education, research, development, and distinction in service.

Mission

SZABIST is committed to produce highly qualified professionals to:
• Meet national and global contemporary needs;
• Conduct cutting edge research and development;
• Provide hi-tech scientific and technological expertise;
• Meet current and future socio-economic challenges;
• Meet global citizenship responsibility.

HEC & CIEC Ranking

SZABIST is ranked as one of the most reputed university by Higher Education Commission (HEC) and Chartered Inspection and Evaluation Committee (CIEC) Sindh. All programs of SZABIST are conducted under strict compliance of the relevant regulator bodies such as NBEAC, NCEAC, NACTE, PEC and KHDA Dubai. Since 2012, the SZABIST-QEC has been awarded more than 91% in the quantitative assessment by Quality Assurance Agency (QAA) HEC, Pakistan.

International Linkages

SZABIST is a registered member of the following international and national associations:
International Association of Universities (IAU), Paris; Association of Commonwealth Universities (ACU), London; The Association to Advance Collegiate School of Business (AACSB), Singapore; Asia University Federation (AUF), Seoul; Asia-Pacific Quality Network (APQN), People's Republic of China; Association of Quality Assurance Agencies of the Islamic World (AQAAIW), Malaysia; The Talloires Network, USA; The Chartered Institute of Logistics and Transport (CILT), UK; Management Association of Pakistan (MAP), Karachi; Marketing Association of Pakistan (MAP), Karachi, Human Resource Development Network (HRDN), Islamabad.

Research

SZABIST strongly encourages research. SZABIST published research journals in various disciplines including Computing i.e. the Journal of Independent Studies and Research (JISR-C). SZABIST also conducts various conferences and seminars our academic year.

BS (Computer Science)

BS (Computer Science)

SZABIST offers a four-year (eight semesters) BS Computer Science degree program which is accredited by National Computing Education & Accreditation Council, (NCEAC). The program covers a wide range of courses in core computer science, information technology and software engineering. The program is essentially a day program and consists of 40 courses (five courses per semester) with a total of 130 credit hours. The complete course plan includes 8 technical electives and 4 university electives. These 8 technical electives provide intensive learning in the diversified areas of computer science and allied disciplines. Internship opportunities are provided to complete degree requirement. The maximum time limit to complete the degree program is six years.

Admission Requirements

The candidate must have completed O-Levels (minimum 8 subjects including 5 compulsory subjects; English, Urdu, Maths, Islamiat & Pakistan Studies) and A-levels (minimum 3 Subjects)/12th Grade/Intermediate with minimum 50% marks or equivalent from a recognized institution. Mathematical background will be preferred for BS-Computer Science program. Inter Board Committee of Chairmen (IBCC) equivalency is required for O & A Levels/IB Diploma/High School Diploma or equivalent. General Paper (A Levels) will not be counted.

Fee Structure*

	Pakistani Nationals	Foreign Nationals
Application Processing Fee :	Rs. 1,500	US$ 45
Admission Fee :	Rs. 20,000	US$ 500
Security Deposit (refundable) :	Rs. 10,000	US$ 330
Student Activity Charges :	Rs. 1000	US$ 30
Tuition Fee Per Semester :	Rs. 112,000	US$ 2,560
Tuition Fee (Per Semester) after 5% Subsidy :	Rs. 106,400	US$ 2,432

(full load of five courses per semester & 16 credit hours)

*SZABIST reserves the rights to revise the fees/withdraw of scholarship without any prior notice.

BS (Computer Science)

FIRST YEAR

Fall Semester
Calculus and Analytical Geometry
English Composition and Comprehension
Fundamentals of Programming
Applied Physics
Introduction to Computer Science
Pakistan Studies

Spring Semester
Object Oriented Programming Techniques
Communication and Presentation Skills
Digital Logic Design
Probability and Statistics
Islamic Studies/Humanities

SECOND YEAR

Fall Semester
Discrete Mathematical Structures
Data Structures and Algorithms

Computer Organization and Assembly Language
University Elective-1
CS Supporting-1

Spring Semester
Database Systems
Finite Automata Theory and Formal Languages
Linear Algebra
Design and Analysis of Algorithms
University Elective -2

THIRD YEAR

Fall Semester
Operating Systems
Software Engineering
Compiler Construction
CS Supporting -2
CS Supporting-3

Spring Semester
Technical and Business Writing

Computer Networks and Data Communications
Artificial Intelligence
Lab: Artificial Intelligence
CS Elective-1
CS Elective-2

FOURTH YEAR

Fall Semester
Final Year Project-I
Parallel and Distributed Computing
Professional Practices
University Elective-3
CS Elective-3

Spring Semester
Information Security
Final Year Project-II
University Elective-4
CS Elective-4
CS Elective-5

Mathematics deficiency course will be offered to those students who have limited mathematical background. (if deemed necessary by PM/HoD)

Admission Schedule

BS (Artificial Intelligence)

BS (Artificial Intelligence)

SZABIST offers a four-year (eight semesters) BS Artificial Intelligence degree. The program covers a wide range of courses in core Artificial Intelligence, Machine Learning, Knowledge Representation & Reasoning, Natural Language Processing etc. The program is a day program and consists of 41 courses with a total of 130 credit hours. The Internship opportunities are provided to complete degree requirement. The maximum time limit to complete the degree program is six years. Following are the program educational objectives of (BS AI).

PEO 1 : To equip students with the necessary skills and knowledge to solve complex problems in real-world settings

PEO 2 : To produce graduates practising in the area of Artificial Intelligence in a socially and ethically responsible way.

PEO 3 : To prepare students for lifelong learning skills in Artificial Intelligence and allied disciplines

Admission Requirements

The candidate must have completed O-Levels (minimum 8 subjects including 5 compulsory subjects: English, Urdu, Mathematics, Islamiat & Pakistan Studies) and A-levels (minimum 3 Subjects)/12th Grade/Intermediate with minimum 50% marks or equivalent from a recognized institution. The mathematical background will be preferred for the BS-Artificial Intelligence program. Inter Board Committee of Chairmen (IBCC) equivalency is required for O & A Levels/IB.

Fee Structure*

	Pakistani Nationals	Foreign Nationals
Processing Fee :	Rs. 1,500	US$ 45
Admission Fee :	Rs. 20,000	US$ 500
Security Deposit (refundable) :	Rs. 10,000	US$ 330
Student Activity Charges :	Rs. 1000	US$ 30
Tuition Fee Per Semester :	Rs. 105,000	US$ 2,400
Tuition Fee (Per Semester) after 10% Subsidy :	Rs. 94,500	US$ 2,160

(full load of five courses per semester & 15 credit hours)

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BS (Artificial Intelligence)

First Year
Semester -1st
Introduction to Computer Science
Lab: Introduction to Computer Science
Fundamentals of Programming
Lab: Fundamentals of Programming
Islamic Studies/ Ethics
Calculus and Analytical Geometry
English Composition and Comprehension

Semester -2nd
Object-Oriented Programming Techniques
Lab: Object-Oriented Programming Techniques
Digital Logic Design
Lab: Digital Logic Design
Linear Algebra
Probability and Statistics
Communication and Presentation Skills

Second Year
Semester-3rd
Data Structures and Algorithms
Lab: Data Structures and Algorithms
Computer Organization and Assembly Language
Lab: Computer Organization and Assembly Language
Discrete Mathematical Structures
Artificial Intelligence
Lab: Artificial Intelligence
Differential Equations

Semester-4th
Computer Networks and Data Communications
Lab: Computer Networks and Data Communications
Database Systems

Design and Analysis of Algorithms
Programming for Artificial Intelligence
Lab: Programming for Artificial Intelligence
AI Elective

Third Year
Semester-5th
Operating Systems
Lab: Operating Systems
Artificial Neural Networks
Lab: Artificial Neural Networks
Machine Learning
Lab: Machine Learning
Knowledge Representation & Reasoning
AI Elective
University Elective

Semester-6th
Technical and Business Writing
Computing Vision
Lab: Computing Vision
Natural Language Processing
Software Engineering
AI Elective
University Elective

Fourth Year
Semester-7th
Parallel and Distributed Computing
Lab: Parallel and Distributed Computing
Professional Practices
University Elective-3
Final Year Project-I

Semester-8th
Final Year Project-II
University Elective
Information Security
Pakistan Studies
AI Elective

Admissions Start	:	April 19, 2021
Last date to apply	:	June 10, 2021
Oral Test & Interview	:	June 21 - July 10, 2021
Orientation	:	September 2-4, 2021

APPLY ONLINE:

Log on to: **http://admissions.szabist.edu.pk**

MS (Data Science)

Master of Science in Data Science (MSDS)

SZABIST offers a 2-year duration MS (Data Science) degree in the evening. It requires 30 credit hours including 3 core courses, 2 specialized data science courses and a Thesis of 6 credit hours is mandatory.

The maximum time limit to complete the MS (Data Science) degree is 4 years.

Program Objectives

The MS (Data Science) program has been designed to give students the option to be part of a data science endeavour that begins with the identification of business processes, determination of data provenance and ownership, understanding the ecosystem of the business decisions, skill sets and tools that shape the data, making data amenable to analytics, identifying sub-problems, recognizing the technology matrix required for problem resolution, creating incrementally-complex data-driven models and then maintaining them to ultimately leverage them for business growth.

Individual objectives include:
- To equip students to transform data into actionable insights to make complex decisions.
- To enable students to understand and analyze problems and arrive at computable solutions.
- To expose students to the set of technologies that match those solutions.
- To gain hands-on experience on data-centric tools for statistical analysis, visualization and big data applications at the same rigorous scale as in a practical data science project.
- To understand the implications of handling data in terms of data security and business ethics.

Admission Requirements

For admission to MS (Data Science), program candidates must possess 16 years of relevant education with a minimum of 60% marks / 2.0 CGPA from a university / Institute recognized by HEC. Eligibility for this program is a 4-year BS (CS). Students with 16 years of education in the following domains (Information Technology, Software Engineering, Computer Engineering, Electrical Engineering, Statistics, or Mathematics) are also eligible to apply provided that they might have to take the following deficiency courses.

Deficiency Courses:
1. Programming Fundamentals (Core Programming Course)
2. Data Structures & Algorithms OR Design & Analysis of Algorithms
3. Database Systems

GRE or GAT (General) or HAT relevant is mandatory for MS students with a minimum 50% score.

Master of Science in Data Science (MSDS)

Core Courses
1. Statistical and Mathematical Methods For Data Science
2. Tools and Techniques in Data Science
3. Machine Learning

Specialization Core Courses (Choose any 2)
1. Big Data Analytics
2. Deep Learning
3. Natural Language Processing
4. Distributed Data Processing

Elective courses:
- Advanced Computer Vision
- Algorithmic trading
- Bayesian Data Analysis
- Big Data Analytics
- Bioinformatics
- Cloud computing
- Computational Genomics
- Data Visualization
- Deep Learning
- Deep Reinforcement Learning
- Distributed Data Processing and Machine Learning
- Distributed Machine Learning in Apache Spark
- High-performance computing
- Inference & Representation
- Natural Language Processing
- Optimization Methods for Data Science and Machine Learning
- Probabilistic Graphical Models
- Scientific Computing in Finance
- Social network analysis
- Time-series Analysis and Prediction

Fee Structure*

	Pakistani Nationals	Foreign Nationals
Application Processing Fee:	Rs. 1,500	US$ 45
Admission Fee:	Rs. 20,000	US$ 500
Security Deposit (refundable):	Rs. 10,000	US$ 330
Student Activity Charges:	Rs. 1000	US$ 30
Tuition Fee per semester:	Rs. 66,600	US$ 1,530
Tuition Fee (Per Semester) after 10% Subsidy:	Rs. 59,940	US$ 1,377

(full load of 3 courses per semester)

*SZABIST reserves the rights to revise the fees/withdraw of scholarship without any prior notice

MS (Computer Science)

MS (Computer Science)

SZABIST offers MS (CS) degree in three domains: Core Computer Science area and in two specialization tracks, i.e., Software Engineering (SE) and Networks and Security (N&S). Students are required to complete 3 focused courses in any specific domain.

The program is of 2-year duration and is offered in the evening. It requires 33 credit hours to complete. Student has the option to complete MS through course work only or with research. If student opts for course work only, he/she is required to complete 11 courses of 3 credit hours each. Else, the student is required to complete 9 Courses (27 credit hours) and Two Independent Research Study (6 credit hours) OR One Thesis (6 credit hours). The maximum time limit to complete the MS degree is four years.

Admission Requirements

Eligibility for this program is a 4-year BS (CS) or 2-year MCS degree from a recognized institution. The candidates with a 4-year professional degree (BE, MSc, etc.) may also apply but will require to complete deficiency conversion courses (up to 12 credit hours courses to be determined in consultation with Program Manager). The programs such as BSCS, BSIT, BSSE, BSCE & BSCSE shall not require any extra courses. All MS students are required to clear GRE or GAT General test or HAT relevant with a minimum 50% score.

Last Degree verification from Higher Education Commission (HEC) is required.

Fee Structure*

		Pakistani Nationals	Foreign Nationals
Application Processing Fee	:	Rs. 1,500	US$ 45
Admission Fee	:	Rs. 20,000	US$ 500
Security Deposit (refundable)	:	Rs. 10,000	US$ 330
Student Activity Charges	:	Rs. 1000	US$ 30
Tuition Fee per semester	:	Rs. 66,600	US$ 1,530
Tuition Fee (Per Semester) after 5% Subsidy	:	Rs. 63,270	US$ 1,455
(full load of 3 courses per semester)			

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Master of Science in Computer Science

Core Courses
Research Methodology
Advanced Algorithms Analysis
Theory of Computation
Advanced Operating Systems
Advanced Computer Architecture

Courses for Specialization:

Computer Science (CS)
Real-Time Systems
Digital Image Processing
Machine Learning
Data Mining
Operation Research
Expert Systems
Reverse Engineering
Digital Forensics and Malware Analysis
Advanced Resource Sharing Architecture
Computer Vision
Robotics
Advanced Database Design
Distributed Computing
Systems and Network Programming
Deep Learning
Big Data Analytics
Natural Language Processing

Software Engineering (SE)
Software Requirement Engineering
Software System Architecture
Software System Quality
Advanced Software Engineering
Software Analysis and Testing
Web Engineering
Software Project Management

Networks & Security (N&S)
Advanced Computer Networks
Network Security
Applied Cryptography
Information Security
Wireless Sensor Networks
Telecom Policies and Regulations
Mobile Ad-hoc Networks
Advanced Data Communications
Cyber Security
Advanced Ethical Hacking
Advanced Routing and Switching

PhD (Computing)

PhD (Computing)

SZABIST offers a PhD Degree in Computing that can be completed during the evenings in three years after the MS degree. 6 PhD courses and dissertation are required to graduate. A total of 48 credit hours must be completed.

Specializations of Study

Specialized areas include Database Engineering, Data Warehousing & Mining, Networking & Communication, Business Intelligence, Process Modeling, Telecommunication, Mobile Communication, Mobile Computing, Artificial Intelligence, Software Engineering, Agent Systems, Multimedia & HCI Systems, Speech Recognition, e-Business and Technology Management, Intelligent Systems, Mechatronics, Machine Vision Image Processing, MIS and any other area which falls within the purview of Computer Science/Computing.

Research

SZABIST strongly encourages the publication of research findings of Independent Studies, Thesis and Dissertation in research journals and conferences. SZABIST also publishes its own research journals.

Admission Requirements

For admission in the PhD program, the candidate must have a 17.5 years of education in a relevant field with minimum 60% marks/ CGPA 3.00 from an HEC recognized institution. GRE/GAT (subject) with minimum 60% score is also required.

Last Degree verification from Higher Education Commission (HEC) is required.

Fee Structure*

		Pakistani Nationals	Foreign Nationals
Application Processing Fee	:	Rs. 1,500	US$ 45
Admission Fee	:	Rs. 20, 000	US$ 500
Security Deposit (Refundable)	:	Rs. 10,000	US$ 330
Student Activity Charges	:	Rs. 1000	US$ 30
Tuition Fee per semester	:	Rs. 72,900	US$ 1,665

(full load of 3 courses per semester)

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PhD (Computing)

COURSES

Following is a tentative list of course offerings for the PhD degree program at SZABIST.

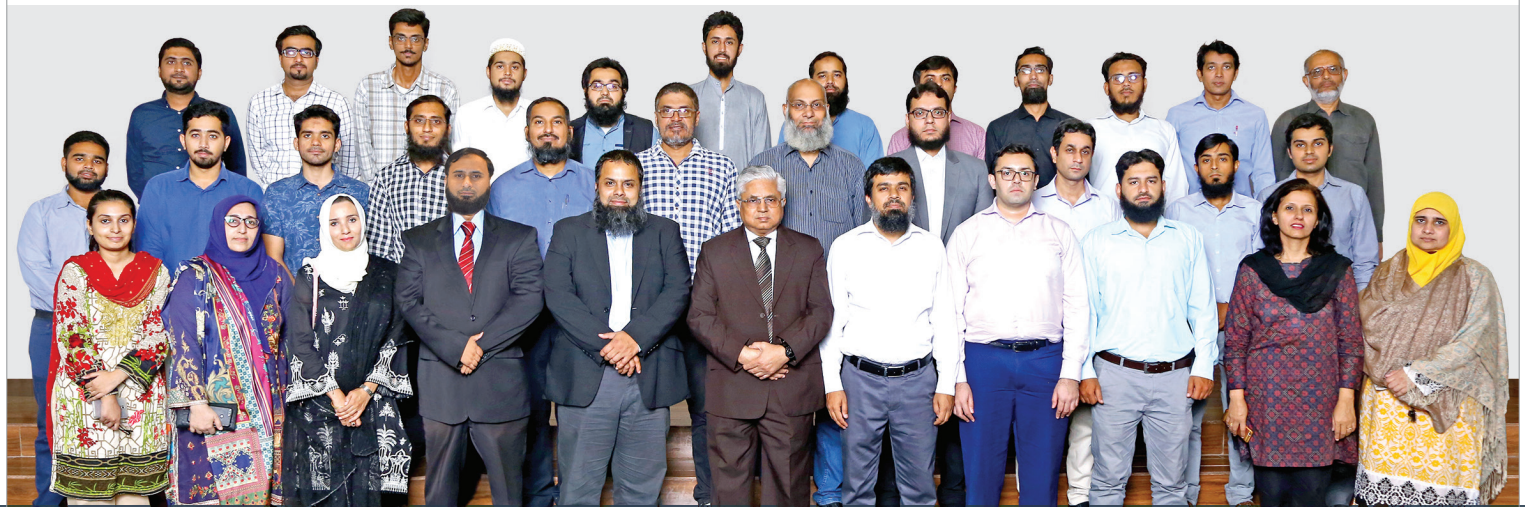Elective courses are offered from the specialized areas of study listed above, subject to minimum enrollment condition

Independent Research Study
Electives-I, II, III, IV
Dissertation
(for Electives, see specialized courses)

Shaheed Zulfikar Ali Bhutto Institute of Science & Technology

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