LUMS
A Not-for-Profit University

Learning Without Borders

IMAGINE YOUR FUTURE

MS DIGITAL AND EMBEDDED SYSTEMS

Syed Babar Ali School of Science and Engineering

CREATING IMPACT THROUGH RESEARCH

The Syed Babar Ali School of Science and Engineering (SBASSE) at LUMS is taking strides in improving teaching and learning, while celebrating the novelty of research. SBASSE, through innovative and impactful contributions to science and technology, is nurturing future leaders with the potential to impact society.

SBASSE offers undergraduate, graduate and doctoral degrees in a wide range of disciplines. The MS programmes at SBASSE are rigorous and designed to impart specialised professional and research-oriented training to students. To graduate, students must accumulate a total of 30 credit hours either entirely from coursework, or by completing 24 credit hours from coursework and 6 from research work/thesis. Thus all SBASSE departments offer two options to choose from: MS-by-Coursework or MS-by-Thesis.

The SBASSE PhD programmes prepare students to think scientifically and conduct high-quality research independently. Major milestones that must be achieved for the successful completion of the PhD degree include the Coursework, Comprehensive (Qualifying) Examination, Thesis Proposal Defense, at least one peer-reviewed journal article and PhD Thesis Defense.

During the course of study, student learning takes place through lectures, tutorials, laboratories, problem-solving exercises, research projects and frequent interaction with experienced, world-class faculty members.

WHY CHOOSE SBASSE

QS World University
Rankings by Subject

#301-350 Computer Science and Information Systems
#351-400 Engineering – Electrical and Electronics
#401-450 Engineering and Technology
#501-550 Physics and Astronomy

KEY INITIATIVES

SAVING OUR CITIES - A CROSS-DISCIPLINARY NEW CENTRE FOR URBAN INFORMATICS

The Centre for Urban Informatics, Technology, and Policy (CITY) is promoting sustainable urban development in developing countries, including reducing the risks of climate change, minimising waste and pollution, and promoting equity and social inclusion through technological innovations and policy frameworks.

WRITING PRIZES AND TECHNICAL WRITING COURSE

SBASSE aims to celebrate exceptional written accounts of final-year projects and dissertations through the Sir Sayyid Ahmad Khan and Jacob Bronowski Writing Prizes. In addition, technical writing courses are available throughout the year to help students improve their scientific writing skills.

SCIENTIFIC COMPUTING FOR RESEARCH

The School is enriching research through scientific and resource-intensive computing facilities offered in our high-performance computing labs.

THE CENTRAL LAB

The Central Lab is a premium laboratory and research space for high-end characterization and analysis for academia and industry within the country. It offers state-of-the-art equipment such as a 600 MHz NMR spectrometer, a physical properties measurement system that operates at temperatures as low as 5 K, inductively coupled plasma mass spectroscopy, photolithography, and field emission scanning electron microscopy facilities.

WORLD-CLASS LAB INFRASTRUCTURE

The School offers smart experimental research including power electronics, ultrafast optics, photonics, spintronics, and more.

CLOUD CLASSROOMS

The Cloud Classrooms provide an immersive learning experience that blends virtual and real-world learning, featuring technical capabilities such as roving cameras, instructor-controlled zoom, full wall projection, and multi-view recording and display.

OCCUPATIONAL HEALTH AND SAFETY

Occupational Health and Safety is promoting health, safety, environmental protection, and regulatory compliance through comprehensive services, which include mandatory online safety trainings.

ENTREPRENEURSHIP

SBASSE promotes entrepreneurship in education through design projects and mentorship in collaboration with the National Incubation Centre in Lahore.

LEARNING WITHOUT BORDERS

Research and teaching at LUMS truly offers its community 'Learning Without Borders' by breaking academic, geographic and socio-economic barriers to make education accessible to all. The University continues to be an intellectual hub, rich with varying perspectives and transformative ideas. With an environment brimming with inclusion, unity, and boundless knowledge, learning continues in and beyond the campus walls with the aim to develop innovators, leaders and change-makers who can contribute to the community and build strong borderless networks.

TOP QUALITY PUBLICATIONS

SBASSE faculty continue to produce top-quality work for the world's leading research journals.

RECOGNITION OF TOP RESEARCH THROUGH SYED BABAR ALI RESEARCH AWARDS (SBARA)

These Awards recognise PhD students. The winners, called the Syed Babar Ali Fellows, are selected for the novelty of their research work, and the potential for lasting impact to their disciplines and the society.

MS
DIGITAL ANDEMBEDDED SYSTEMS

How will you launch your new world?

The MS DES programme, a one-of-its-kind, has been designed by incorporating the local rising industry needs and is aimed to train students in the design of digital integrated circuits (ICs) using industry-standard IC design tools and methodologies. In parallel, it will enable the students for design and development of the ever-evolving field of Embedded Systems. Students enrolled in the programme will complete the full design cycle - from specification to design - of low-to-high-complexity systems as part of their course work. Graduating students would be able to work in the national and international embedded and digital IC design industry and help bridge the skill gap in this industry that exists between Pakistan and the developed world.

What will your new world invent?

The Electrical Engineering department has gradually grown to 21 Faculty Members, full-time PhD faculty members who teach and direct research. The following table maps different labs/clusters, and faculty on the themes discussed above:

Themes	Labs/Clusters	Associated Faculty
Data (AI Hardware and Theoretical Foundations)	Electronics and Embedded Systems Lab	Dr. Muhammad Adeel Pasha, Dr. Muhammad Jahangir Ikram, Dr. Shahid Masud, Dr. Muhammad Awais Bin Altaf & Dr. Wala Salem Mustafa Sadeh
	Smart Data, Systems, and Applications (SDSA) Lab and Signal, Image and Video Lab	Dr. Zubair Khalid, Dr. Muhammad Tahir, Dr. Momin Ayub Uppal & Dr. Nadeem Ahmed Khan
	Cyber Physical Networks (CyPhyNet) Lab	Dr. Abubakr Muhammad & Dr. Hassan Jaleel
	Clinical and Translational Imaging Lab	Dr. Hassan Mohy-ud-Din
	Networks and Communications Lab	Dr. Zartash Uzmi & Dr. Tariq Jadoon
Life (Biomedical Devices and Point-of-Care Healthcare)	Semiconductor and Nanoelectronics Devices Lab	Dr. Nauman Zafar Butt
	Electronics and Embedded Systems Lab	Dr. Muhammad Awais Bin Altaf & Dr. Wala Salem Mustafa Sadeh
	Clinical and Translational Imaging Lab Signal, Image and Video Lab	Dr. Hassan Mohy-ud-Din & Dr. Nadeem Ahmed Khan
	Bio-Agri Photonics Lab	Dr. Muhammad Imran Cheema
Sustainability (Systems View of the Water-Energy-Food Nexus)	Semiconductor and Nanoelectronics Devices Lab	Dr. Nauman Zafar Butt & Dr. Abubakr Muhammad
	Centre for Water Informatics and Technology (WIT) and CyPhyNet Lab	Dr. Abubakr Muhammad & Dr. Hassan Jaleel
	Energy and Power Systems Lab	Dr. Hassan Abbas Khan & Prof. Nauman Ahmad Zaffar
	Centre for Water Informatics and Technology (WIT)	Dr. Abubakr Muhammad
	Advanced Communications (AdCom) Research Lab	Dr. Naveed Ul Hassan & Dr. Ijaz Haider Naqvi

How will DES help you realise your ambition?

The Electrical Engineering department is internationally reputed, providing a research environment supported by international collaborations, and comprises highly skilled faculty. The students inducted in the MS DES programme will have an enriched academic experience where after completing their core course work requirements, they can choose to take courses from different application areas including,

- Robotics and Intelligent Systems
- Multimedia and Image Processing
- Machine Learning, Deep Learning and AI
- Electrical Power and Energy Systems

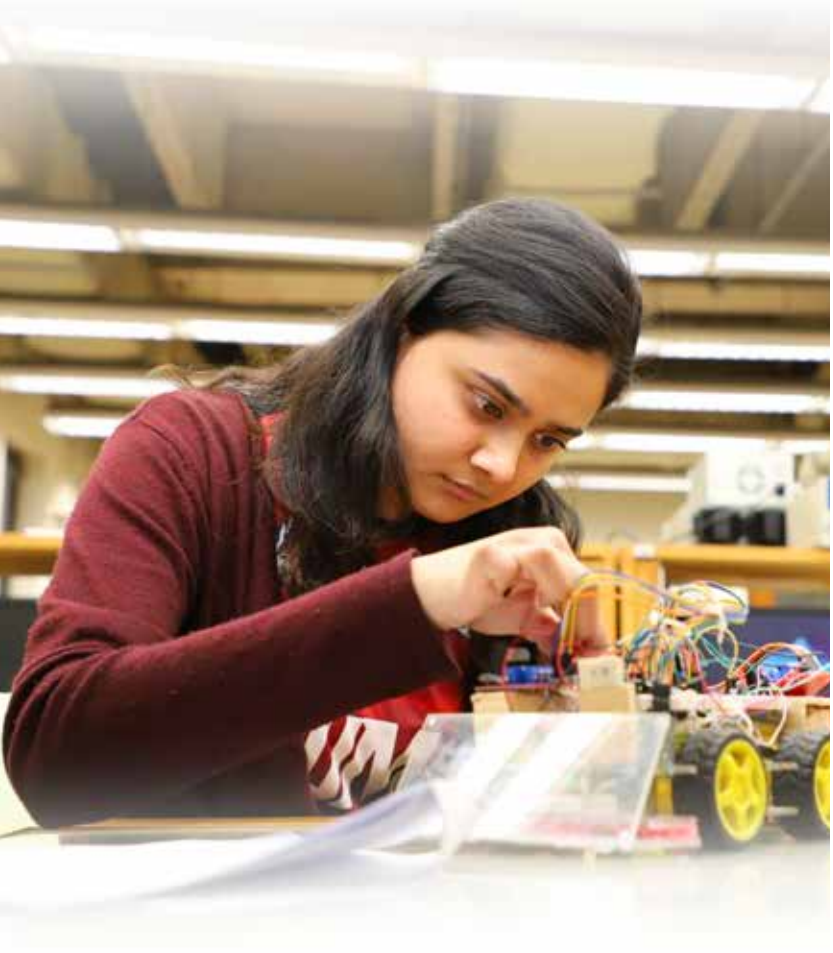
Embrace the DES experience

- The Electrical Engineering department provides an excellent opportunity for graduate research; together faculty and students have published 305 Journal papers from 2018-2021, the highest number across LUMS.
- Dr. Adeel Pasha, Dr. Shahid Masud, and their PhD student, Fatima Hameed Khan have recently published their research in the Special Issue prestigious Elsevier Computer and Electrical Engineering, a leading journal in the field. The special issue was focused on the design of digital VLSI circuits for AI applications.
- Dr. Awais Bin Altaf and his PhD student, Abdul Rehman Aslam have recently published their research in IEEE Transactions on Biomedical Circuits and Systems, a leading journal in the field. Mr. Aslam has also been selected for the IEEE Circuits and Systems Society Pre-Doctoral Award.
- Dr. Adeel Pasha's PhD graduate, Dr. Saad Zia Sheikh has joined Bosch Rexroth Germany as an Embedded Systems Software Developer. He is working on providing safety-critical solutions for the next-generation real-time industrial controllers.
- While at LUMS, Dr. Saad Zia Sheikh has produced an amazing body of research work while developing energy-efficient real-time scheduling solutions for multicore architectures. He has published in the world's leading journals on the topic, including IEEE Transactions on Parallel and Distributed Systems, ACM Transactions on Embedded Computing Systems, and IEEE Letters of the Computer Society.
- Dr. Zubair Khalid has been elected to the editorial board of IEEE Signal Processing Letters as an Associate Editor.
- Dr. Adeel Pasha has been elected as the Chair of Membership Development at the IEEE Lahore Section which is the oldest and the largest section of the IEEE society in Pakistan.

DR. MUHAMMAD SABIEH ANWAR

Dean and Professor, Syed Babar Ali School of Science and Engineering

"The graduate programmes in science and engineering at SBASSE, LUMS are poised to make an impact. Our deepest impact as an institution would truly be made by the research that emanates from our graduate education and the research that it propels. We are committed to providing a collegial, rigorous and progressive research milieu that triggers the thirst for knowing more and seeking the truth, and in the process, creating tools, gadgets, machines and ideas that address the human condition and global issues. We promise that our graduate programmes will make you ride through the two extremes of the microcosm and the macrocosm, the ideal and the practical, the abstract and the tangible. Welcome to the Syed Babar Ali School of Science and Engineering!"



YOUR JOURNEY BEGINS HERE!

Admission Criteria for Local and International Students

Admission is purely merit-based and rests on the following criteria:

MS Programme

- Academic Record
- Performance in Admission Tests
- Application Review
- Submission of complete online application, application processing fee and supporting documents by the stipulated deadline
- Interview Performance (if needed)
- Letter of Recommendation

Scan for more information

PhD Programme

- Academic Record
- Performance in Admission Tests
- Application Review
- Research Statement
- Submission of complete online application, application processing fee and supporting documents by the stipulated deadline
- Letters of Recommendation
- Interview Performance (if shortlisted)

Note: This is the minimum criteria that applicants need to fulfil in order to be eligible to apply. Fulfilment of this criteria does not guarantee admission to LUMS.

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DR. MOMIN UPPAL

Associate Professor and Chair, Department of Electrical Engineering

"The Department of Electrical Engineering is the largest and most complex operation at SBASSE comprising the biggest group of faculty, numerous labs and facilities, a large body of hard-working students and dedicated staff members. Electrical Engineering is the engine that drives the information and intelligence revolutions; it is the inspiration for synthetic biology and neuroscience; it is the instrument of scientific discovery in Physics and Chemistry; it is the user and generator of the deepest results in Mathematics. Our faculty and students build advanced communication systems, design hardware for intelligent systems, conceive renewable energy solutions, study biomedical devices and invent smart systems for the manufacturing industry and agriculture."

Admission Criteria for Phd Programme for Foreign Nationals

SBASSE's PhD application for foreign nationals caters to applicants who currently reside outside Pakistan and have a foreign nationality.

All other applicants (i.e. those who have dual nationality, are Pakistani nationals, or are overseas Pakistanis) are required to apply through the regular admission application.

Admission is purely merit-based and rests on the following criteria:

- Academic Background
- Research Background
- Online Test and Interview (if shortlisted)

In order to study at LUMS, foreign nationals must obtain a 'Study Visa' from the Pakistani Embassy/Consulate working in their country. The Pakistani Embassy/ Consulate will only issue a Study Visa for students' stay at LUMS upon receipt of Higher Education Commission (HEC), Pakistan's 'No Objection Certificate' and clearance from the Ministry of Interior, Pakistan.

For the issuance of Visa, students must submit relevant documents to the LUMS Admissions Office through postal mail/courier service by the stipulated deadline.

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FINANCIAL SUPPORT FOR LOCAL AND INTERNATIONAL STUDENTS

Admission to all LUMS programmes is purely on merit and independent of students' ability to pay the related tuition fees. Once a student has been admitted to a programme, there are several mechanisms in place to provide financial support based on need and merit. All awards are reassessed each academic year based on performance, need, available resources and prevailing University policies. LUMS is committed to providing as much financial assistance as possible within the limits of its available resources. Nevertheless, the University may not be able to meet all requests for financial assistance, and it is strongly recommended that applicants secure as much of their own funding as possible. Several funding opportunities are available to deserving MS and PhD students. These include:

- Merit Scholarships
- Partial tuition fee waivers for MS Basic Sciences students
- LUMS Interest-free Loan that covers partial to full tuition fee expense (only for local applicants)
- External Scholarships (support and eligibility for these scholarships vary depending on the donor)
- Options to work as Research or Teaching Assistants (subject to availability)
- Full funding for four years of the PhD, which covers tuition, registration, admission fee and a monthly stipend for 4 years

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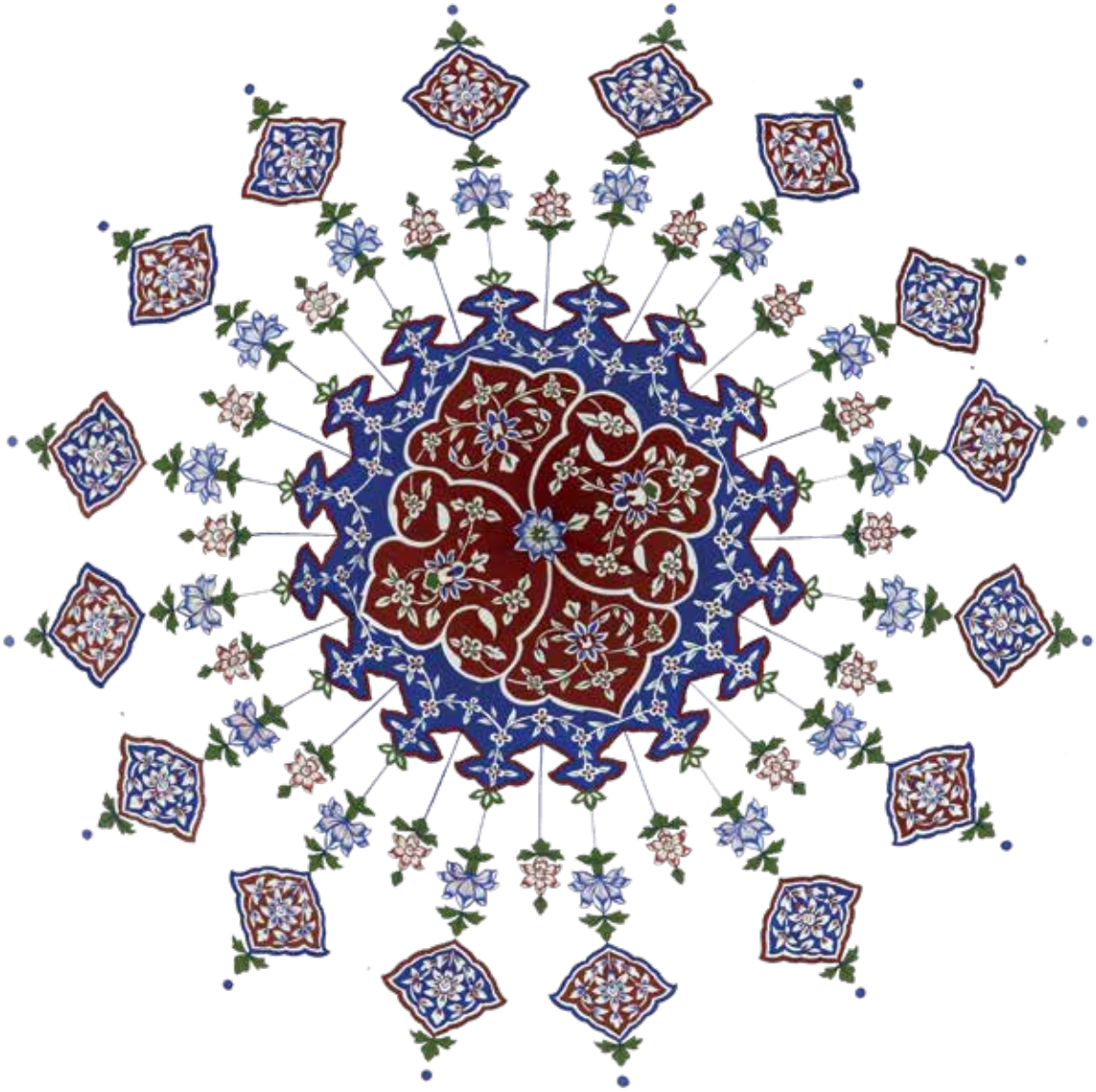
DR. SAAD ZIA SHEIKH

PhD Electrical Engineering 2020

"SBASSE maintains a strong and rigorous research culture allowing students the freedom to explore individual interests and provides specialized skills to tackle the most complex and challenging problems. World-class faculty, compelling focus areas, international collaborations along with the opportunity to work along foreign experts all add to the outstanding university experience."



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